Handbook of Research on Adult Learning in Higher Education

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This chapter provides an overview of the development and mission of community colleges to present the challenges that adult students who attend community colleges often face, and to explore ways that community colleges can help students overcome these challenges. Challenges are often related to other obligations adult students face, financial pressures, geographic location, academic ability, and feelings of not belonging. Community colleges are uniquely situated to address these challenges through programs and practices from beginning orientation, through coursework, and onto graduation. Postsecondary education can lead to employment that can give students the resources they need to improve the lives of their families and communities.

The failure of the American education system to teach African American students has been well chronicled. This chapter draws attention to the history of Eurocentric pedagogy and its ineffectiveness to educate African American students. The principles of Afrocentricity are presented as a plausible way to counter ineffective, hegemonic, and ethnocentric curriculum planning for all students, with particular emphasis on students of color. Differentiated instruction offers adult educators a way to vary instruction and integrate an Afrocentric paradigm and content into student-centered curricula. This chapter concludes with two Afrocentric application activities.

This chapter discussed the importance of physical fitness concerning adult learners' readiness to participate meaningfully in academia. Despite the importance of health-related physical fitness, not many adults seem to have given the issue (physical fitness) the needed attention. The chapter focused on the issues associated with a reduced level of physical activity participation, and the changing modes of transportation, and how the issues could interfere with learning if not addressed — suggestions on how to improve physical fitness while learning constitutes parts of the discussion.

The aviation industry experienced a significant growth over the years. Such growth was supported by a highly knowledgeable workforce, which presented various skills, including problem-solving and decision-making. The need for a highly skilled workforce led an aviation-focused university located in southeast USA to provide students with learning opportunities to hone those skills to succeed in the industry. This chapter explains the process through which those learning opportunities are created.

This chapter presents a compilation of best practices for preparing chemistry curricula and courses that consider the cognitive needs of adult learners. Chemistry instructors at the post-secondary level may receive little guidance on how to meet the needs of adult learners, members of a diverse undergraduate STEM student population. The author illustrates how adult learning theories and chemical education research can be applied to support reentry learners. Some aspects of distance education for adult learners in the sciences are examined, especially the unique challenge of offering laboratory coursework in this setting. The author makes recommendations for supporting faculty who engage in course revision with adult chemistry learners in mind. This chapter is relevant for university-level chemistry faculty, administrators and instructional designers.

This chapter presents the design and development of the competency-building 3D Instructional Video Project intended for developing pre-service teachers' technology integration competency. Unlike traditional projects in educational technology courses that are well defined and structured, involving using an educational tool to complete a task, the 3D Instructional Video Project is a semester-long project requiring pre-service teachers to plan their 3D modeling and printing integrated lesson, explore Tinkercad and design their 3D models, test their 3D models with the Makerbot Desktop, print off their 3D models with a Makerbot 3D printer, and present their 3D modeling and printing integrated lesson planning through a video created with iMovie. This 3D Instructional Video Project engages pre-service teachers in discovery learning and is designed to help pre-service teachers to build their competency for dealing with the constant changing landscape of educational technology and transforming teaching and learning with emerging technologies.

Service-learning has been identified as a high-impact, experiential teaching practice by the Association of American Colleges and Universities. This chapter examines how service-learning (SL) initiatives at one public institution of higher education allowed students opportunities to give back to their community while gaining valuable adult learning experiences. Three cases are presented describing how graduate and undergraduate students (N=229) enrolled in one of four courses (Political Science, Special Education, Early Elementary Education, and Business) incorporated a service-learning component for relevant and purposeful adult learning outcomes. Following the presentation of each of these cases of service-learning, a cross-case analysis and key terms and definitions are offered.

Preface

Adult education has continued to gain momentum since its inception and has become a recognized academic discipline that encompasses different subject areas. An examination of adult education and its methodologies in designing and presenting instruction are of interest to educators, professionals, researchers, and practitioners. This *Handbook of Research on Adult Learning in Higher Education* is about adult learning in higher education and the application of learning theories and instructional technologies in different course designs and delivery formats (residential, online, and blended). The handbook offers fresh, innovative narratives and insightful ideas on adult learning. It discusses factors that facilitate effective instruction for adult learners. It uses case studies to demonstrate best practices to engage adult learners. The focus of the handbook is to use emerging technologies, data, and artefacts to expand the understanding of adult education. The handbook also examines research in adult education from various disciplines. While there are many books on adult education, however, this handbook is unique because it offers a different perspective in adult teaching and learning. It provides abundant resources to engage adult learners using enhanced technologies and digital theories. The handbook offers strategies and research reports for developing and delivering adult instruction with practical activities, including visual and interactive technologies. It provides a detailed interpretation of pedagogy and andragogy to illustrate the characteristics which both theories share. The aim is to show that both pedagogy and andragogy can be used to support effective instruction for both children and adult learners.

Adult education is a universal phenomenon and has made an impact on different academic and non-academic programs delivered online and face-to-face, including blended and hybrid platforms. The term adult education in higher institutions of learning refers to teaching and learning beyond secondary school education. It embraces diverse subject disciplines that higher educational institutions offer. Knowles (1980) described some of the characteristics of an adult learner, which include self-directed, problem-based, experiential, and relevance-based learning. Successful adult learning involves being innovative, inquisitive, and forward-looking in anticipation of emerging or shifting paradigms and instructional technologies. By being forward-looking, the adult learner will be in a state of readiness by engaging in life-long learning. Therefore, it is necessary that adult learners receive the best training in instructional design strategies, instructional delivery, and research methodologies in adult education. The current handbook is designed to translate strategy and research products into best practice models. The nature of adult education, with its broad-spectrum, provides a platform that influences a myriad of subject areas and disciplines which is discussed in this handbook.

The handbook traces the emergence of adult education, examines the economic and social rationale, including the ideological assumptions that inform adult education. The idea is to help the reader understand the history and evolutionary changes in adult education. The underlying assumption that galvanized the inception of adult education is rooted in the ideology which invokes people's consciousness about social justice and economic engagement. Adult education has transformed from its modest and humble beginning to be a recognized program of study in higher education. Despite the recognition given to adult education as a program of study, its definition remains a conjecture because it (adult education) tends to be defined according to the roles it plays within a given context.

Merriam and Brockett (2007) defined adult education as "a practice in which adults engage in systematic and sustained self-educating activities to gain new forms of knowledge, skills, attitudes, or value" (p. 7). The definition of Merriam and Brockett depicted the essential characteristics of adult education. Nevertheless, it failed to recognize adult education as a concept of ideas and a methodological approach for teaching and learning. These constructs form the discussion in the handbook. Holmes and Abington-Cooper (2000) posed questions regarding the meaning of adult education. The authors (Holmes and Abington-Cooper) asked, "whether adult education has an identifiable form and substance, or does it permeate through the environment like air? Is adult education a practice or a program?" These rhetorical questions are meant to emphasize the elusive nature of adult education as a concept as well as its abstract nature. Adult education can represent an idea (methodology) and practice (adult learning activities/contents). Mohring (1989) argues that Knowles (1980) attempted to redefine the relationship between andragogy and pedagogy, making the meaning of andragogy less clear. Knowles's earlier position is that andragogy is explicitly for adults and pedagogy for children, which suggested that a dichotomy exists between andragogy and pedagogy.

Madwitz and Bayor (2013) contended that "workforce is one of the bedrocks of not only the American middle class but also the US economy as a whole." In effect, adult education provides the training to equip adults with the knowledge and skill for economic sustenance and growth. The handbook demonstrates the use of various emerging technologies and current theories in developing and presenting adult learning programs. It (the handbook) provides inventive approaches for developing instruction in a manner that reflects relevance to the learning goals of the adult learners. Adult education represents an essential channel for adults and non-adults (adolescents) to acquire new knowledge and skill to meet their professional and personal goals. It represents an avenue for adults to update their current knowledge and technological competence as well as help them to remain competitive in the job market for upward social and economic mobility. It (adult education) provides information to help adults keep abreast of information and connect through social media and information technology. Formal and informal involvement in adult education programs allows adults to be globally connected, share ideas, and learn from each other. The effectiveness of adult learning is, in part, a determination of the practitioners' ability to adapt to changes in new knowledge formation and technological innovation.

The discipline of adult education as an organized body of knowledge continues to evolve and change. Therefore, adult educators must develop a mindset necessary to adapt to changes as they occur to enable them to remain current in their teaching contents and methodologies. It is imperative for adult educators and professionals, including researchers and students, to strive to seek ways to improve the design and delivery of adult education programs in a manner that is responsive to the American workforce. This handbook provides insights and examples on strategies, practices, and materials from various academic disciplines dealing with the design and implementation of adult education program in online and face-to-face as well as in blended platform.

The general assumption is that andragogy is an adult learning strategy. However, this handbook is critical that andragogy as a learning strategy is exclusively reserved for adult learners, while pedagogy focuses on non-adult learners (children). The position taken in this handbook supports the narrative that non-adult learners can benefit from andragogical learning principles. The report of a case study included in this handbook provides information on adults' preferred instructional methods. The handbook contains methods of presenting instruction to adults in higher education based on research and theoretical constructs. Some of the topics covered in this handbook include an integrated model of a strategic discussion forum, simulation based-learning, gamification and adult learning, social media-based instruction, backward design strategy, project-based learning, including the use of podcasts in online learning, and the 3D modeling learning approach. Additionally, the handbook includes a discussion of connectivism and heutagogy.

The American population is changing because of the various factors such as migration, globalization, changes in knowledge production, and emerging technology. Adult education practitioners have the responsibility to train the new migrants and help to assimilate them into the community and prepare them for higher learning in institutions of higher education in the US. Evolving immigration policies also continue to shape and re-shape the design and delivery of adult education programs. Adult educators and program designers must be prepared to design productive learning activities for adults who are interested in changing careers by aspiring to expand and update their knowledge and skills. Given the transformative nature of society, adult education practitioners tend to play "catch-up" in their effort to address changes brought about by emerging new knowledge and research productivity. Globalization plays a significant role in adult education, which forces instructional designers, adult educators, and practitioners to address differences among students using multicultural education strategies to accommodate cultural differences. All the emerging issues mentioned above pose challenges for adult educators as they attempt to design adult education programs to address the related problems in society.

This handbook is a valued resource and an excellent reference material that will be beneficial to adult educators and practitioners, including researchers from different disciplines in higher education. In general, professionals in various fields of higher education will benefit from the valuable dialogue contained in this handbook. Each chapter contains application activities/scenarios to help teachers engage students through discussion, practice exercise, demonstration, problem-solving, 3D modeling learning approach, and small group activities. The application activities/scenarios will help teachers evaluate students' understanding of each chapter and assist them (students) in applying the newly acquired knowledge to promote transfer learning. Lifelong learners who want to improve their understanding of adult education and gain insight into various innovative learning strategies will find this handbook a useful reference for expanding their repertoire of knowledge and keep abreast of advances in knowledge production and emerging technologies. This handbook documents innovative ideas, expertise, experience, including the technological skill of the contributing authors. Some of the topics contained in this handbook include the following:

- Foundations of Adult Education and the Principles of Andragogy
- Emerging theories in Adult Education
- Emerging Trends and Issues in Adult Education
- The Changing Characteristics of Adult Learners
- Online Learning and Effective Use of Online Discussion
- Virtual Reality
- Gamification
- Simulation in Adult Learning
- 3D Modelling Learning Approach

- Designing and Delivering Instruction for Adult Learners
- Technology and the Transformation of Adult Education
- Professional Development and Adult Learning
- Engaging Adult Learners through Community-based practice
- Service Learning for Adult Learners
- Challenges and Issues in Adult Education
- Case Studies in Adult Learners

Chapter 1 examines the concept of adult education by analyzing its emergence as an academic discipline and assesses the philosophical ideologies through which it finds expression. It provides a critical review of andragogy as a framework for examining its perception as a teaching method exclusively for adult learners. The chapter reveals that andragogical principles can be used to develop learning strategies to support instruction for both children and adult learners. The assumption that pedagogy is exclusively reserved for teaching children is critically assessed. To demonstrate that adults learn from instructional strategies that are supported by both pedagogical and andragogical principles, a case study is carried out. The conclusion is that adults learn from similar methods as much as children. It indicates that the distinction between pedagogy and andragogy as principles of learning is somewhat spurious. The chapter discussed strategies for using digital theories to facilitate instruction.

Chapter 2 presents blended learning as an emerging approach to distance education that has gained increasing acceptance by faculty in higher education. This chapter presents an innovative approach to blended learning conceptualized as Blended Plus. This approach empowers students to choose how they prefer to interact with instruction within a course.

Chapter 3 describes a model for leveraging community engagement to support learning in higher education institutions. The model capitalizes on bi-directional and mutually beneficial school-university-community partnerships. It purposefully attends to local societal problem-solving. The model uses collaborative and problem-based learning as pedagogical approaches to promote interdisciplinary learning in and about the local and regional community.

Chapter 4 explores how adults think, learn, and apply knowledge in their daily lives to effectively design curriculum, create activities, and integrate valuable technology into the course design. The chapter summarizes adult learning theories, including self-directed, transformative, and experiential learning, as well as the concept of andragogy. It provides instructors with practical tools and methodologies which may be used to produce viable adult learning experiences.

Chapter 5 deals with a senior design project in urban engineering. A top design course in an urban engineering technology (ET) program was examined to propose accelerated project-based learning. This mixed-methodology research resulted in an accelerated PBL model geared to significant time, cost, and quality efficiencies in rapidly evolving, technological environments for optimal outcomes in 21st century higher education. The study concluded that this A-PBL model could also minimize the employment gap and fuel self-motivation.

Chapter 6 provides an overview of the development and mission of community colleges, including the challenges that adult students who attend community colleges face. The chapter also explores the ways that community colleges can help students overcome these challenges. Challenges are often related to other obligations adult students face, financial pressures, geographic location, academic ability, and a sense of isolation.

Chapter 7 draws attention to the history of Eurocentric pedagogy and its ineffectiveness to educate African American students. The principles of Afrocentricity are presented as a plausible way to counter ineffective, hegemonic, and ethnocentric curriculum planning for all students, with emphasis on students of color. Differentiated instruction offers adult educators a way to vary instruction and integrate an Afrocentric paradigm and content into student-centered curricula. This chapter concludes with two Afrocentric application activities.

Chapter 8 discusses the importance of physical fitness concerning adult learners' readiness to participate meaningfully in academia. It is believed that despite the importance of health-related physical fitness, not many adults seem to have given the issue (physical fitness) much attention. The chapter focuses on issues associated with a reduced level of physical activity and modes of transportation and how these issues interfere with learning. The authors suggest strategies for improving physical fitness and its connections to adult learning.

Chapter 9 describes how the aviation industry experienced significant growth in the student population. Such growth was supported by a highly knowledgeable workforce, which presented various skills, including problem-solving and decision-making. The need for a highly-skilled workforce led an aviation-focused university located in the southeast of the USA to provide students with learning opportunities to hone those skills in order to succeed in the industry.

Chapter 10 provides a comprehensive review of the literature on the lived experiences of instructional designers from different sectors. The chapter examines prior research and highlights the significance of reviewing the competencies and standards developed by professional organizations within the field.

Chapter 11 considers the functions of online discussion and concludes that discussion alone does not guarantee deep and lasting learning. The discussion should be rooted in a sound andragogical design practice to promote meaningful learning. Online discussion requires effective instructional design to engage adult learners and help them to achieve the desired learning outcomes.

Chapter 12 chapter examines empirical research on online discussion strategies to develop a coherent, integrated model of online discussions. The literature on online discussions reveals that distance educators do not know how to design and facilitate online discussions. The chapter proposes an integrated model of online discussion to address the problem. The model provides instructional designers, faculty developers, and instructors with a coherent framework for designing, facilitating, and participating in online discussions to meet the diverse needs of adult learners.

Chapter 13 examines how second-career teachers' prior experience impacts student success. Through a review of research literature, this chapter explores second-career teachers' ability to draw from their accumulated knowledge, experience and wisdom to enrich classroom instruction, and the impact such experience has on students' success. This chapter also examines the relevance of transformative learning theory, constructivist learning theory, and Maslow's hierarchy of needs theory to a second-career teacher experiential approach to teaching and the impact such experience has on the students' success.

Chapter 14 explores how current approaches to English Language Learner Education frequently suffer from the erroneous assumption that students are somehow academically deficient. Consequentially, higher education institutions in America neglect issues that impact English Language Learners. By examining and discussing existing approaches, this chapter highlights specific shortcomings and offers more effective solutions in order to understand English Language Learners better.

Chapter 15 discusses the use of simulation in higher education, particularly in engineering, business, and health care disciplines. The authors have identified three simulation types in terms of learning outcomes: single skill building, role play or skill-building in a simple context, and comprehensive scenario-based simulation. The observation is that simulation is beneficial to student learning in all disciplines.

Chapter 16 deals with chemistry instructors at the post-secondary level focusing on who teach diverse undergraduate STEM student population and how instructors receive little guidance on how to meet the needs of adult learners. The chapter explores the unique characteristics of reentry learners. This chapter is written with university-level chemistry faculty and instructional designers in mind. It presents a compilation of best practices for preparing curricula and chemistry coursework that consider the cognitive needs of adult learners.

Chapter 17 presents the design and development of the competency-building 3D Instructional Video Project intended for improving pre-service teachers' readiness for technology integration. Unlike traditional projects in educational technology courses that are well defined and structured, the 3D Instructional Video Project is a semester-long project requiring pre-service teachers to plan integrated 3D modeling and printing lesson. The chapter discusses the design and testing of 3D models as well as specific 3D modeling tools.

Chapter 18 describes service-learning as a high impact experiential teaching practice by the Association of American Colleges and Universities. This chapter examines how service-learning (SL) initiatives at one public institution of higher education gave students opportunities to give back to their community while gaining valuable adult learning experiences. Three cases described how graduate and undergraduate students (N=229) enrolled in one of the four courses (Political Science, Special Education, Early Elementary Education, and Business) incorporated a service-learning component to address relevant and purposeful adult learning outcomes.

Chapter 19 examines the use of social media technologies in adult teaching and learning environments based on a review of scholarly publications. The chapter aims to examine changes in current social media and to better understand the paradigm shift, including the trends and issues pertinent to the application of social media in adult learning.

Chapter 20 discusses the use of podcasts to promote career choices in an online marketing course. The chapter explores how podcasts that included interviews with experts in various marketing fields provide authentic learning opportunities, particularly for addressing the characteristics of Generation Z students. This chapter examines the efficacy of the use of audio recordings as a pedagogical tool for engaging students in both active learning and disseminating information about different career opportunities.

Chapter 21 presents a systematic analysis of published works on utilizing gamification in higher education. The analysis aims at shedding light on the merits and challenges of using gamification in education. The author investigated the studies that tackled the use of gamified learning in various educational contexts. Results of this systematic analysis showed that the use of gamification in higher education is associated with three main elements: pedagogy, design, and behavior.

Chapter 22 discusses various methods and technological tools which are used to meet the unique needs of adult learners. One of the methods is gamification, in which game elements and mechanics are utilized within a non-gaming context. This study reviewed the current literature and to present an overview of the implementation of gamification in the adult learning process.

Chapter 23 deals with the integration of technology in the classrooms. However, little has been written about the human side and how the widespread use of technology changes students' expectations, the instructor's approach to teaching, learning satisfaction, and students' ability to apply what they have learned to future coursework and improve their use of technology generally.

Chapter 24 focuses on how Virtual Reality (VR) can be used to educate students in a variety of disciplines. This chapter includes a synthesis of the literature on the use of virtual reality in higher education. The chapter also provides specific examples of virtual reality utilizing specific VR class assignments from multiple universities. The authors suggest ideas for future research and the application of VR inside and outside of the classroom.

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Chapter 1
Foundations of Adult Education, Learning Characteristics, and Instructional Strategies

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ABSTRACT

The chapter examines the concept of adult education by analyzing its emergence as an academic discipline, and assesses the philosophical ideologies through which it finds expression. It provides a critical review of andragogy as a framework for examining its perception as a teaching method exclusively for adult learners. The review reveals that andragogical principles can be used to develop learning strategies to support instruction for both children and adult learners. The unchallenged assumption that pedagogy is exclusively reserved for teaching children is critically assessed. To demonstrate that adults do learn from instructional strategies that are supported by both pedagogical and andragogical principles, a case study is conducted. Adults learn from similar methods as much as children. It indicates that the distinction between pedagogy and andragogy as principles of learning is somewhat spurious. The chapter discussed strategies for using digital theories to facilitate instruction.

INTRODUCTION

This chapter examines the concept of adult education by exploring its emergence and its application in teaching and learning. The position taken in this chapter is that the early introduction of adult education is rooted in the political and economic empowerment of the underprivileged members of the society. Adult education, like some theoretical concepts, is embedded in some social and economic programs, which include social capital, social justice, civil society, and community engagement. The relationship between adult education, on the one hand, and social capital, as well as civil society, on the other hand,

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are explored to accentuate its (adult education) philosophical base. Examining the historical underpinning of adult education and its ascendancy to a program area of study constitutes a part of the dialogue in this chapter. Most literature on adult education views it (adult education) primarily from the framework of the advanced economies with minimal recognition that it is a universal phenomenon. In developing countries, adult education represents a channel through which people transmit cultural heritage from one generation to the other, including providing knowledge and skill for the workforce. The argument in this chapter is that adult education and its methodologies are not peculiar to specific economies (industrialized nations).

Adult education is practiced globally and has a widespread application. The belief is that the evolution of adult education is about future progress in society (Nurullah and Naik, 1951). The US, 1984 Adult Education Amendments Act is designed "to expand the purpose of adult education by including the new national priority on literacy. The goal of the Amended Act is to "enable all adults to acquire basic literacy skills necessary to function to reemphasize the importance of literacy. The rationale of the Amended Act also includes helping the "States to improve educational opportunities for adults who lack the level of literacy skills requisite to effective citizenship and productive employment" (US House of Representatives 1991, p. 505). The Morrill Act of 1862 is grant awards to universities for research in agriculture and mechanical area of study, and the objective is to promote adult and vocational education at the university level. (National Association for Public School, Adult Education, 1968). This chapter provides a narrative of adult education from a broad perspective rather than from a narrow position and examines the role of andragogy and pedagogy in adult learning.

Most educational practitioners have supposedly argued that andragogy is a method of instruction, exclusive to the teaching of the adult learners while ostensibly ascribing pedagogy to the teaching of the non-adult learners (children). The implicit distinction between pedagogy and andragogy suggests a false dichotomy. Houde, 2006 recognizes that "underpinning the model of andragogy is the idea that adults and children are different" (p. 91).

Mohring (1989), contends that the terms andragogy (implies the education of adults) and pedagogy (meaning the education of children) are etymologically inaccurate. Although pedagogy originates from paid, meaning "child," from antiquity, it has also stood for education in general—without reference to the learners' ages (p. 52). According to Knowles and Holton (1998), adults acquire experience from various life engagements and "self-identity" (p. 91). On the other hand, the child gains experience from family and social relationships. However, the authors fail to explain how the difference in experience impacts the learning process of the child and the adult. According to Marzano (2007), successful instruction depends on collaboration and interaction between the teachers and the students, including the knowledge content (the subject of instruction). "This trilogy, proponents of both pedagogy and andragogy seem to miss in their arguments" (Ekoto and Gaikwad, (2015, p. 13).

The difference between the two concepts (pedagogy and andragogy) is somewhat blurry. The present authors posit that andragogy as an instructional approach to learning is equally beneficial to both adults and non-adult learners. A critical analysis of the concept of pedagogy as a method of teaching children is provided to examine the premise underlying the assignment of pedagogy to the education of children as opposed to adult learners. Conversely, it is crucial to understand the assumption that supports the perception that andragogy is better suited for adult learners in comparison to children.

Abundant evidence exists in the literature that shows that adults learn from the application of andragogy. However, empirical data on specific instructional strategies preferred by adult learners is minimal. The difficulty encountered by researchers and adult education practitioners is that andragogy lacks specificity. It is challenging to translate andragogical principles into practical strategies because of the multiple concepts through which it finds expression. The question is: What instructional strategies do adult learners prefer? To answer this question, the present authors carried out a case study aimed at collecting data to determine adult preferred instructional methods. The aim is to provide empirical data on the instructional strategies preferred by adult learners and the underlying justification for their choice to better engage them during instruction.

HISTORICAL PERSPECTIVE AND THE EVOLUTION OF ADULT EDUCATION

Originally the term adult education is first introduced in England in 1810 as a means of combating literacy among the adults (Blythe, 2000). It (adult education) has continued to evolve since the 18th century and has done so to this day. It is a form of continuing education, which refers to a recurrent education. During the 18th century, adult education is a term used to describe individuals who are receiving training but are not part of a full time, formal education system. Instruction takes place at night, after regular school hours. Public schools, including colleges and universities, provide adult education classes through the extension services. During the 1700s, adult education training does not necessarily lead to an award of a degree (Chao, 2007). The major part of adult education is apprenticeship. The master artisan provides training to the trainees, and the popular methods of imparting knowledge and skill are observation, demonstration including learning by doing, etc.

In some cases, the master artisan provides reading and writing to his apprentices. During this period (18th century), a variety of adult learning establishments emerged, and these include halls or places for public lecture or discussion known as lyceums. These places (lyceums) become the meeting places for adult learners. During the 19th and 20th centuries, the Chautauqua Movement began as a learning group and entertainment in small American villages and towns. John Vincent and Lewis Miller found the movement (Ferati, 2017). By 1900, the number of Chautauqua institute has grown to 150. However, by 1924, the Chautauqua movement began to decline. According to Ferati, Chautauqua Movement has a problem because it could not support itself financially (Schmitz, 2015). The Movement relies on philanthropic donations (Schmitz). Attempts were made to revive the Movement (Gwalthney, 2017 and Taylor, 2017). The original Chautauqua facilities remain in existence, and the educational programs expanded to include summer classes (Ferati, 2017).

The definition of adult education tends to be elastic because of the different roles it plays. As an educational program, adult education plays multi-functional roles. It began as an unorganized educational program but has a significant influence on promoting adult literacy, community awareness, and civil society, etc. It has expanded and attained ascendency and recognized as a program of study in higher education. It has made a positive impact on industrial and business training programs as well as professional development training workshops in higher education. Most colleges and universities offer courses in adult education. Despite being recognized as a program of study, its definition remains obscure. As a result, the definition of adult education continues to be a conjecture among education professionals and researchers in the field. In comparison to other academic programs, the concept of adult education as a discipline is considered less attractive because of the multi-dimensional aspect of the adult education discipline. The United Nations Educational, Scientific and Cultural Organization (UNESCO), 1976) in Talabi (2014) has attempted to define adult education in a broad spectrum by making a generalized statement describing it as the:

Entire body of organized educational processes, whatever the content, level and method, whether former or otherwise, whether they prolong or replace initial education schools, colleges, and universities as well as in apprenticeship, whereby persons regarded as adult by the society to which they belong develop their abilities, enrich their knowledge, improve their technical or professional qualifications or turn them in a new direction and bring about changes in their attitudes or behavior in the two-fold perspectives of personal development and participation in balanced and independent social, economic and cultural development (p. 101).

The definition provided by UNESCO (1976) is too elusive and makes the import of the meaning unclear, multi-laid, and subject to varying interpretation. It lacks specificity in articulating a cohesive concept that depicts the nature of adult education. UNESCO's definition tends to suggest that the meaning of adult education resides within the individuals involved and their perceived purpose of adult education. Therefore, such a definition assumes that adult education is exclusive for adult students (individuals who are 18 years or older). United Nations has been emphasizing the need to eradicate illiteracy among adults. UNESCO (2005) Universal Declaration on Human Rights on December 10, 1945, through the Organization General Assembly, Article 26 reaffirms the right of every individual irrespective of gender or age to receive an education. UNESCO maintains that the purpose of adult literacy education in "Nigeria is to ensure that the learning needs of young people and adults are met through access to appropriate learning and life skills programs. The goal is to achieve a 50% improvement in the level of adult literacy by 2015, especially for women, and equitable access to basic and continuing education" (UNESCO, 2005) in Nwafor and Agi (2013, p. 460).

The Nigerian government made provision "to provide a functional literacy program and continuing education for adults and youths who have never had the advantage of formal education or did not complete primary school education. These include the nomads, migrant families, the disabled, and other categories or groups, especially the disadvantaged gender" (p. 25). Merriam and Brockett (1997) believe that age is vital in defining adult education. These authors explain that adult education is about the "activities intentionally designed to bring about learning among those whose age, social roles, or self-perception define them as adults" (p. 8). The definition of Merriam and Brockett suffers from the same deficiency as the UNESCO's definition because it uses chronological age as the primary variable that defines adult education. Merriam and Brockett's definition limits adult education to "activities intentionally designed" (p. 8), which does not include informal, spontaneous learning or internet-based learning. The definition does not take into consideration the transformative nature of modern society or the ever-evolving technological apparatus. Such a definition is untimely.

The emphasis on defining adult education from the viewpoint of chronological age is misleading. A child who drops out of a formal school system and opts for apprenticeship is participating in adult learning under the umbrella of adult education. In the US, some students leave high school without obtaining a high school diploma. These students may enroll in a general education development (GED) program as a form of adult and continuing education or may undertake a workforce education training. Individuals can enroll in an adult education program if circumstances necessitate such enrollment irrespective of the chronological age. High school students do enroll in various adult and continuing education programs outside the school system to acquire skills in the subject area of their interest. High school students receive extra private lessons to help them with the Standardized Admission Test (SAT) or Admission College Test (ACT). These informal lessons represent adult education program or continuing education programs.

The views taken in this chapter is that adult education represents a formal and informal learning activity undertaken by an individual in a structured or unstructured environment. The goal may be to acquire new knowledge and skill or to improve existing knowledge and skill for personal growth and career improvement. It is not necessary to define adult education on age criterion only because children who are 16 years may engage in adult education if they choose to do so. Individuals under the age of 18 may benefit from adult education program because the program will help them prepare for adulthood and adult roles. In developing countries, young adults from humble households who cannot afford to attend formal education system enroll in adult education as the only option open to them. Most of the youth who are not in the formal education system opt for an apprentice system where they learn by observation, demonstration, and by doing. Therefore, participation in adult education programs, especially in developing countries, is not a choice, but dictated by circumstances. Presently, poor students opt for adult education, organized by private, wealthy individuals as an alternative to the formal education system. In most developing countries, adult education provides knowledge and skill to individuals who want to obtain computer skills through what is known as the internet café, own by private businesses. Plumbing, welding, dressing making, etc., are still learned through an apprenticeship as a form of adult education.

In 1970, the US amended the Adult Education Act to include those who are 16 years of age and older and have not received secondary school education (Rose, 1991). The intention is to recognize that admission into an adult education program should not be based on the chronological age but the desire and interest of the individual. Rubenson and Elfert (2015) observe that effort to transform "adult education into a field of study accelerated in the US in the 1950s, but by the mid-1990s, it has become least vibrant in Europe as in North America" (p. 133).

Some education professionals have described adult education from the perspective of its (adult education) roles and functions in the society, including from the political ideology. According to Hsing (2008), "adult education is related to issues of public welfare, employability, mobility and social integration" (p. 9). The idea of linking adult education and learning with public welfare suggests that education represents one of the means through which the government provides aid to individuals that need assistance. The assumption is that at the inception of adult education, the state (the government) used it as an intervention to provide employability skills to adults who lack such ability. The anticipation is that adult education will help prepare the recipients for work to earn a living and promote community integration.

Adult education has transformed into a program of study that is not focused solely on necessary job skills, literacy, and numeracy skills. It is a part of the mainstream college program in business and industry as well as part of private learning centers. Carr-Chellman (2005) argues that "adult education is, in part, about developing human agency" (p. 1). The belief is that adult education is about working to develop human potential through a group or organizational support. The argument is that all learning is about human development aimed at enabling individuals to become productive members of society. Wang and Cranton (2013) maintain that critical theorists believe that adult education aims at inspiring social and political transformation.

ADULT LITERACY, SOCIAL CAPITAL, CIVIL SOCIETY, AND COMMUNITY ENGAGEMENT

Literacy education refers to the process whereby one receives knowledge in reading and writing to enable him/her to learn and improve cognitive ability to understand self and the world around. The rationale is to assist the learner in developing reading, writing, and numeracy competency. Literacy is about helping learners to grow and acquire the basic skills necessary for development. Reading, writing, and numeracy skills are essential for economic and social participation. These skills play a fundamental role in one's future educational pursuit, as well as improving one's social capital and involvement in civic society. Coben and Alkema (2017) argue that "educational programs increase learners' engagement in numeracy. The authors believe that literacy practices show improved outcomes for learners in terms of increased numeracy and literacy proficiency and future life benefit" (p. 24).

According to Rose (1999), education is a tool for improving the economic opportunities for the poor and the unemployed. The belief is that adult literacy education has implications for economic and social engagements. Coben and Alkema believe that adult literacy and numeracy programs help to engage adults in the use of "digital technologies" (p. 25). The issue is that improving literacy and numeracy skills among adults will help them adapt to the present technology-driven world. There are research areas within each discipline to enhance the practice of adult learning (Cherrstrom, Robbins, and Bixby (2016); Käpplinger, (2015); including Harris and Morrison (2011). Mott (2009) states that "adult and continuing education include instruction across the lifespan and in varied contexts, there are many purposes associated with it" (p. 792). Dunst, Trivette, & Hamby (2010) maintain that the growth of adult education and various instructional models developed have helped to improve the learning outcome of adult learners. These authors (Dunst, Trivette, and Hamby) believe that using a variety of models have generated research interest in the field of adult education. Marcella and Nesbit (2013) state that adult education policies are associated with "incoherent and fragmented – more like a patchwork of measures responding to specific issues than a framework of linked principles and programs" (p. x).

At the beginning of adult education, the focus is on providing literacy skills to adults and to create awareness about the political and economic debate in the community. The inference is that adult education draws attention to political and economic disadvantages among the less affluent members of the society, including building social capital and creating an ecosystem market relationship. In effect, adult education becomes an instrument for creating consciousness towards community engagement, social capital, and civic society among individuals in the community. According to McClenaghan (2000), "adult education is about empowering individuals and social groups by involving them as citizens in collective activities" (p. 566). Such empowerment entails providing support and encouraging resourcefulness as tools for development through participation in an adult education program. The idea is to acquire basic literacy and create an opportunity for community engagement. Essentially, community engagement is about involving in group activity within a geographical location to foster collective action and inclusiveness. It (community engagement) helps groups of individuals in a community to focus on group interest for development rather than on individual aspiration. Bourdeiu (2001) indicates that social capital involves community involvement and participation in shared values and norms through communal social infrastructure. The position taken by Hsing (2008) is that social capital has provided the rationale and the tools through which adult education can be justified and promoted as a good and noble educational program.

The argument is that there are differences in the mode and methods of implementing adult education programs, including a difference in recognition of the outcome learning. Critics have remarked that social capital is seen as a vague concept because its definition encompasses a multiplicity of variables, which renders the meaning elusive. Some critics believe that it (social capital) is snake oil because of its perception as the panacea for achieving social justice and combating economic ills in society. These critics are skeptical that the enforcement of adult education will combat structural and societal inequality. However, adult education has become a tool for harvesting human potential, achieving social and cultural integration. Therefore, adult education remains in the process of transformation in search of an identity to fulfill its functional role of promoting knowledge and skill acquisition as well as attempting to achieve social justice. Baatjes and Mathe (2015) bolster the role of adult education as a vehicle for social transformation, and authors argue thus:

The role of adult education as an agent for social change has been prominent for several decades and has informed the activities of civil society and government campaigns in various countries such as Cuba, Brazil, Nicaragua, Guinea Bissau, Tanzania, and many others. The radical tradition views civil society as a privileged domain of progressive learning, political struggle, social movements, and social change (p. 396).

Torres (1990) believes that adult education curricular offerings and the flexibilities associated with it (adult education) are more akin to the community needs, unlike the formal education system. According to Torres, adult education creates an opportunity for political awareness and helps to mobilize adults for community development and engagement in Latin American countries of Cuba and Nicaragua. Baptiste (2001) rejects the argument that adult education is the panacea of all the ills of society in relation to achieving social justice. Baptiste claims that the proponents of human capital view human beings from the mechanical perspective, which focuses primarily on educational attainment as the determinant of economic productivity. Social inequality is not intolerance or narrow-mindedness, but the result of economic marginalization and repression of the vulnerable members of society (Foley, 1994).

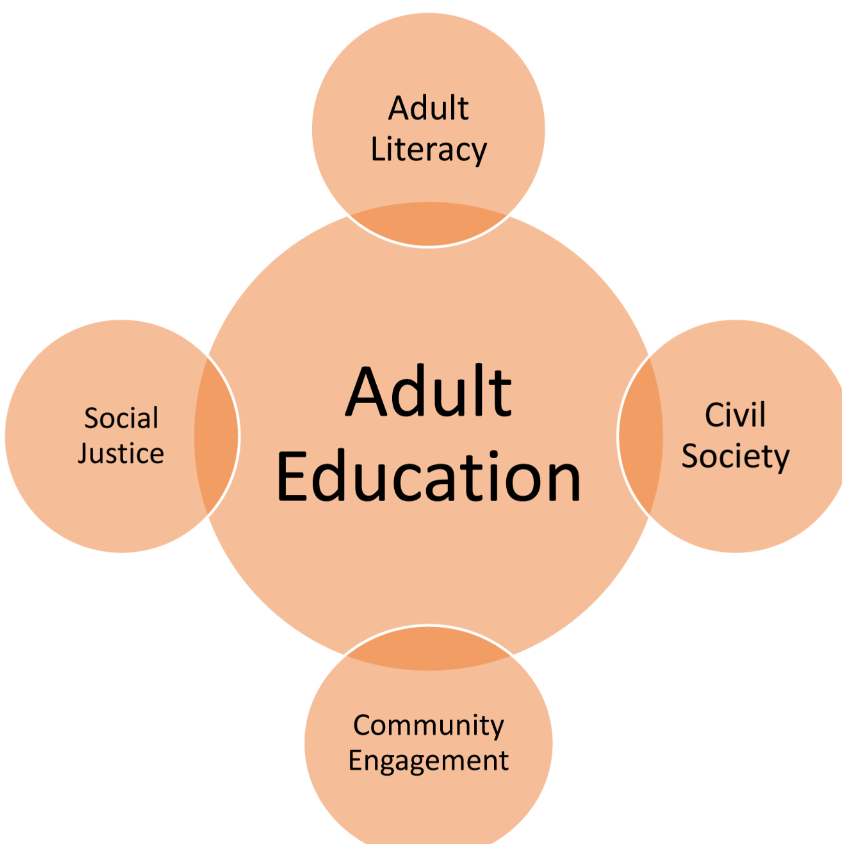
Civil society refers to an ecosystem relationship that is created by individuals or groups of people in the organization and institutions to advance shared knowledge, interest, and values to achieve desired goals. Achieving such goals may depend on collaboration and relationships, which do not relate to family solidarity (Topsoe-Jensen, Obery, Chaturvedi, and Bisiaux, 2018). The concepts of civil society and social justice have permeated the philosophy of adult education, and radical adult educators view the process of educating adults as a platform for political maneuver and debate. Murphy (2001) claims that adult education practitioners are sympathetic toward the political philosophy of the left. Murphy posits that "examining the debate regarding civil society and social justice reveals that they have historically been situated about the state (political society) and the market economic society" (p. 347). Murphy asserts that the inference on civil society has a political underpinning and submerged under the mantle of adult education. Murphy further argues that its undisguised function is to engage in a debate shrouded in a discourse rooted in politics and market economy. Murphy indicates that civil society has become a buffer for adult education theoretical ideology. The author argues that such a radical ideology is the propagation of progressive thinkers in the field of adult education. Observers of the social justice and civil society debate remark that adult education theory is being used as a façade to create awareness concerning the political and economic disparity from the left.

The understanding is that "adult education was propelled by the industrial bourgeoisie's interest in having available manual labor, which was capable of participating in productive activities" (National Dimensions of Adult Education and Lifelong Learning ©PRIA International Academy 2014, p. 7). The growth of workforce development is made possible through adult education programs such as "adult basic literacy, employability skills, and career exploration" (Jacobs, 2006, p. 26). Jacobs recognizes that the relationship between adult education on the one hand and workforce education, on the other hand, galvanizes adult economic participation. Figure 1 shows various programs that support the development of adult education and legitimized under the umbrella of adult education. Consequently, these programs become part of the dialogue in educational institutions and private organizations. Wang and Cranton (2013) argue that some of the "philosophical perspectives that guide adult education practice have been organized into a variety of different frameworks" (p. 135) and rationalized as depicted in Figure 1, shown below.

THE EMERGENCE OF ANDRAGOGY

According to Knowles (1980), adults have a unique way of learning, which is through andragogy, which is different from pedagogy perceived to be how children learn. Svein (2017) argues that that Kapp, a German gymnasium high school teacher is the first person to use the word andragogy. Kapp believes that andragogy reflects social justice and virtue for the good of the individual and society. Kapp realizes that the subject matter of his book, Platon's Erziehungslehre, does not only relate to children but includes adults. Therefore, he devotes some parts of his book to adult learning and describes it as andragogy. As a result, the concept of andragogy is born. The theme of his writing relates to Plato's viewpoint of the nature of lifelong learning. Kappa's notion of andragogy focuses on human subjective qualities such as

Figure 1. The philosophical ideology of adult education



human character and values, and he argues that they are vital for human existence. According to Wang, Henschke, and Fay (2013), Kapp is the first author to use the term andragogy to describe adult learning. By 1921, the concept of andragogy is no longer in use in European countries (Davenport, 1985). However, it (concept) resurfaced in later years in Yugoslavia, France, including Holland (Davenport). Knowles becomes acquainted with andragogy through a Yugoslavian teacher in the 1960s (Davenport). Andragogy comes from the Greek word, avδρ- andr, which means man and άγwyóc agogos donates to lead adult. The literary translation implies that man leads an adult (Davenport, 1985). Knowles (1984) believes that it is appropriate to assign andragogy to adult learners because its central theme focuses on the adult. Knowles is interested in developing a learning strategy for adult learners, so he equates adult learning with andragogy.

Andragogical learning strategies have been practiced in developing countries since the existence of the cosmic world. The concept is not peculiar to specific countries where the word andragogy emerged. The principles and practice of andragogy have been in practice before the establishment of formal education. In ancient times, the methods of transmitting knowledge and skill from one generation to another reflect andragogical principles and practices, although the term andragogy is never in use at that period. In ancient days, parents and guardians expose their children and wards to the practice of andragogy. Therefore, it is an educational theory that transcends national boundaries, and it is timeless. World communities transmit cultural heritage from the old to the young using andragogical techniques. Knowles, Holton, and Swanson (2011) affirm that andragogical philosophy provides the guideline for organizing "the educational system in the USA" (p. 35). Thorndike (1928), in his scientific research report, concludes that adults can learn. The recognition that adults can learn is important because, in the 1920s, the subjective notion is that adults are not able to learn. The findings of Thorndike yielded scientific proof to support the idea that adults can learn (Knowles, Holton, and Swanson). By 1928, adult education gained support when it received funding by the American Association for Adult Education and the funding for research by the Carnegie Corporation.

Critical Review of Andragogy

The assumption is that andragogy provides learners with the opportunity to direct their study or at least be involved in determining the contents of their learning. However, it is not explicitly clear how learners will have control over curricular activities and assessment, including the evaluation of their learning performance. Rachal (2002) echoes similar opinion and states that "in several of these investigations, instructor control is nearly absolute, and learner control is negligible" (p. 213). Rachal argues that learning "effectiveness" is primarily determined by learner achievement, which is often measured by tests and grades. To Knowles, "tests and grades are anathema to the very idea of andragogy" (p. 211). The point is that in an andragogical classroom as it practiced in a pedagogical learning environment, tests and grades are tools for evaluating student progress. Therefore, using andragogical learning philosophy, teachers have not yet succeeded in developing student testing procedures that match the flexibility inherently espoused in the andragogical philosophy. Critics also observed that andragogy is variously defined and implemented without consistency. Such a lack of procedural uniformity provides researchers with unwelcome anxiety. The variability in the definition of andragogy and the inconsistency in applying it pose a problem for researchers. Another challenge is the elasticity associated with andragogy because of the ubiquitous abstract constructs which give meaning to it. Inadvertently, andragogy tends to be a slippery and elusive concept.

According to Merriam and Caffarella (1991), andragogy has generated more polemic discourse and controversial debate than many educational concepts. Knowles (1980) defines andragogy as "the art and science of helping adults learn" (p. 42). Knowles' definition appears to be controversial. However, the controversy is triggered by philosophical foundations instead of its practical efficiency (Rachal, (2002). Merriam (2001) explains that andragogy helps students to question the assumption made about knowledge. Marriam believes that taking a critical view of the knowledge presented by the instructor helps the student to engage in reflective learning. The aim is to help students develop new ideas from the topic under discussion. Merriam (2007) notes that andragogy is subject to various interpretations. As a result, examining andragogy using scientific methods is problematic because of the multiple concepts that define it. Emancipatory learning tends to help students to understand the social construct of knowledge through critical reflection. The proponents of andragogy believe that it is flexible and that students can determine what to learn and how they learn it. However, teachers control tests and grades, and students have no input regarding the assessment process (Rachal, 2002). Therefore, students are compelled to follow the curriculum, which is controlled by teachers as it is practiced in pedagogical classroom.

THE CONCEPT PEDAGOGY

Pedagogy originates from the Ancient Greek word pais, which means a child (boy); the offshoot is 'paid.' The Greek word for leader is agogus. In effect, paid-agogus or pedagogue means a leader of the child. Pedagogy emanates from pedagogue or paidagogos and donates a teacher of boy (child) Wheeler (2013). Patel and Khanushiya (2009) define pedagogy as "the art and science of teaching or leading (agogy) the child (pedi)" (p. 290). As a result, teachers and practitioners view pedagogy from a narrow perspective. The slim perspective focuses on teaching strategy explicitly for children because of the meaning of paidagogos, which is the root word for pedagogy (leader of a child) (Wheeler). Pedagogy refers to children attending school. By the end of the 19th century, pedagogy emerged as applied science and as a learning strategy for children. Educations began to emphasize the practice side (strategy) of pedagogy instead of the guiding principle part of it. Vella (2006) maintains that pedagogy is a guide for understanding the process of teaching and learning.

The assumption is that pedagogy is the science of teaching and learning, and the teacher is the knower. The teacher assumes the position of an authoritative knower. The relationship between the teacher and the student becomes hierarchical. During the early days of schooling, pedagogy becomes primarily associated with children because most adults are concerned with work and taking care of the family. Therefore, references made to pedagogy is about how children learn. The implication is that pedagogy becomes the symbol of how children learn. The classroom becomes teacher-centered because it is under teacher control.

Houssaye (2007) has a different view of pedagogy; the author argues that pedagogy deals with understanding how to teach and learn irrespective of whether the learner is a child or an adult. The position taken in this chapter mirrors Houssaye's views.

According to Houssaye, the conceptual aspect of pedagogy remains in abeyance, but the focus remains on the practic*e* part, which is the teaching strategy. The assumption is that children are not mature and unable to decide their learning needs. Therefore, it is the responsibility of the teacher to impart knowledge to children in a manner that reflects children's immaturity and lack of experience. The proponents of teacher-centered instruction argue that instructivism is considered appropriate for teaching children.

The instructive nature of teacher-led instruction is seen as rigid and has resulted in a weak narrative that pedagogy is not suited for adult learners.

The assumption is that pedagogy is instructive (Dole, Bloom, and Kowalske (2016). These authors remarked that high-stake tests and structured lessons for K4-12 students disempower teachers and students alike. Grant and Hill (2006) argue that the requirements of testing contribute to the acceptance that the pedagogical method of teaching is teacher-centered. Fullan and Langworthy (2013) remark that students will not be motivated to engage in their study, and teachers may experience stress because of the rigid implementation of the pedagogical strategy. The authors (Fullan and Langworthy) call for a change in the hierarchical relationship between teachers and the students to make classroom flexible and less rigid as well as student-oriented. Research evidence has shown that students participate in the learning activities when they explore the real world and provide the opportunity to discover information in a manner that allows open mindset (Cohen, 2014; Dweck, Walton, and Farrington, 2013). Such open-mindedness promotes reflective learning among children.

On the contrary, pedagogy can play a part in adult learning if it is used as a guiding principle to facilitate teaching and learning. Knowles (1980), in his earlier thesis, indicates that pedagogy and andragogy are two opposing theories of learning. Over the years, Knowles acknowledges that the two approaches are no longer opposed to each other. Rather they may complement each other. The distinction between pedagogy and andragogy may not be exclusive as suggested, but somehow unclear because children can also benefit from the application of andragogical theory. For instance, children and adults learn better in an interactive learning environment, and both learn when the classroom is engaging and activity-based. Both children and adults tend to learn minimally in a passive learning environment and when the class becomes threatening. Adult education theorists recognize that Knowles (1978) popularized the use of andragogy as an adult learning approach during the period when instruction is mainly teacher-centered. Kenyon & Stewart, (2001) claim that instructivist pedagogy inhibits learning irrespective of whether the students are adult or non-adult learners (children). Learning is not about being a spectator; neither is it a passive endeavor. Productive learning should engage different senses used for learning. The perception of pedagogy as a conceptual guide for designing and delivering instruction provides an opportunity to understand the theories that support instructional design and delivery. The erroneous assumption is that teachers need to fill children with knowledge using the instructivist method. Instructivist theory presumes that the teacher is the knower and that the role of the students is to assimilate knowledge without question or reflection. "Education has traditionally been seen as a pedagogic relationship between the teacher and the learner. It was always the teacher who decided what the learner needed to know, and indeed how the knowledge and skills should be taught" (p. 3).

The present authors maintain that the objective of a given lesson plays a crucial role in determining the type of strategy that the teacher selects to present instruction. The essence of a successful teaching is to achieve productive learning whereby adults and non-adult students acquire the knowledge and the skill embedded in a given instruction. Successful learning includes developing different perceptive and new patterns from the information presented during the instruction. Developing new models from the accumulated knowledge provides the learners with the ability to customize knowledge and use such knowledge to address related issues in the larger society. Propper interpretation of pedagogy promotes learning, but an improper understanding of pedagogy inhibits teaching and learning.

In an andragogical classroom, the teacher assumes the role of a facilitator instead of a transmitter of pre-digested knowledge. Ahonsi (2012) believes that a teacher who implements andragogy as a teaching approach perceives his/her role as influencing the learner rather than imposing on the students. Some educational observers tend to argue that pedagogy seems to reflect the characteristics of the instructivist learning strategy. Knowles claims that pedagogy focuses on knowledge acquisition. Dewey (1902) criticizes the inactivity of students because of the inappropriate interpretation of pedagogy, which primarily focuses on transmitting knowledge from the teacher to the student. The assignment of pedagogy as a means of teaching non-adults emanates from the perception that it (pedagogy) is appropriate for individuals with limited knowledge acquisition and life experience. Therefore, such individuals need the knowledge to be imparted into them, a process that Freire (1970) refers to as banking education.

According to Freire, the banking method of instruction denies a student participation in the learning process and mirrors rote memorialization. Ausubel (1960) claims that it is subject to forgetfulness. If educators and practitioners view pedagogy as a principle that guides teaching and learning, students will not be perceived as "empty barrels" (Freire, 1970). Children and adolescent learners enjoy interacting with peers, sharing information, and being creative, etc., as much as adult learners. To draw attention to the shared characteristics between pedagogy and andragogy, the present authors created Table 1 which summarizes the functions of pedagogy and outlines its proper and improper interpretations, including the shared characteristics of both pedagogy and andragogy.

DIGITAL LEARNING THEORIES: CONNECTIVISM AND HEUTAGOGY FOR ADULT LEARNERS

Connectivism and Adult Learning

As adult educators and practitioners continue to make effort to use pedagogical and andragogical theories properly, it is essential that they infuse the emerging digital theories into instructional design and delivery. Therefore, adult education is not only about generating ideas to strengthen teaching and learning. It includes the use of media communication to support learning needs and improve technology literacy to promote e-learning. With the growth of technology, learning is no longer situational but transcends all observable and imaginary boundaries. Knowledge and ideas are produced not only by human intelligentsia but embedded in non-human objects and sources contained in the web (Matta, 2010). Connectivism, as a digital educational theory is gaining momentum. According to Geoesbrecht (2007), connectivism is an educational theory that provides an opportunity for students and teachers to connect and learn using a database, artifacts, images, photos, etc. stored on the web. While at the same time, modifying the knowledge acquired to meet their learning needs. Conradie (2014) argues that "as a pedagogical approach, connectivism has merit and can create a challenging learning environment. As a learning theory, it draws on well-established learning theories, including constructivism and cognitivism" (p. 258).

Through the application of connectivism, learners connect among themselves, including connecting to various e-resources. Connectivism supports informal learning, which Siemens (2004) claims that it is suited for adult learners because of its flexibility as well as contextual functionality and interactive collaboration. Connectivism provides adult students with a multi-dimensional data source to help them engage, reflect, and discover as they learn. Reflective and discovery learning creates an opportunity to generate new ideas for problem-solving. The purpose of connectivism is to tap into the abundant learning resources embedded on the web in a manner that the adult learners can share cultural milieu and artifacts. E-learning through connectivism becomes a "negotiated interaction" among students on the one hand

Table 1. Proper and improper interpretation of pedagogy and shared characteristics of pedagogy and andragogy

Principles of Pedagogy	Proper Interpretation of Pedagogy	Improper Interpretation of Pedagogy	Shared Characteristics of Pedagogy and Andragogy
Functions as teaching and learning principles which help teachers translate proven theories into instructional strategies for both adult and non-adult learners (children and adolescents).	Pedagogy is about how teachers guide and direct students to learn effectively with a focus on the learning needs of the learner and the desired objectives It functions as a guide for selecting learning activities based on the predetermined needs and outcome. As a guide, it provides opportunity for the teacher to make decision in the interest of the learners. As a guide, students are encouraged by teachers to engage in interactive activities. When pedagogical classroom becomes collaborative and interactive, students share ideas and learn from each other. The need for authoritative control is reduced and/or diminished.	Pedagogy is not a teaching method specific and exclusive to children. Pedagogy is not about teacher control of the selection of learning materials unilaterally without consideration to students' needs. In an ideal pedagogical classroom, the relationship between the teachers and the students is not hierarchical. Pedagogy does not inherently require teachers to assume the role of an authoritarian knower. The role of pedagogy is not for teachers to assert rigid control over the students and reduce them to a passive audience. Poor interpretation of pedagogy can lead to the ineffective use of its (pedagogy) guiding principles.	When pedagogy and andragogy are perceived and practiced as guiding principles of teaching and learning, all students learn effectively. The method of applying pedagogical and andragogical principles is what shapes teaching and learning narratives, and thereby defines the success of a given instruction. All students learn better when the classroom is interactive and engaging irrespective of whether the students are adults or not. Learning rarely takes place when the environment is authoritative, less supportive, rigid and threatening for both adults and children. It is the responsibility of the teacher to navigate the classroom to make it relaxed, friendly, interactive and engaging for all learners. It is the duty of the teacher to use pedagogy and andragogy as guiding principles to meet the learning needs of both adults and non-adult students.

Table 2. Proper and improper interpretation of pedagogy and shared characteristics of pedagogy and andragogy continued

Principles of Pedagogy	Proper Interpretation of Pedagogy	Improper Interpretation of Pedagogy	Shared Characteristics of Pedagogy and Andragogy
Using pedagogy to achieve meaningful learning.	The use of pedagogy as a teaching and learning principle is to provide opportunity for children and adults to learn creatively and reflectively. Pedagogical principle enables teachers to engage students using different strategies and methods that will impact learning positively for both adults and children. The choice of methods of instruction depends in part on the desired learning objectives and resources available. The rigor and intensity of instruction depends in part on the learner's level of cognitive development.	The use of pedagogy as a principle of is not to create a living library (Bruner, 1966) or to resort to rote memorialization (Ausubel (1960). Pedagogy does not have an in-built mechanism to monitor its application. Skillful and resourceful teachers use it effectively to move the learning process forward successfully. Pedagogy does not result in a negative learning outcome for adults while creating a positive learning outcome for children. The mode of application determines the effectiveness or the ineffectiveness of the instruction.	Pedagogy and andragogy are about teaching students to become creative learners with problem-solving skill and reflective thinkers. The teacher gives life to pedagogy and andragogy as principles and guidelines for planning and delivering instruction. Pedagogy and andragogy are neutral and are amenable to teachers' and student manipulation. Pedagogy and andragogy are to the teacher what the clay is in the hand of the potter. The teacher guides and direct learning using appropriate pedagogical and andragogical principles for both adults and non-adults.

Table 3. Proper and improper interpretation of pedagogy and shared characteristics of pedagogy and andragogy continued

Principles of Pedagogy	Proper Interpretation of Pedagogy	Improper Interpretation of Pedagogy	Shared Characteristics of Pedagogy and Andragogy
Creating readiness to learn using pedagogical principle	Teachers understanding of the students, irrespective of age and maturity helps to get them ready and set the stage for learning. Readiness to learn involves in part preparing the cognitive structure of the learner by engaging them in familiar learning activities that stimulate their interest and curiosity. Teacher should introduce new knowledge to students by linking it to what the students know or with the learning activities that students are familiar with.	Assumes that students are not ready to learn because of lack of maturity. Pedagogy is not about knowledge being presented to students mechanically and rigidly without flexibility for creative thinking. Pedagogy does not assume that children are expected to learn without stimulating their interest. In a pedagogical classroom, learning is unproductive when the learning environment is less prepared to support learning.	For both adults and non-adults, learning cannot take place without teachers setting the stage for learning by creating interest and motivating students to focus on the learning material. Creating readiness to learn is part of the pedagogical and andragogical learning principles. Pedagogy and andragogy models require teacher to inspire students (children, adolescents and adults) to learn by awakening their interest in a manner that addresses their need. Pedagogical and andragogical principles are appropriate for children and adults, it is the responsibility of the teacher to make instructional decision based on the learner's need.
Identifying immediate and long-term need using pedagogical knowledge	Through the application of pedagogical principle, teachers can determine the immediate use of the knowledge and the skill to be acquired by stating the outcome learning to create interest among learners. Pedagogy deals with the short and long-term goals of all learners (children, adolescents and adults). It deals with cumulative long-term goal of instruction to sustain learning and create anticipation and expectation.	The unwitting assumption is that non-adult students may not be interested in knowing the immediate and long-term use of the knowledge and the skill they will acquire. Instruction without a learning outcome lacks focus. An instruction without immediate and long-term benefit may not motivate adult and non-adult students to learn.	Proper use of pedagogical and andragogical principles means that teachers need to address the short term and longtime goals for both adult and non-adult students to bring learning to life and create a sense of achievement. Short term and long-term goals help to create a sense of achievement among children and adult learners. Establishing instructional objectives will help teachers define assessment and evaluation procedures for both children and adults.

and between students, teachers, and web resources, on the other hand (Okojie, 2014, p. 8). Therefore, it is the responsibility of the teacher and the instructional designers to create a learning environment that breeches cultural boundaries in knowledge acquisition. Through the medium of connectivism, adult learners become more active as they excavate knowledge and information contained in various online depositories. Connectivism helps students perceive a relationship among subject disciplines as they pursue their education.

Technology overshadows human life and defines how individuals, institutions, including businesses, conceptualize the parameters of success. It also includes the intricacy and superiority in the use of various technologies and media networks to identify and solve a problem. Technology is a means of creating new opportunities to expand the frontier of what is already known and explore avenues for entering the unknown. The dominance of American military myth is because of her superior advancement in hardware and software technologies, which provides military chiefs advantages over their adversaries. Meteorologists boast of the accuracy of their weather prediction because of the use of advanced radar

Table 4. Proper and improper interpretation of pedagogy and shared characteristics of pedagogy and andragogy continued

Principles of Pedagogy	Proper Interpretation of Pedagogy	Improper Interpretation of Pedagogy	Shared Characteristics of Pedagogy and Andragogy
Using pedagogical theory to address differences among learners.	Proper understanding of the pedagogical principle helps teachers develop the ability to understand individual difference among students Students have different learning styles and prefer different methods of instruction irrespective of chronological age.	Pedagogy is not about ignoring learning differences among learners. It is not about failing to use different types of assessment and evaluation procedures. Using inappropriate method of teaching and learning which does not recognize differences among students may dampens learners' interest to engage in the learning activity that booster creative tendencies.	Children, adolescents and adults learn more effectively when teachers diversify instructional method and selects appropriate instructional strategies to reflect the learning style of learners. This applies all types of learners.
Using pedagogy to engage students actively and improve classroom participation	Principles and practice of pedagogy are used to encourage students' participation through interactive engagement and involvement in activity-based learning. Pedagogy recognizes that learning is a social activity where learners and teachers engage in an academic dialogue.	Pedagogy is not about solitary learning where students learn in isolation. Pedagogical classroom is not merely about assimilating information presented by teachers.	The concepts of pedagogy and andragogy share important principles of teaching and learning. Both concepts encourage interactive learning, collaborative learning, active participation and sharing of ideas among students to enrich the instructional materials.

technology. The importance of technology in all spheres of life cannot be over-emphasized. The growth and success of adult education as an academic discipline are related to the level and intensity of technological application. Therefore, the integration of various media and communication technologies, including digital theories, will strengthen the planning and the presentation of instructional contents to adults in face-to-face, online, and in blended learning environments.

Heutagogy and Adult Education

Blaschke and Brindley (2011) describe heutagogy as a self-determined learning approach. The argument is that heutagogy is a move from pedagogy to andragogy, and from andragogy to heutagogy (Kenyon and Hase 2001). The assumption is that heutagogy equips learners with the ability to instruct self and self-direct one's learning. It creates an opportunity for adult learners to be involved in developing and delivering instruction. The adult learner takes charge of the learning materials through a holistic desire to create autonomous competence. The primary goal of heutagogy is to prepare adults to become lifelong learners and nurture the willingness to engage in continuous development (Anderson, 2010). The belief is that heutagogy provides an opportunity for exploratory learning using technology. Self-determination is one of the primary ingredients in a heutagogical learning environment. "A heutagogical approach recognizes the need to be flexible in the learning where the teacher provides resources, but the learner designs the curriculum, not just the learning process, by negotiating the learning" (Hase and Kenyon, 2003, p. 7). Flexibility in learning is suitable for both adults and non-adults. However, the authors (Hase and Kenyon) fail to explain how students will negotiate learning and how the assessment will be negotiated to identify outcome learning.

Heutagogy is to encourage a quest for an independent capability that propels students to venture into the unknown without the constrained imposed by pedagogy. To a certain degree, andragogy may be restrictive. It provides boundless thinking capacity as the adult learner explores limitless web resources and manipulates them to his/her advantage. The theory of heutagogy provides distant education with a diverse platform for learning using various media technologies, databases, and internet artifacts, etc. In explaining the importance of heutagogy, Blaschke and Hase (2015) argued that "…people are now lifelong learners, learning their profession throughout life, in chunks, and when they need it. Added to that, the explosive advancement of technology in the last decade has made learning readily accessible at any time, everywhere, and in any form" (p. 1).

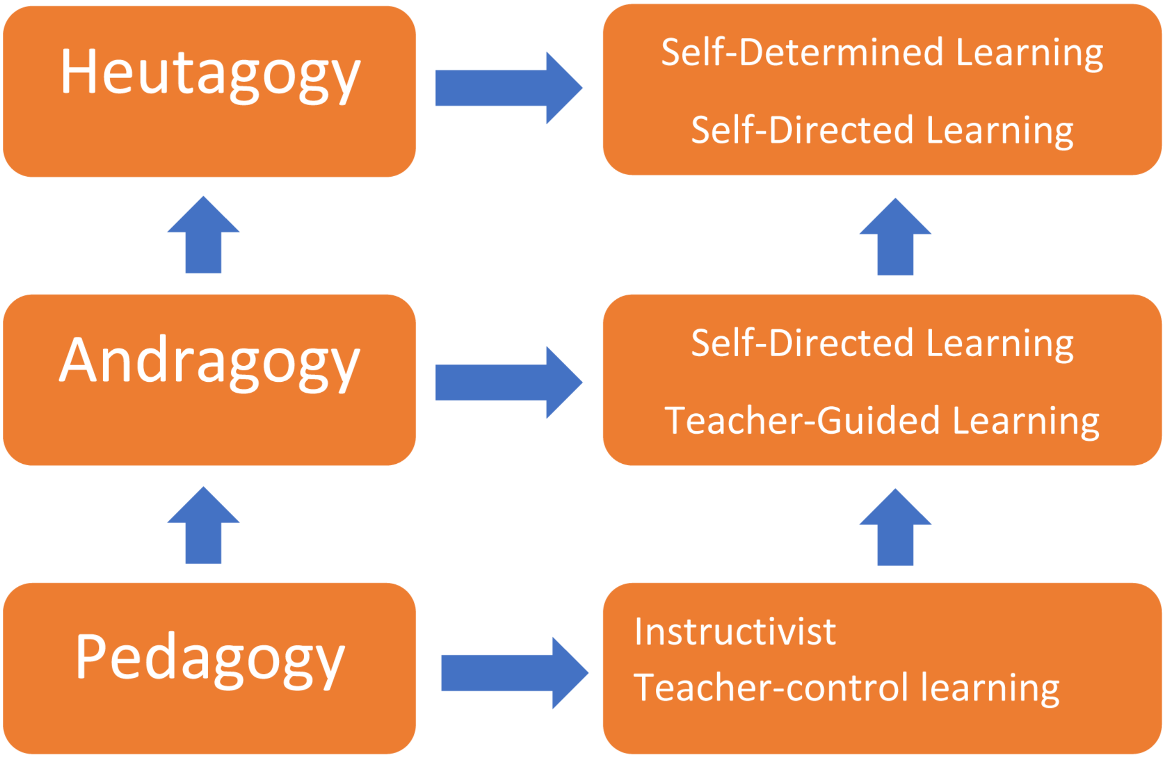
Agonács and Matos (2017) contend that heutagogy is a useful tool for promoting lifelong learning and self-determined effort toward learning, which can benefit adult and non-adult learners. Agonács and Matos argue that "the pedagogy–andragogy–heutagogy (PAH) continuum, can be used to guiding students toward becoming self-determined learners through the building of technology-supported personal learning environments (PLEs)" (p. 75). The argument is that adult and non-adult learners do benefit from pedagogy, andragogy, and heutagogy, and contrary to the position taken by Knowles (1970). Figure 2 demonstrates pedagogy—andragogy—heutagogy continuum, as perceived by Agonács and Matos (2017).

However, the present authors reject the assumption of the hierarchical ascension from pedagogy to andragogy to heutagogy. The authors maintain that the learning objectives dictate the selection of the instructional strategies, and learners' needs, as well as the resources available, etc. In general, teachers use the strategies and the resources available to them to reinforce learning taken into consideration the student level of cognitive development and the subject matter of the instruction. The current authors believe that using different digital theories will help students become resourceful learners that are self-directed and self-determined. Pedagogy, andragogy, connectivism, and heutagogy can be used in designing, presenting, and reinforcing adult learning and learning in general. To determine the learning strategies that adult online learners prefer, the present writers carried out a case study. The goal of the case study is to provide empirical data to assess adult perceived, preferred instructional strategies.

CASE STUDY ON ADULT PREFERRED INSTRUCTIONAL STRATEGIES

The objective of the case study is to assess if adult students can learn from methods that are supported by both pedagogical and andragogical learning theories. The focus of the case study is to determine the preferred instructional methods of online adult students. According to Treegavarapu, Summers, and Mocko (2007), a case study research "is an ideal method, when the research aims to find answers to why and how" (p. 4). The use of an in-dept interview provides a rich data source to understand adults' preferred learning strategies. It offers an opportunity for adult students to identify their preferred, perceived learning strategies as well as justify their choice of those strategies identified.

Figure 2. The pedagogy–andragogy–heutagogy (pah) continuum (Agonács and Matos, 2017)



Statement of the Problem

The problem of this case study is the assumption that adult students learn from specific instructional strategies that are different from non-adult learners (children). Some education theorists have argued that a pedagogical approach to learning is more suited for non-adult learners, while the andragogical method is appropriate and well-matched for adult learners. The position taken by the current researchers is that both adults and non-adults can benefit from the principles of pedagogy and andragogy. Therefore, to understand how adults learn, it is necessary to investigate adults' preferred instructional strategies. The following research questions guided the study.

Research Questions

1. Can you describe your preferred instructional strategies?
2. Can you discuss your motivation (justification) for choosing the strategies you have described as your preferred instructional method?

Related Literature

The general perception is that adult students have delineated methods of learning through which they learn as adults. The argument is that adults have specific learning approaches that are exclusive to them as adults. In some instances, such strategies may not apply to non-adult learners (children and high school students). This assumption has been minimally challenged using a case study. Knowles (1980) has, for a long time, maintained that adults have a specific approach to learning; in other words, adults follow specific learning techniques which differ from non-adult students. However, authors such as Thompson (1989) argue that adult learning characteristics are not different from children. Okojie, Boulder, and Boulder (2011) found that adults learn in various ways that are no different from children. Darbyshire (1993), argues that the perception that adults learn exclusively from andragogy while children learn from pedagogy is questionable.

Laguador and Dizon (2013) found that children, as well as adults, learn through project-based instruction. Bredekamp (1992) states that a project-based method of teaching supports instruction for all types of learners. Kreber and Cranton (2000) maintain that good teaching is "knowing how to facilitate discussion, knowing how to use a variety of instructional methods, knowing how to prepare a lecture, being able to write learning objectives and knowing how to construct good tests" (.479). Grasha (1999) argues that instructional strategy should not be judged unilaterally without implementing it in the classroom. Roth and Roychoudhury (2003) found that those students taught with active instructional methods do better in the assessment test than those taught with traditional methods irrespective of whether they are children or adults. The implication is that effective instructional methods depend on how well teachers implement such methods. Therefore, teachers' ingenuity is essential in using instructional methods successfully. McKenzie (2001) indicates that adults learn effectively when they (adult learners) are exposed to learning "activities that match a personal interest, style, and developmental readiness" (p. 5). Sivertsen (1993) states that active learning is about learning and doing using a variety of instructional methods for both adults and non-adults (children).

The Population of the Case Study

The participants of the case study are made up of 11 master's degree students and four (4) doctoral students from a major four-year college in the Southern part of the US. Graduate students who are involved in this case study enrolled in two graduate courses in spring 2019. All the students in the two classes volunteered to participate in the case study. Therefore, a census population is used. Data collection took place during the 2019 spring semester. Six male students and nine female students make up the population. The age of the participants is between 24 years and 50, and most of the students are education majors. The interview took five weeks to complete. Three students had an interview each week, and each interview session took 45 minutes. The interviews are recorded using an electronic device. Letters A-O are used to represent the interviewees to maintain confidentiality. Table 5 shows a summary of the participants' demographic information.

Instrument for Data Collection

An in-depth interview is the method of data collection for this study. Experts in the field of adult learning and teaching strategies reviewed the research questions for accuracy. In this case study, the researchers

Table 5. Student demographic information

Participants Number	Gender	Degree	Age (years)
A	Female	Master's Degree	24
B	Female	Master's Degree	27
C	Female	Master's Degree	27
D	Female	Master's Degree	29
E	Female	Master's Degree	30
F	Female	Master's Degree	31
G	Female	Master's Degree	34
H	Female	Doctoral Degree	39
I	Female	Doctoral Degree	47
J	Male	Master's Degree	25
K	Male	Master's Degree	26
L	Male	Master's Degree	32
M	Male	Master's Degree	46
N	Male	Doctoral Degree	48
O	Male	Doctoral Degree	50

established trustworthiness through the process of member checking (feedback from the respondents) and peer debriefing (colleagues reviewed the transcript). Generally, trustworthiness is about establishing confidence in the data collected and to make sure that the findings are transferable to other contexts. Also, an audit trail (collection of all relevant documents), the researchers used triangulation to make sure that the research processes and methodologies are dependable and reliable. The use of an in-depth interview is appropriate for the current study because it allows the interviewees to identify their preferred learning strategies and justify their choice for the strategy identified. The rationale is to discover the type of learning strategies that adult learners believe will help to enhance web learning. This study has some limitations. The case study is carried out in one higher educational institution. The online students who participated in the study are limited in number. The participants are interviewed at different times and on different days and weeks. The validity of the data is subject to the honesty of the interviewees in responding to the research questions.

Methods of Data Analysis

Data analysis includes coding, memoing, and using content and theme analysis, including, interview responses transcribed verbatim immediately after completing the interview. Coding helps to identify concepts to determine their relationship as well as to understand the insight such a relationship generates. Memoing implies making reflective notes immediately after each interview. The coding of the data helps to recognize patterns and the themes relevant to the study (Bailey 2007; Gay, Mills, & Airasian, 2012). A document analysis helps to triangulate the data collected from the interviewees to determine the trustworthiness and the accuracy of the data collected. Reviewing participants' earlier class discussions on learning styles and methodologies helps to achieve triangulation.

The case study provides data on the participants' preferred instructional methods and the justification for their preference. Thirteen (86.66%) students identify problem-solving as their most preferred instructional strategy. The demonstration method, discussion, and discovery methods are the second preferred instructional. The least preferred methods are reading for meaning, literature reflection, annotating/paraphrasing article, and teacher-centered method. One student chose each of these methods one time, and this represents 6.66% of the participants.

Data Analysis

Data collected shows that there is no pattern in the students' preferred instructional methods concerning gender and degree classification. However, older adults prefer discussion methods, problem-solving, demonstration, and discovery methods. The younger students prefer student-centered method, project-based method, simulation, reflective learning, compare/contrast method, self-directed learning, and small group discussion. The frequency number assigned to each instructional strategy depends on the number of students who identify such instructional methods as their preferred strategy. The justification that the students provided reflects the themes, patterns, and ideas that the students provided through their responses. Students direct remarks are included in their justification to give more insight into their responses. Table 6 presents a summary of the students' preferred instructional strategies.

DISCUSSION OF THE FINDINGS

The unwitting perception is that adult students learn exclusively from an andragogical instructional approach while pedagogy is suitable children. However, Mohring (1989) does not subscribe to the distinction that andragogy is for adult education, while pedagogy is for children. According to Mohring, such difference is "etymologically inaccurate (p. 52). The results of the present case study show that adult students prefer a variety of instructional methods that are supported by both pedagogical and andragogical principles. The findings indicate that 11 (73.33%) adult students prefer the discovery method of instruction. The discovery method is not exclusive for adult learners; it is also appropriate for children. Bruner (1966) maintains that the discovery method helps children to develop an inquiring mind. The results show that 86.66% of the interviewees prefer the problem-solving approach. Dodge and Coker (1998) observe that children who possess the skill of problem-solving are better prepared to face the challenges and rigors of our complex universe. Drake (1993) states that the educational profession should focus on helping children to develop the skill and the ability to provide solutions to a problem. The results indicate that 73.33% of the respondents prefer the discussion method. The discussion method of teaching allows for both hierarchical and horizontal communication during instruction so that teachers and class members can engage in active interaction without inhibition. In support of the discussion method for both children and adult learners, Nicolai (2015) indicates that it is necessary to provide activities and use discussion to create awareness of the classroom engagement.

The demonstration method of teaching provides students with the opportunity to learn by doing. The current case study results show that 73.33% of the respondents prefer demonstration method of teaching. Okojie, Boulder, and Boulder (2011) found that demonstration/hand-on activities are rated highest among the instructional strategies. According to Cabibiham (2013), demonstration provides a cognitive picture to explain ideas or concepts which may be difficult to describe verbally. Giridharan and Raju

Table 6. Students' preferred instructional learning strategies

Instructional Methods	Student Justification for their Preferred Instruction Strategies Adult Student Population: 15	Number of Times Chosen as the Preferred Method Frequency (*f*)	Percent %
Problem-solving	Problem-solving learning strategy equips students with the skill to apply the concept learned outside the classroom. The overwhelming pattern among the students is transferability of knowledge and skill acquired. One of the students writes "key to this technique of instruction is that it enhances students' critical thinking as well as analytical ability" (student E).	13	86.66
Demonstration	It "generates interest in the subject, helps to develop skills, good for visual learner like myself" (student C). The pattern in the responses of the students who choose demonstration method is that it promotes learning by doing. It encourages active learning.	11	73.33
Discussion	Students who choose discussion method acknowledge that it supports collaborative learning. They believe that discussion method can enhance student understanding by encouraging reflection, "broadens student thinking by allowing them to see each other's point of view and reinforces knowledge, all while building a learning community" (Student B).	11	73.33
Discovery	The general theme is that discovery method of instruction motivates students to learn through personal initiative and through "researching, experimentation, and asking questions" (Student C). All the students who choose discovery method agree that it encourages inquiry mind through research effort.	11	73.33
Demonstration/ hands-on activities	Students who choose demonstration/hands-on activities state that it provides opportunity for students to acquire new skill and retain such skill. One of the students writes that it provides practical experience. "It supports active learning" (Student, G).	10	66.66
Project-based method	Students who choose project-based learning remark that it represents an authentic learning experience and provides students with real-life learning opportunity. Nine students who prefer project-based learning state that it is "an authentic method of learning because it is based on real life experience" (Students A, D, F and O).	9	60

(2016) state that "demonstrations provide the multisensory approach to teaching through practical hands-on learning using working models" (p. 176). Seven (46.66%) students prefer the reflection method of teaching. Walker (1985) posits that reflection helps both children and adult learners alike to connect new information with the existing knowledge, thereby creating a new pattern of the learning material. Walker's observation illustrates that adults and non-adults can learn from the same instructional strategies depending on how such strategies are used to support learning. However, the intensity and rigor of the application may differ depending on the cognitive development of the students.

Bredekamp (1992) argues that projects and themes are essential for helping all types of students in the learning environment to learn effectively. The point is that both adults and children can learn using a project-based method of instruction. The findings of the current case study show that 60% of the adult students interviewed identified project-based learning as the preferred methods of instruction. In the present case study, 53.33% of the interviewees choose student-centered as their preferred instructional method. According to Laguador and Dizon (2013), student-centered can be used to promote learning and achievement among children and adult students alike. Weimer (2013), observe that learner-centered method of teaching motivates students by giving them some control over learning processes. Five (53.33%) students prefer the lecture method. Those who choose lectures believe that it is a good method to present

Table 7. Students' preferred instructional learning strategies continued

Instructional Methods	Student Justification for their Preferred Instruction Strategies Adult Student Population: 15	Number of Times Chosen as the Preferred Method Frequency (*f*)	Percent %
Student centered method	Student-centered learning approach helps learners to have control over the learning process, and "finally it encourages collaboration" (student J).	8	53.33
Simulation method	Simulation mimics authentic situations which reflects real life activity. It engages students as they learn. "It provides opportunity to transform learning into active participation" (Student A).	8	53.33
Compare and contrast	Compare and contrast method helps students to identify similarities and differences in the topic being studied. "It promotes critical and reflective thinking" (student H and M).	7	46.66
Reflective learning	Reflective learning approach helps students to ponder over the learning materials and mentally review them "in order to develop new insight (student B). Students believe that developing new idea is critical to creative learning and that reflective learning "helps the process of creativity" (student I).	7	46.66
Self-directed learning	Students believe that it helps self-development, supports lifelong learning. Students remark that it will help them remain current. "Encourages determination" (student K).	6	40
Content-focused	Six students believe that content-focused method helps to explain the topic of instruction as a way of motivating students to focus. Student A remarks that "a lot of emphasis is laid on the clarity and careful evaluation of the content".	6	40
Lecture method	Students point out that lecture method is good in presenting large body of information. One of the students states that "lecture method is good for summarizing class presentation" (Student M).	5	33.33
YouTube Video/ Demonstration	Students believe that YouTube video is demonstrative and interactive. A student remarks that YouTube videos provides a "great resource for demonstrating just about anything" (Student I).	5	33.33

and disseminate a large body of information. Okojie, Boulder, and Boulder (2011) found that the lecture method is beneficial when combined with activities and discussion.

Fifty-three percent of the students involved in this study prefer simulation as a teaching strategy. The respondents believe that it (simulation) mimics real-life activity and helps to make learning more authentic. Both adults and non-adults prefer to learn in an environment that manifests authenticity because it promotes transfer learning. Girod and Girod (2008) maintain that the simulation method helps in the presentation of key features of the learning activity in a manner that provides both adult and non-adult students with experience for reflection and insight. The findings from this present study support the position taken by Darbyshire (1993). The author (Darbyshire) acknowledges that the "distinction between andragogy and pedagogy is spurious and based upon assumptions which are untenable" (p. 328). Thompson (1989) believes that the notion that "all adults share a set of learner characteristics that differ from the learning characteristic of all children is problematic" (p.2). Giesbrech (2007) argues that connective pedagogy helps both adult and non-adult learners to be connected using social media networks, including internet resources, to share ideas. Heutagogical method of learning promotes an inquiry mind and encourages independent effort to learn for adult and non-adult learners to promote lifelong learning.

Table 8. Students' preferred instructional learning strategies continued

Instructional Methods	Student Justification for their Preferred Instruction Strategies Adult Student Population: 15	Number of Times Chosen as the Preferred Method Frequency (*f*)	Percent %
Vocabulary's code	Four students believe that vocabulary code helps student to links words that are related together so that new meaningful categories can be formed. "Students gain the skill to use learned vocabulary in a different related context" (Student H).	4	26.66
Small group discussion	Small group discussion helps students "define issues and prioritize them" (Student G). Learning is encouraged with motivation, exchanging of ideas and collaboration. "It guides the learners and captures their attention" (Student N).	3	20
Independent Study	Three adult students prefer independent study method of learning because it helps them to control their learning process. One student remarks that independent study and lecturing help students to ask question and seek data to discover knowledge. Also, another benefit of independent study is that "it allows students to work at their own pace (student F).	3	20
Reading/ Reflection	Two students believe that reading and reflection helps students to remember what they have read and learned. "Reading and reflection is a flexible way of learning" (Students K and I).	2	13.33
Reading for meaning	A student remarks that "students learn the relationship between words and phrases. Students identify themes and patterns to arrive at a conclusion. Reflection can also be a powerful activity that promotes learning and self-evaluation" (student D).	1	6.66%
Literature Reflection	One student points out that "literature reflection method of instruction helps students to synthesize course materials, highlight key ideas from recommended readings" Student O).	1	6.66%
Teacher-centered	"Teachers present instruction without interruption and with clarity" (Student L).	1	6.66%
Annotating/ Paraphrasing Articles	Annotating/paraphrasing "allows for note taking, it provides the opportunity to highlight key points which helps to summarize key ideas" (Student C).	1	6.66%

RECOMMENDATIONS FOR FUTURE RESEARCH

No one method is adequate for an effective learning outcome because of the differences among the students in their preferred instructional methods. It is, therefore, critical that teachers engage students from different learning perspectives. Teachers can use the theories of pedagogy and andragogy as deemed necessary to select appropriate methods of learning that reflect students' preferred instructional strategies for both children and adults. Further study with a more culturally diverse student body is essential to have a comprehensive database for instructional decision-making. It is vital to examine the impact of cultural differences on students' preferred instructional strategies to address diversity in a multicultural society like the US. A study with a larger population is recommended to increase the size of data collection for a robust data analysis. A mixed method of research will provide more insight into the theories that support learning in both the traditional classroom and online. The results show that student participants prefer different instructional strategies because they learn from a multiplicity of approaches. As teachers understand the motives underlying students preferred instructional methods, it is incumbent on them to diversify their instructional practices to accommodate students' instructional preferences and the motivations underlying such preferences.

CONCLUSION

The present authors traced the evolution of adult education and its emergence as an academic discipline. The observation is that adult education is rooted in a movement designed to combat adult literacy and bring awareness to political ideology, including economic disparity. Various programs such as social justice, civil society, and community engagement are used to encourage adults to participate in political and economic engagements. Even to this present day, adult education continues to provide an opportunity for adults and adolescents to improve their existing knowledge and skill as well as acquire new skills to enhance their economic competitiveness. Adult education remains one of the tools for creating political awareness and promoting social engagement and community involvement in the ever-changing world. As information technology and social media network continue to transform, adult education remains one of the tools for providing individuals with technological skills through various formal and informal training, including different types of web training workshops. The conclusion is that adult education continues to galvanize economic and social participation as well as creating political consciousness and promoting civic responsibility as it begun during its (adult education) inception. Therefore, adult education continues to support the philosophical assumptions that fueled its (adult education) emergence during the 18th century.

The assumption that pedagogy is exclusively for teaching children while andragogy is for adult learners is critically analyzed. The current authors affirm that the improper interpretation of pedagogical theory led to the acceptance that the application of the theory is authoritarian and instructivist in nature, including teacher-centered. The conclusion is that pedagogy is not a specific method or strategy for imparting knowledge but a guiding principle for teaching and learning for both children and adult learners. The realization is that such a distinction is somehow misleading. The use of connectivism and heutagogy as methods of instruction helps to promote the social aspect of learning and foster self-determination approach toward learning. To demonstrate that pedagogy and andragogy are not mutually exclusive in their application, the chapter contributors carried out a case study. The findings from the case study show that pedagogy and andragogy share essential features as learning principles that are beneficial to all types of learners. Adults, adolescents and children learn from a variety of methods that are supported by both pedagogy and andragogy. The conclusion is that pedagogy shares major characteristics with andragogy. Houde (2006) supports the present conclusion and contends that "andragogy, with its focus on the individual and concern about learning, teaching and adult development has many parallels with pedagogy." (p. 91).

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KEY TERMS AND DEFINITIONS

Adult Education: Formal and informal learning instruction provided beyond secondary education system designed to prepare individuals (adolescents and adults) to improve their potentials and achieve their personal, social and economic goals in life.

Adult Literacy: Refers to the percentage of the people in the country who are 15 years and over who do not read or write.

Andragogy: Learning principles which are assumed to be appropriate for adult learners. Knowles (1984) assigned andragogical learning principle to the teaching of adult learners because the central theme of andragogy focuses on the adult.

Civil Society: Refer to a wide of array of organizations: community groups, non-governmental organizations, labour unions, indigenous groups, charitable organizations, faith-based organizations, professional associations, and foundations" World Bank (2010) (http://go.worldbank.org/4CE7W046K0**).**

Community Engagement: The development of a mutual working relationship and connection between local and public bodies such as councils and community organization

Connectivism: An educational theory which provides opportunity for students and teachers to connect and learn using information, database, artifacts etc. stored in the web

Customization of Knowledge: The process of developing a new idea from the concept presented during instruction and using the idea to address related issue in a manner that new meaning and application emerge.

Heutagogy: Self-determined learning approach which equips learners with the ability to instruct self and self-direct one's learning.

Instructivism: Transfer of knowledge "directly into the mind of the learner from the instructor. This knowledge is expected to be wholly accepted and not questioned by the learner or even analyzed by him" (Onyesolu, Nwsor, Ositanwosu and Iwegbuna (2013, p. 40) (https://www.educatorstechnology.com/2013/05/awesome-chart-on-pedagogy-vs-andragogy.html).

Non-Adults: Children and Adolescents

Paidagogos: Means the leader of a boy and it is a concept from which pedagogy is derived.

Pedagogy: Accepted as a science of teaching, the teacher assumes the position of an authoritative knower and the relationship between the teacher and the student becomes hierarchical.

Social Justice: Refers to justice in relation to the distribution of opportunities, wealth, rights and privileges.

Structured Learning: Formal learning program or a course that is designed using instructional methodologies and guided by an established curriculum topic to make sure that the data collected is valid and dependable.

Unstructured Learning: Open-ended learning where learners are not faced with the traditional classroom confinement, no established set of rules.

APPENDIX: REVIEW ACTIVITIES/SCENERIOS

1. Discuss the philosophical ideology and the programs that provide the foundation for the emergence of adult education. Students are required to discuss the impact of the following programs to the evolution and growth of adult education.
    a. Adult Literacy
    b. Social Justice
    c. Civil Society
    d. Community Engagement
2. Critically review the assumption that andragogy is mainly an adult learning theory.
    a. Discuss learning principles and characteristics which are shared by pedagogy and andragogy.
    b. Pedagogy is a guiding principle for teaching and learning instead of a strategy. Discuss
    c. The improper perception of pedagogy has led to the to the assumption that pedagogy is instructivist and teacher centered in nature. Provide a critical review.
    d. Provide examples of the andragogy learning strategies that can be used to deliver instruction for children and adult learners.
3. You are working with graduate students on the online course, describe the steps that you will take to use connectivism, a digital-based learning theory to design instruction.
4. As a teacher, explain the approach that you will take to create a heutagogical learning environment.
    - Provide five learning activities that are supported by each of the following instructional strategies/methods. Explain why you consider the activities you provided appropriate for the strategies listed below.
    - Reflective learning
    - Problem-solving
    - Discovery learning
    - Simulation method
    - Small group discussion
    - Project-based learning
    - Demonstration method
    - Lecture method
    - Self-directed learning

Chapter 2

Innovative Approach to Meet the Needs of Working Professionals Through Blended Learning

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ABSTRACT

Blended learning is an emerging approach to distance education that has gained increasing acceptance by faculty in higher education. This chapter presents an innovative approach to blended learning conceptualized as Blended Plus. This approach empowers students to choose how they prefer to interact with instruction within a course. Existing research in blended learning shows significant impact on student learning outcomes. Despite this, some faculty feel apprehensive about online learning modalities, perceiving it as a threat to their faculty role. Others find it appealing because they believe it protects their essential role as the facilitator of instruction. This chapter illustrates how a group of faculty members made students' needs a priority through their willingness to modify courses to provide working professionals greater accessibility to education. Benefits, challenges, and future directions of the new approach will be discussed.

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INTRODUCTION

Blended learning represents a variety of instructional approaches that includes both face-to-face (i.e., synchronous) and online (i.e., asynchronous) components. Examples of emerging approaches to blended learning include flipped or inverted learning. These approaches include distinct online delivery of instruction and course content, followed by live discussions in a face-to-face setting (Lee, Lim, & Kim, 2017). This chapter illustrates how the authors implemented an innovative approach to blended learning on a regional campus of a state research university. The potential for increased flexibility and access to education was important for expanding the geographic reach of the campus and essential for meeting the needs of the students, many of whom are working professionals. This approach, which the authors conceptualized as *Blended Plus*, expanded blended learning through giving students autonomy in determining how they would interact with the class. Specifically, students were given the choice to interact synchronously through face-to-face class meetings or through the use of videoconferencing software connected to a learning management system, or asynchronously by viewing archived recordings of the live meetings and completing interactive online assignments. Students were given the option to choose each class meeting which modality worked best for them. The authors developed a qualitative action research design to answer the following questions:

1. What is the effect of implementing a *Blended Plus* delivery on student engagement and learning outcomes?
2. Will implementing a *Blended Plus* course delivery impact student recruitment and retention in degree programs on the campus?
3. Will access to live class meetings via the internet expand the reach of the regional campus?

This chapter begins by exploring the literature regarding the evolution and impact of blended learning approaches. This is followed by a report on an action research study in which a group of faculty members implemented an innovative approach to blended learning on a regional campus of a state research university. Next, the chapter will demonstrate the viability of blended learning models for better meeting the needs of working professionals through making courses more accessible. Lastly, this chapter addresses important lessons learned in implementing *Blended Plus* as well as recommendations for future research on this instructional approach.

LITERATURE REVIEW

Institutions of higher education serve many different types of learners with diverse life circumstances. This, along with immense technological advancements, has had a transformative effect on higher education. As such, many have incorporated technology into their instruction to better serve the needs of their students. This technology-enhanced learning (TEL) is implemented in a variety of ways including the use of learning management systems (LMS), more flexible access to courses through asynchronous online instruction, the use of specific technologies by individual faculty members, massive open online courses, and a wide variety of additional applications (Gregory & Lodge, 2015). Yet as institutions utilize technology to widen student access and facilitate engagement, it is important to consider the best way to implement such uses of technology. Specifically, it seems important for institutions to not simply use technology for the sake of using technology, but rather thoughtfully consider how to utilize it to best meet the needs of students and promote positive learning outcomes. Below, the authors provide an overview of the literature regarding blended learning, one effective and flexible approach to instruction that intentionally incorporates technology. Specifically, the authors address the effectiveness of blended learning, how students and faculty members perceive this approach, institutional adoption of this approach, and finally considerations for implementation and instructional design for delivering courses in a blended format.

Effectiveness of Blended Learning

Meta-analytic studies regarding the effectiveness of blended and online instruction suggest that students who receive multiple learning experiences through these modalities tend to perform better than those who receive purely face-to-face instruction (Bernard, Borokhovski, Schmid, Tamim, & Abrami, 2014; Means, Toyama, Murphy, & Baki, 2013; Sitzmann, Kraiger, Stewart, & Wisher, 2006; U.S. Department of Education, 2010; Zhao, Lei, Yan, Lai, & Tan, 2005). Importantly, approaches that included some aspect of blended learning proved most important in strengthening student learning outcomes (Bernard et al. 2014; Means et al. 2013; Zhao et al., 2005). For example, a meta-analysis focused on the effectiveness of online instruction conducted by the U.S. Department of Education (2010) found that students who participated in blended approaches to learning were responsible for the observed online advantage. Moreover, when blended learning was excluded from the analyses, those who received online instruction did not perform as well as those who received face-to-face instruction. Zhao et al. (2005) also found that blended learning produced a significantly greater effect size when compared with instruction that was purely face-to-face in terms of student achievement. In addition, Sitzmann et al. (2006) found that web-based instruction which included blended components was more effective than face-to-face instruction for particular types of knowledge such as declarative knowledge ("knowing that") and procedural knowledge ("knowing how"). Finally, more recent studies (Bernard et al., 2014; Means et al. 2013) revisited the impact of blended learning related to advances in web-based technologies and found that blended instructional design continues to produce enhanced student outcomes over purely face-to-face instruction.

Faculty and Students Perceptions of Blended Learning

Despite the reported effectiveness of online and blended approaches specifically, many faculty members hold differing beliefs about the effectiveness of such approaches and varied levels of self-efficacy in utilizing it (Boelens, Voet, & De Wever, 2018). The greatest concern reported by faculty is the potential for technology to take over their faculty role (Porter & Graham, 2016). Other concerns about blended learning include the perception of decreased student interaction, lack of time to effectively prepare for blended courses due to heavy workloads, lack of financial support, and challenges with facilitating online interactions (Humbert, 2007; Oh & Park, 2009). Even with these stated concerns, overall, research suggests that faculty attitudes toward online instruction, including blended learning, have become more favorable (Allen & Seaman, 2013).As such, blended approaches may serve as a bridge between online and face-to-face instruction. Specifically, faculty members often perceive blended approaches less threatening because the instruction remains integral to the delivery of course content. Blended learning thus allows faculty members to leverage the advantages of online instruction while maintaining a traditional course structure and faculty role. Further, blended approaches allow faculty members to decide what portions of instruction to provide through online systems and resources and how to best use live instruction in the classroom.

It is also important to note that while institutions have increasingly incorporated online delivery, like faculty, there is mixed receptivity for online and blended learning among students. A survey of students at Shasta College in California revealed that while budget cuts resulted in reduction of face-to-face sections and consolidation through online offerings, some students preferred the face-to-face alternative (Glancey, 2018). Another reason students may not prefer this modality relates to access to technology. As recently as 2016, the Federal Communication Commission (FCC) estimated that 8% of the U.S. population still lacked access to broadband (FCC, 2018). This was most pronounced in rural areas where more than 30% lacked access.

In contrast to the above, Steyn and Tonder (2017) suggested that incorporating technology with face-to-face instruction may provide the most optimal form of delivery. These researchers found that engagement with technology not only broadened access to course delivery, but also enhanced participation of students. Specifically, female students who reported discomfort asking questions in the face-to-face environment, experienced increased confidence and ease in asking the same questions through online collaboration. Steyn and Tonder suggested that in this way, technology not only addressed issues of access, but also social equity. Another study indicated similar results regarding the accessibility of courses to students between 25 and 49 years old and those in the workforce:

The ECW project led to the development of innovative student support, teaching and learning. The shift from the traditional face-to-face-centered approach to a strong student-centered blended approach gave a clear message for the need to change the current higher education structure and culture to better support non-traditional students. (Jones & Lau, 2010, p. 412)

These findings reiterate the importance of blended models that balance opportunities of synchronous and asynchronous delivery with flexibility for adult learners.

Widening Participation in Higher Education

At the institutional level, attitudes regarding the importance of blended instruction to institutional growth also appear to be changing. For example, in the early 2000s less than half of institutions reported online education as critical to their future. As of 2012, 70% of institutions reported online instruction as critical to institutional growth (Allen & Seaman, 2013). The catalyst for this change in attitude may be attributed to shifts in student demographics and potential student populations. The number of high school graduates in the United States is shrinking, reversing two decades of growth in that population (Seltzer, 2016). A report from the National Center for Education Statistics (2011) stated that 2.6 million people entered four-year colleges immediately after high school and lived on campus, while 17.6 million fell into the category of parents, working adults, military, and others. By 2015, students 25 and older comprised 38% of undergraduate in the nation (Kena et al, 2015).

Given this trend, many institutions of higher education are increasingly turning to online delivery to meet the needs of the shifting population of students. This seems especially important given that adult learners face challenges including coordinating work schedules, childcare, and caring for elderly parents. (Glancey, 2018). Between 2012 and 2015 more private-nonprofit and public intuitions entered the online market, shifting the majority of the population away from private-for profit institutions, which now hold less than 15% of the online market (Straumsheim, 2017). Given the apparent need for greater flexibility in course delivery to support changing student demographics, institutions and faculty members should carefully consider how and when to incorporate and implement technology in the classroom.

Considerations for Adoption and Implementation of Blended Learning

As institutions increase the use of blended learning models, the adoption and implementation of this modality must be paired with strong faculty support. In fact, without the widespread buy-in of faculty, such changes are likely to fail (Christo-Baker, 2004). Graham, Woodfield and Harrison (2013) developed an institutional blended learning framework to support their institution's transition to and faculty member's adoption and utilization of blended learning. Their framework outlined key markers of strategy, structure, and supports institutions must put in place during the implementation of a blended learning model. Strategy in this framework referred to a clear vision with a common definition for blended learning, policies for its implementation, forms of advocacy put into place for the needs of varied constituencies, and a clearly defined how and why blended delivery was being implemented. Structure referred to institutional governance, the blended delivery model, clear guidelines for developing and delivering classes in this format, example schedules, and the software and hardware needed for a blended format. Finally, the support encompassed how the institution facilitated the implementation of the blended delivery in terms of technology support, instructional support, and faculty incentives. The presence and implementation of the strategy, structure, and institutional support contributed to faculty member's decisions to embrace or reject the blended learning approach. Porter and Graham (2016) found that faculty identified the structure and support components as most impactful on their attitudes toward blended delivery. In their study, 52% of faculty identified infrastructure, such as the availability of technology tools to provide the blended instruction with ease, as most impactful on their willingness to embrace a blended modality. Faculty also pointed to technical and pedagogical supports as significant on their adoption decision. They also found that faculty needed to know that their institutions decision to move to blended learning aligned with their own values.

Besides the personal concerns related to adopting and implementing blended learning as previously mentioned, some faculty perceive the use of technology as detrimental to instruction and learning in general. This includes the belief that face-to-face methods are superior and non-transferable to online settings, that the use of LMS cause students to be lazy, and that technology can be disruptive to learning. However, research suggests that blended models enhance the overall experience of students, promote collaborative interactions, and result in improved learning outcomes (Diaz & Brown, 2010). Students entering higher education settings almost uniformly expect TEL in the form of utilizing a LMS like Blackboard™ or Canvas™. Even in the classroom, there is an expectation that instructors will utilize technology in some way (e.g., PowerPoint, Internet Browsers, Video). However, the move to blended instruction requires a philosophical shift in faculty and student roles and significant investment of time by individual faculty members (Gregory & Lodge, 2015).

Specifically, blended delivery represents a shift from a teacher-centered or "sage on the stage" approach to instruction to a learner-centered or "guide on the side" approach (Morrison, 2014). This creates functional changes in the student and instructor roles and responsibilities. For example, instructors develop and facilitate course content and activities in such a way that students take on a more self-directed approach to their course responsibilities (Morrison, 2014). This requires a different way of thinking about, creating, and delivering courses. As with any major change, this may lead to confusion or frustration for faculty members and students alike . This change can also complicate the faculty role, particularly when the institution's overall philosophy about the faculty role and resulting workload policies do not align with these demands. Many academics operate in institutions that emphasize research over teaching. Yet, faculty not only need the time to enhance their instruction with technology, but also their technological knowledge and skills. As such, research suggests the need to incentivize these efforts in adopting and implementing blended learning for it to be successful (Gregory & Lodge, 2015). This could include support for professional development and an adjustment in faculty workload. Often, institutional policies stand in contrast to the specific faculty workload requirements related to a transition to blended learning. Overall, institutions need to clearly communicate the rationale for the use of technology to enhance instruction as a strategic priority, be willing to make the necessary investments of time and money to facilitate the cultural shift, provide adequate training for all involved, and adopt effective strategies for implementing the transition (Gregory & Lodge, 2015).

Effective Instructional Design for Blended Learning

As stated above, blended learning requires a fundamental shift in faculty thinking about student engagement from a teacher-centered focus (i.e., sage on the stage) to a learner-centered focus (i.e., guide on the side) for facilitating student learning (Morrison, 2014). In teacher-centered approaches, lecture is utilized as the principal mode of delivery and focuses on the transmission of content through lecture from the experienced expert to the inexperienced novice. Learner-centered approaches focus on facilitating learning through empowering students to actively engage in and take greater control and responsibility over their learning. This is an important shift for effective instructional design for blended learning.

To illustrate, Dias and Diniz (2014) found an interactive learning environment including synchronous and asynchronous learning tools, teacher-student interaction, self-regulated learning, and the user-friendliness of technology tools to be valued by students. They suggested that effective student engagement results from students interacting across varied connections including the learner and the course-content, the learner and the instructor, the learner and the LMS, the learner with other learners. Supporting student engagement in these areas allows for an interactive blended learning environment, increasing motivation, engagement, interaction with learning activities, and ultimately learning outcomes (Dias & Diniz, 2014).

Another shift in thinking for effective instructional design is that while students enrolled in a blended course experience some component of a live, face-to-face instructional interaction, they must be treated as online students first. These students will need specific technical, academic, and student supports to promote their success (Jerke & Mosterd, 2017). These supports include access to an informational technology help desk, specialized academic advising, and instructional supports along the way. Regardless of how faculty members design and implement their blended course (e.g., adding online components to the face-to-face course, replacing some face-to-face activities with online activities, or building a new blended course from scratch), it is essential that the focus be on the students' experience learning and not just the instructors' perspective.

Lai, Lam, and Lim (2016) suggest that online instruction can be integrated in courses either by consolidation or extension principles. Consolidation includes a combination of components such as listening to lectures and discussions and reviewing these concepts in the online setting so students can solidify their understandings. The extension principle involves complimentary online and face-to-face experiences in which students go deeper into concepts presented in the live class meetings. It is important to note that these principles are not mutually exclusive and that the best student learning outcomes result from the integration of the two. An example of the consolidation and extension principle is a course that breaks the instruction into two-week units, with a live class meeting the first week in which course-content is presented followed by an asynchronous online week that allows students to do an in-depth review of, interact with, and demonstrate their learning about what was presented. A good blended design provides integrated review and extension in both the live and online components.

A quantitative study by one group of researchers (Castano-Munoz, Duart, & Sancho-Vinuesa, 2014) emphasized the importance of the online portion of a blended course being highly interactive. To maximize this, the authors suggested that course designers should thoughtfully consider how to support interaction of learners with other learners as well as the instructor. When the online component was highly interactive, academic achievement was significantly improved.

In order to effectively implement a blended course, one must also consider whether to adapt an existing face-to-face course to include online delivery-components, designing an entirely new course that incorporates both synchronous (e.g., face-to-face or through use of videoconferencing software) and asynchronous components, or taking an online course and incorporating synchronous components (Fish & Wickersham, 2009). Fish and Wickersham (2009) suggest that the first step is to design rich, achievable and measurable learning objectives based on an assessment of student needs and established learning standards. The next step is to create authentic learning events with engaging, relevant tasks for the learners. The instructor should use interactive instructional strategies and learning events that flow from and support learning related to relevant course objectives. One strategy is to adapt successful learner-centered strategies and activities from the traditional face-to-face classroom environment, while another strategy is to develop innovative activities that are better supported by the online environment (Merrill, 2003).

Regarding the online component of blended learning, many online courses tend to be overly text-intensive. Given the importance of engagement and interaction within courses mentioned earlier (i.e., learner with content, learner with other learners, etc.), the online course components present the opportunity to creatively deliver information in a variety of ways. More engaging designs include utilizing a variety of visual elements such as pictures, maps, and concept maps as well as linking additional web resources. Emerging technologies within the online environment can also be leveraged to facilitate learner to learner interaction. Traditional online courses involved a tremendous amount of independent work. By providing authentic, relevant group tasks, an instructor can facilitate peer support and more in depth understanding of concepts that comes from ongoing communication and collaboration between students. In order for these online groups to be most effective, they could require students to work interdependently to produce quality outcomes and collaboratively to provide support and the opportunity for reflection. It is important for instructors to be well versed in the collaboration tools provided by their institution's LMS to support effective group interactions (Merrill, 2003). A final component of the effective use of online tools is the evaluation of their use to facilitate these ongoing group interactions. Evaluation techniques such as usability tests, pilot studies, surveys, and anecdotal observations should be considered to determine congruency between the collaborative learning tasks and mastery of learning objectives. User comments and pilot implementations are among the best ways to evaluate the success of online group interactions (Blummer & Kritskaya, 2018).

A final consideration in effective instructional design for blended learning relates to the learner-centered principle of self-directed learning. Specifically, the gradual release of responsibility model, also known as scaffolding, is a popular approach to moving instruction from teacher-directed, whole-group instruction to the more learner-centered, collaborative learning recommended to enhance online instruction. Also known as "I do, we do, you do," this model begins with a demonstration of a learning task by an instructor, followed by students working with the instructor's support on the learning task which reinforces and extends the initial demonstration, and finally the individual learner demonstrates mastery and application independently. The model provides a structure for instructors to incrementally shift from more teacher-directed modeling of concepts and skills to students assuming responsibility for their learning through collaboration with the instructor and peers. Table 1 below displays the mentoring roles and responsibilities in the gradual release of responsibility model. At the beginning, the instructor bears the responsibility for providing direct instruction while the student is required to actively listen and ask questions for clarification. At the next stage, the lines begin to blur between roles as the instruction becomes more interactive in nature. In the last stages, the student takes on more responsibility for their learning by engaging in tasks designed by the instructor while the instructor focused on providing thoughtful feedback. The last stages are interchangeable, meaning that the student can go back and forth between independent practice and group collaboration.

Description of the Research Context

An innovative approach to blended learning was implemented at ANONYMOUS UNIVERSITY campus beginning in the summer of 2017. ANONYMOUS UNIVERSITY is a non-residential, regional campus serving 30 counties in East Central ANONYMOUS STATE and eight counties in West Central ANONYMOUS STATE. The campus includes two physical facilities including the ANONYMOUS UNIVERSITY campus which houses class meeting spaces and faculty offices for the Divisions of Arts and Sciences and Education and the ANONYMOUS UNIVERSITY campus which houses class meeting spaces and faculty offices for the Division of Business and Physician Assistant program. ANONYMOUS

Table 1. Mentoring roles and responsibilities for gradual release of responsibility model

	Instructor	Student
I do it ***Direct Instruction***	• Provides direct instruction • Establishes goals and purpose • Models • Think aloud	• Actively listens • Takes notes • Asks for clarification
We do it ***Guided Instruction***	• Interactive instruction • Works with students • Checks, prompts, clues • Provides additional modeling • Meets with needs-based groups	• Asks and responds to questions • Works with teacher and classmates • Completes process alongside others
You do it independently ***Independent Practice***	• Provides feedback • Evaluates • Determines level of understanding	• Works alone • Relies on notes, activities, classroom learning to complete assignment • Takes full responsibility for outcome
You do it together ***Collaborative Learning***	• Moves among groups • Clarifies confusion • Provides support	• Works with classmates, shares outcome • Collaborates on authentic task • Consolidates learning • Completes process in small group • Looks to peers for clarification

Source: (Fisher & Frey, 2007)

UNIVERSITY is a transfer campus offering junior, senior, and graduate-level courses. Enrollment on the ANONYMOUS UNIVERSITY campus as of Fall 2018 was 575 total students. Of these students, 162 were enrolled in programs in Arts and Sciences, 105 were enrolled in programs in Business, and 244 were enrolled in programs in education. Remaining students were listed as unclassified. Of these students, 171 identified as male and 404 identified as female. Overall enrollment for ANONYMOUS UNIVERSITY as of Fall 2018 was 21,731.

This action research study was implemented due to alarming declines in enrollment over a ten-year period. ANONYMOUS UNIVERSITY's campus enrollment was 785 students in 2007, but had declined to 495 by 2017. While enrollment numbers for the Divisions of Arts and Sciences and Business remained relatively static during this period, the Division of Education experienced a significant decline, from over 400 students to just 259 in the same period.

The participants in the study were primarily faculty and students in the elementary education program. Initially, one of the authors, who is a faculty member in elementary education, and his students participated in the pilot. The design and implementation team included this faculty member, the Head of Campus, the division head for education, and a team leader from the university's information technology services unit. The pilot phase design and implementation team developed a blended approach to instruction based on empirical research. Importantly, piloting the approach in the courses taught by the author allowed for technology trouble-shooting with support from the ITS team leader. In the subsequent phases of the project, it was necessary to expand the implementation team so that a coordinated effort within a program could be offered in the blended design. The team was expanded to include two additional ITS staff members and four faculty members teaching both face-to-face and specialized cohorts of the elementary education program designed for teacher assistants and other school para-professionals completing the degree requirements to become licensed teachers ($N = 7$ for first cohort, $N = 10$ for second cohort, $N = 17$ for the third cohort). The blended delivery made it possible for these students, who were primarily working professionals, to attend classes while maintaining their full-time jobs. The students were recruited through interest meetings held at schools within a one-hour radius around the campus, press releases about the new course offerings, and distribution of information to human resource directors at school districts throughout the state. Three faculty members in the Division of Business also offered their courses in the blended design and three faculty members in the Division of Arts and Sciences participated in training related to *Blended Plus* delivery, but did not utilize this approach.

Blended Plus

The *Blended Plus* design differs from blended instructional designs found in the literature by expanding the concept of what is considered face-to-face instruction and by empowering students to make decisions about how they best interact with course content. The major shift in this design is the use of web conferencing software and specially outfitted classrooms to allow students to attend classes live without having to be physically present on campus. During phase one, Blackboard Collaborate Ultra™ which was embedded in the Blackboard™ LMS, was used along with a Logitech GROUP™ video conferencing equipment that was borrowed from a conference room on campus. During phases two and three, the equipment was permanently installed in twelve classrooms on campus. The university also migrated to the Canvas™ LMS and embedded WebEx™ software within this LMS for video conferencing. Students needed a computer with a web camera and ear buds with a microphone along with a reliable internet connection to attend classes live from any location. Students attending classes through web conferencing were instructed to share their camera at all times, but to mute their microphone unless they wanted to ask a question or respond to a class discussion. This allowed students to demonstrate their attentiveness while also reducing distracting background noise.

Another key feature of the *Blended Plus* design was providing a set of courses that students typically take together during a particular semester and providing them in a synched hybrid fashion. For example, our elementary education students typically take an early childhood education course, two early literacy courses, and a diversity class during the same semester. These classes were scheduled on one afternoon/evening per week with the classes stacked on top of one another. The first set of classes met from 4:00 p.m. to 6:30 p.m. and the second set of classes met from 6:45 p.m. to 9:15 p.m. All of the classes met live during the first week of class with the two courses splitting the class times in half. After that, each of the classes met live every other week and provided completely asynchronous online course material during the weeks when no live class meetings were scheduled. For example, the early childhood class met from 4:00 p.m. to 5:15 p.m. the first week to go over the course syllabus and expectations. The diversity class met from 5:15 p.m. to 6:30 p.m. to do the same for that course. After that, the early childhood class met live during week two while the diversity class provided online instruction via the LMS. During week three, the diversity class met live while the early childhood class provided online instruction and alternated so forth throughout the semester. Thus, each class met live approximately 50% of the time.

Students participating in the *Blended Plus* courses also had the option to attend live class meetings (either in person on by logging in online) or to view recordings of the class meeting and to complete associated assignments within one week of the class meeting. This not only gave the student greater flexibility, but allowed the instructor to keep attendance. The students were also able to choose how they participated in the class sessions week to week. For example, a student could choose to attend live in person on the first week of class and then log in for live class meetings the rest of the time. If a student had work or a personal conflict with the class meeting time one week, the student could view the class recording and complete the online class assignments for that week. It is important to note that if students chose the option to view the class recording, they were required to complete written assignments (typically discussion board posts or reflective essays) to demonstrate mastery of content that was covered in class that week. This provided encouragement to attend the live meetings as students were able to demonstrate mastery by participating in class discussions versus having to respond to discussion prompts in writing.

DATA COLLECTION AND ANALYSIS

This qualitative study is based on an emancipatory, developmental, critical action research model. The over-arching theoretical frame for action research is the ideological perspective of postmodernism. This model requires researchers to identify problems they encounter in their environment and apply theory and practice to implement solutions to these problems. As such, the researchers in this model assume the roles of designing and implementing an action plan to solve the problems (Kemmis & McTaggert, 1988). The most common approach to action research includes selecting the research area, collecting and analyzing preliminary data, developing and implementing an action plan, collecting more data after plan implementation, and analyzing and assessing the effect of the action plan (Berg & Lune, 2015; Creswell, 2013). With this in mind, the authors developed, implemented, and evaluated the action plan throughout to ensure it matched purposes of the study. Along the way, the authors kept reflective notes on their own experiences and casual conversations with students and colleagues and collected archival data such as results of course evaluations, recordings of class meetings, and institutional reports. The notes and archival data pieces were reviewed for initial impressions after each stage of the project design and then reviewed again at subsequent stages to determine possible emerging themes related to the research questions. A hierarchy of codes was created based on themes emerging from the data and themes established in the literature. The data were categorized based on the coding and a matrix was created that showed the themes and provided evidence from the notes as well as from the archival documents. The final stage of data analysis was to consolidate the emerging categories into a series of major concepts that portrayed meaning that was derived from the data (Berg & Lune, 2012).

The authors thoughtfully incorporated each step of the participatory action research process into the action plan while implementing the *Blended Plus* delivery. Table 2 below illustrates the steps of the participatory action research (PAR) method followed by the authors. The process began with the observation of declining enrollment on the ANONYMOUS UNIVERSITY campus, particularly in Division of Education. The authors determined that while many students continued to prefer face-to-face classes, the availability of online programs at ANONYMOUS UNIVERSITY's main campus in ANONYMOUS TOWN as well as other institutions was negatively impacting ANONYMOUS UNIVERSITY's overall enrollment as students chose degree pathways they perceived to be more accessible and congruent with their lifestyles.

The authors developed a variety of solutions to this problem including the development of synched hybrid classes that allowed students to stack two classes that typically occurred during the same semester of a student's program of study on top of each other with alternating live class meetings and online assignments. Another identified solution was to adjust the evening class schedule to start classes at 4:00 pm and end them at 6:30 pm with no break so a second set of classes could be offered from 6:45 pm to 9:15 pm. This allowed students who worked and had other family obligations to decrease the number of

Table 2. The participatory action research (PAR) by method

MOMENT	WHAT'S HAPPENING
OBSERVATION	It was observed that the degree programs at the ANONYMOUS UNIVERSITY regional campus were steadily declining in enrollment from 2007-2017.
DIAGNOSIS	While the original purpose of the regional campus was to serve students in a particular geographical region, the campus was losing market share to online degree programs at the main campus and other institutions.
ACTION PLANNING	Faculty were asked to propose solutions to the problem of declining enrollment. A variety of approaches came up including offering synched hybrid classes, adjusting class times to allow for more classes in the afternoons/evenings, and expanding the reach of the campus using videoconferencing technology.
ACTION	All of the solutions above met some aspect of student needs, but they needed to be integrated in a systematic way to have greater impact. The *Blended Plus* delivery was initially piloted in four summer classes by one faculty member and then expanded across the campus into complete degree programs.
EVALUATION	To evaluate the effectiveness of the *Blended Plus* design, a variety of data were collected. This included artifacts such as reflections on teaching practice, casual conversations, and observations of *Blended Plus.*
LEARNING	Implementation of the *Blended Plus* delivery over an entire degree program resulted in enrollment growth, expanded program reach, and higher student engagement. Issues related to faculty support, technology access, and pedagogical considerations continue to be explored.

Source: (Kemmis & McTaggert, 1988)

times they had to campus, particularly when students paired this with the synched hybrid approach. While these approaches made some classes more accessible to a portion of students, they still did not expand the geographic reach of the campus, as long commutes would prevent students outside of a 45-minute driving radius to access the course offerings. This led to the development of a solution conceptualized as *Blended Plus.*

Ultimately, the authors engaged in three cycles of the participatory action research process. During each cycle, the authors frequently reviewed their reflective notes and observations from their own teaching practices and casual conversations with study participants and systematically organized these into categories. For example, codes were created for such things as student engagement, learning outcomes, technology challenges, and student success. As part of the design of the *Blended Plus* delivery, each class meeting was recorded and archived for the students, which also allowed the authors to view and reflect on their class meetings as well. The supporting archival documents such as course evaluations, press-releases regarding the new initiative, and institutional reports were also marked and coded along these emerging categories. At each stage of the participatory action process, the authors identified and reflected on emerging themes in order to create an action plan for the next cycle. This ongoing reflection allowed the authors to take what they learned from each action cycle and to thoughtfully modify, expand, and/or continue those ideas during subsequent cycles.

Trustworthiness of qualitative research is established in a number of ways including credibility, transferability, dependability, and confirmability (Shenton, 2004). To establish credibility and dependability, the authors utilized well-established qualitative research methods (e.g., Berg & Lune, 2015; Creswell, 2013; Kemmis & McTaggert, 1988). In addition, the authors have conducted multiple studies using similar methods. Other aspects contributing to the credibility of this study included open-ended casual conversations to facilitate honesty of informants, the opportunity for participants to refuse to participate, peer scrutiny of the manuscript to be prepared, including faculty members in the pilot with high levels of experience in the field, member-checks of data analysis, and an examination of previous findings from similar studies.

Trustworthiness in the forms of both credibility and confirmability is enhanced in the triangulation of data sources used in the study design. The participatory action research process was taken through three action cycles to ensure that consistent data were driving themes and concepts that emerged through the analysis versus researcher bias. An additional layer of triangulation was provided by looking at multiple data sources including causal conversations, observations, and archival data.

While qualitative research is designed to report on a specific context, which limits generalizability, the findings from qualitative research are connected to a larger whole (e.g., other research). In addition, others reading this chapter may find themselves in settings or contexts that are similar and as such may apply these findings to their situations (Shenton, 2004). Because many universities are implementing blended instructional designs, it is possible that other groups will find the knowledge produced by this study to be useful to their contexts. This enhances the trustworthiness of the study by providing an aspect of transferability.

FINDINGS

As is typical in participatory action research, the results of the study are presented below as a narrative of the events as they were experienced (Creswell, 2013). After completing the observation, diagnosis, and action planning phases, an action plan was created that involved a pilot of *Blended Plus* by a single faculty member (one of the authors) in four of his education classes during the summer term of 2017.

The Pilot

This pilot involved four education courses including three undergraduate courses ($N = 21$ students) and one graduate course ($N = 6$ students). The goal was to test a modified blended delivery conceptualized as *Blended Plus* in which students were given the option to attend class in one of three ways: synchronously through face-to-face class meetings or through the use of videoconferencing software connected to a learning management system, or asynchronously by viewing archived recordings of the live meetings and completing interactive online assignments. Students were additionally allowed to go back and forth between the modalities based on their needs for each class meeting. The goal was to make courses more accessible to teacher assistants participating in a new initiative designed to make obtaining a degree and license as a teacher more accessible as they work full-time jobs.

A distance classroom with built-in cameras was designed for connecting with similar classrooms on the ANONYMOUS UNIVERSITY main campus was identified for use for the classes. Unfortunately, the distance technology did not work with the videoconferencing software integrated in the LMS. A temporary setup was created using a portable videoconferencing system that included a camera with a speaker and built in microphone to temporarily resolve this problem. This was connected to the computer in the distance classroom so the face-to-face students could see students who were logged in live on the video monitors in the room. This was not ideal as the camera had to be propped up and intentionally pointed at what the instructor desired for the students logged in to see. The class meetings were also recorded and archived so students could choose to watch the class meetings at a later time and complete the class assignments posted in the LMS.

In spite of the challenges, course evaluations and casual conversations with individual students indicated an overwhelming positive reception to the new modality. Students particularly praised the technology and the way it helped them to take classes from a remote location. In the graduate course, two students chose to attend live for each class meeting, two students exclusively logged in live, and the other two students alternated between attending live face-to-face, logging in live, or attending asynchronously based on their individual needs and preferences. Interestingly, the students who attended exclusively face-to-face shared that they enjoyed and benefited from the enhanced interaction provided by the blended approach as well as the opportunity to meet students who would otherwise could not have attended classes. One student's comment captured this sentiment well, "for the students who attended the physical classroom, it also offered perspectives from students from other parts of the state. One student took the class from ANONYMOUS CITY. It's always good to get a fresh perspective from someone else who's not in this particular region. Those perspectives can be particularly helpful when the discussion turns to education policies."

Expansion

After gathering data from the pilot, it was clear that students felt engaged by the *Blended Plus* course delivery. Additionally, though it expanded the geographic reach of the campus somewhat, in order for the *Blended Plus* course offerings to attract a wider pool of students and increase campus enrollment, it needed to be provided in a systematic way . The elementary education faculty had recently started an initiative for teacher assistants and other school para-professionals to complete the elementary education program in the synched hybrid format, however the reach of the initiative was limited to students who could commute to campus from their workplaces in time for class. This program seemed an appropriate and viable to place to implement *Blended Plus.* Thus, the faculty began to look to the new expanded blended delivery as a possible way to support the teacher assistants while simultaneously expanding the initiative. One faculty member stated that in the ANONYMOUS PROGRAM (ANONYMOUS ACRONYM) initiative, "our students are teachers, so they're working all day long. We have people who come to this campus who live an hour or more away, and so you get off of work after school and then try to be here for a four o'clock class, the geography gets in the way of being able to do that." The blended offerings were expanded to the first cohort of teacher assistants participating in the new initiative.

In this continuation of the action research cycle, all of the classes in the teacher assistant cohort were offered in the *Blended Plus* delivery which allowed them to continue to work full-time and interact with the class based on their specific needs (e.g., geographic distance from campus, preferences regarding live or online instruction, and ability to attend class during the schedule times). Additionally, several classrooms on campus were equipped with videoconferencing capabilities including webcams and microphones that functioned properly with the video conferencing software in the LMS to broadcast and record the live class meetings. One specially designed classroom also included smart integrated displays (touch screen monitors with built in computer), new chairs and tables on wheels to facilitate group interaction among students, and monitors at four stations for collaborating with students who are logged in live.

One challenging aspect of this phase of the action research cycle involved identifying and bringing additional faculty on to teach in the new modality. Encouragingly, implementation of *Blended Plus* in the elementary education program for teacher assistants appeared well received. Students provided positive feedback regarding the flexibility and interactions facilitated by the blended design. One student commented, "I work part-time, and it's helpful if I have to go into work on short notice…that we have that option." The most striking impact was the 14% increase in enrollment each after initially implementing *Blended Plus.* The authors attributed this drastic increase in enrollment in part to the implementation of the blended learning modality. This assumption was supported by student comments regarding their reasons for choosing to attend and remain at ANONYMOUS UNIVERSITY as well as the fact that the number of elementary education majors doubled from just three years prior.

Another important impact was that 100% of the initial ANONYMOUS ACRONYM cohort completed the degree program in elementary education. Students again pointed to the blended delivery as a key factor in helping them gain the academic knowledge and skills required to become a licensed teacher, while also working full-time in their school districts. One student stated, "I really wanted to go back to school, but as a wife, mother and full-time employee, a traditional college class schedule would have been extremely difficult, if not impossible to juggle. Through ANONYMOUS ACRONYM I had the opportunity to put into practice what I was learning in my university classroom, as well as share new and innovative teaching strategies with my fellow teachers back at my school. This has been a long, but extremely rewarding journey for me. I am grateful to ANONYMOUS UNIVERSITY and look forward to having my own classroom once a teacher vacancy within our district opens" (Press Release, 2018). Another student stated that the blended delivery helped her to complete the program, "when I moved in June, it was basically impossible for me to make the hour-and-a-half drive back to ANONYMOUS TOWN for class after working in the classroom all day. Being able to log on to my computer and participate live in all aspects of the class as if I were actually there—including class discussion—helped me tremendously. I had a great experience at ANONYMOUS UNIVERSITY through the ANONYMOUS ACRONYM initiative, and I can't wait to receive my degree" (Press Release, 2018).

Finally, because instructors teaching in the specialized initiative for teacher assistants also taught face-to-face sections of the same courses during the project's timeline, student outcome data was available for comparison. This comparison revealed that students in the *Blended Plus* delivery performed better than their counterparts in the face-to-face sections by earning more "As" and "Bs" and fewer "Cs" and lower. In fact, 80-90% of students in the 2nd cohort earned an "A" in their various courses as compared to 29-62% of face-to-face students during the same timeframe. These findings align with Means et al. (2013) who found increased student learning outcomes for those in blended delivery courses.

Faculty Incentives and Support

After this initial expansion, the Head of Campus set a goal for expansion of the *Blended Plus* model to classes and degree programs across the campus. He said, "as a new generation of students emerge, we seek to understand how to better engage technology in curriculum delivery. Our enrollment is comprised of students ranging from 20 years of age to a recent graduate who was 80. Blended delivery allows us to literally offer face-to-face, synchronous online, and recorded options for most any class on our ANONYMOUS TOWN campuses. An initial experiment with this delivery was done in the summer and fall semesters of 2017 with elementary education classes. This year we will equip more faculty to engage the power of blended delivery in their classes, making an ANONYMOUS UNIVERSITY education possible for many who would otherwise not be able to attain it" (Press Release, 2018). To support this goal, faculty were provided with a $1,000 incentive per blended course taught that could be used for travel for professional development or to purchase technology to support their blended classes. Two additional cohorts from the teacher assistant elementary education program also participated in the blended design beginning in the spring of 2018 and the spring of 2019 respectively. Additional programs across campus also began offering some of their classes in the blended modality.

To further support the adoption and effective implementation of *Blended Plus*, a third continuing action cycle including a special training program was developed by one of the authors. The training included five one-hour sessions presented in the *Blended Plus* design format addressing topics such as research support for online and blended instruction, how blended delivery protects the essential role of the faculty member as the facilitator of learning, basic tips for setting up a class in the LMS used by the university, and information on how to specifically plan for dialogue and interaction in the blended class using Vella's (n.d.) Eight Steps of Design and 12 Principles of Effective Adult Learning. An overarching theme throughout these trainings included helping faculty to conceptualize their courses delivered in this way as online first, with the addition of a face-to-face component. Finally, faculty were trained on how to facilitate interaction with both live and online students using a variety of instructional protocols. It was during this process that the authors and participating faculty began to consider ways to enhance the blended experience. Casual conversations with a variety of faculty indicated that challenges with technology were the biggest frustration experienced by students and faculty alike. The university switched to a new LMS during this time period which exacerbated the technical difficulties. The university simply did not provide adequate support for *Blended Plus* during the transition. Faculty also expressed the need for release time to develop new *Blended Plus* course offerings. This led to continued discussions about how to provide adequate faculty support and will be the focus of how to improve the implementation of the blended delivery.

DISCUSSION

Blended learning has been an emerging trend for online education in higher education settings. A variety of approaches have been implemented across a spectrum with varying combinations of face-to-face and asynchronous online modalities (Lee et. al., 2017). The *Blended Plus* model sought to expand the definition of blended learning by giving the student some autonomy about how they interacted with the face-to-face component of the class, giving them the option to attend face-to-face, live online, or viewing the archived recordings of the live class meetings. While the modified *Blended Plus* delivery provided new instructional resources and benefits to both faculty and students, the overarching goal of this participatory action research study was to help faculty design instruction that was more accessible to a variety of different types of learners based on sound instructional principles. More specifically, this study sought out to answer three research questions:

1. What is the effect of implementing a *Blended Plus* delivery on student engagement and outcomes?
2. Will implementing a *Blended Plus* course delivery impact student recruitment and retention in degree programs on the campus?
3. Will access to live class meetings via the internet expand the reach of the regional campus?

The first question focused on how this modified blended modality impacted the ways students engaged and performed in their coursework. The second question focused on how the campus's ability to recruit and retain students in its academic programs. The last question extended this focus on recruitment, specifically looking to see if different types of students outside of the typical geographic reach of the campus chose to participate in its programs because of the access provided by the *Blended Plus* design. These questions guided the action research process, frame the discussion of the findings, supported the authors' development of recommendations aimed at enhancing blended instruction while improving accessibility of instruction for working professionals.

Student Engagement

When *Blended Plus* was initially presented to the faculty, the greatest reported concern was the perception that student engagement would diminish if/when students chose to attend classes live via videoconferencing software or asynchronously by viewing the archived recordings versus attending face-to-face. This concern is congruent with the literature on online instruction (Boelens et. al., 2018; Sitzmann et. al., 2006; U.S. Department of Education, 2010; Zhoa et. al., 2005), which highlights the unfounded nature of these seemingly intuitive insights. This study aligned with the prior research by showing enhanced engagement of students by the blended design (Betts, 2009). However, challenges also existed related to engagement. These included technical issues with the technology and insufficient faculty support.

Throughout all three cycles of the study, faculty reported a variety of issues with the technology that prevented good student engagement. They experienced problems such as the camera and microphone not connecting properly to the computer, difficulties with adjusting settings related to volume levels and camera angles, and internet connectivity issues on both the student and campus sides. Institutional policies about job responsibilities and working hours for the IT professionals on the campus often did not allow for adequate support for faculty to navigate these issues. Though they were willing to provide assistance, often they were unable to be present when needed or they did not adequately understand the goals of the blended format in order provide adequate support. For example, all of the ANONYMOUS ACRONYM initiative classes took place in late afternoon and evening, but IT staff work during normal business hours. Previous literature on implementing new technologies related to online and blended learning suggest that administration, faculty, and IT staff should thoughtfully plan for and frequently communicate about how to best do this (Christo-Baker, 2004).

Faculty teaching the blended courses also received financial incentives to support their professional development and to purchase technology tools to support their instruction. However, they were not given release time to make adjustments to their courses. Previous research has pointed to a lack of time to adequately prepare for blended instruction due to heavy workloads as an obstacle to effectively implementing this modality (Humbert, 2007; Oh & Park, 2009). In this study, a lack of release time was attributed to budget constraints and potentially a lack of understanding of the time involved in adjusting courses to a blended design. Several faculty members reported that the blended design resulted in approximately 25% more necessary preparation time. Faculty who teach a three to four course load reported that this felt like teaching an overload without additional compensation.

Student Outcomes

While the two cohorts of teacher assistants participating in this study had a 100% completion rate, concerns existed about student outcomes. Specifically, many faculty members expressed concern regarding how to adequately monitor test taking for the students who participate in classes in a completely virtual sense. Additionally, some faculty reported concerns about students' maturity level in maintaining a fidelity of participation online like they would in a live class meeting, particularly the students participating completely asynchronously. Despite these concerns, students earned higher grades in the *Blended Plus* courses than their peers in the face-to-face sections. Previous research has shown that faculty perceptions of online learning are becoming more positive as these approaches expand more and more in higher education settings and that students actually perform better in online versus purely face-to-face settings (Allen & Seaman, 2013).

Recruitment and Retention of Students

The action plan resulted in a campus enrollment increase of 14% after many years of stagnant or declining enrollment and much of this increase can be attributed to the *Blended Plus* offerings in elementary education. As mentioned before, there was also a 100% completion rate in the participating ANONYMOUS cohorts. However, difficulties in implementing the blended model on the campus resulted in only minimal participation by one of the ANONYMOUS UNIVERSITY campus divisions and virtually no participation by another. This trend seemed to shift near the end of the last action cycle, but systematic use of the blended model was still only occurring in the elementary education program and a few graduate programs in the Division of Education. Unless students can consistently count on the availability of online and blended offerings in their programs, they must choose other options if their responsibilities prevent them from being on campus live. Previous research has shown that the real-life concerns of diverse students such as work schedules, childcare, and caring for elder parents can get in the way of participation in higher education (Glancey, 2018).

Expanded Campus Reach

For many students, driving distance is a barrier for furthering their education. As such, a goal of this project was to expand the geographic reach of the campus. Again, unless an entire program of study is provided in either online or in the *Blended Plus* format, it is only accessible to those students who are able to attend face-to-face. This greatly limits the market of potential students. An additional barrier was determining if ANONYMOUS UNIVERSITY was actually allowed to implement this new approach. Specifically, some faculty members and administrators questioned whether the new offerings stood in competition with offerings on the main campus and provided through the online campus. The faculty senate even added it as an agenda item to one of their meetings. In the end, the resulting increase in enrollment caused the model to come into more and more favor with campus administrators. Despite this, some faculty on the main campus continued feel concern when students chose to switch to the *Blended Plus* classes.

SOLUTIONS AND RECOMMENDATIONS

The following are solutions and recommendations for implementing *Blended Plus* based upon issues, problems, and successes discussed in the previous section:

- Start by casting a clear vision for what you want to accomplish with the *Blended Plus* approach and build consensus with a group of faculty members and administrators before implementation. Begin with the end in mind and make sure infrastructure and other essential supports are in place before making changes. If you are an administrator, identify a faculty member that can lead the charge from the peer level and provide a great amount of support for that individual.
- Examine institutional policies about responsibilities of technology support staff to ensure they able to support the implementation of the *Blended Plus* modality. This includes communicating about the goals and purpose of this approach and so that they are able to provide the technology support to faculty member's need and at the times of day that it is necessary.
- When outfitting classrooms with the videoconferencing hardware necessary to provide the live online and recorded class meetings, make sure quality equipment is installed that communicates well with the institutions LMS and integrated videoconferencing software. It is possible to have a classroom with multiple cameras that automatically switch camera angles based on voice and facial recognition. These systems tend to be costly, but greatly enhance the experience. Consider having one or more classrooms outfitted with the state-of-the-art equipment and additional rooms set up with more simple videoconferencing hardware. Some faculty will be more comfortable with the higher-end technology than others.
- Be mindful of making too many or unnecessary changes. For example, do not switch to a new LMS in the middle of launching the new modality.
- Objectively evaluate the amount of time it will take faculty to make adjustments to the courses and consider adjusting workload policies to give them time to do good work that facilitates student engagement.
- When providing faculty professional development on effective blended design, consider including the gradual release of responsibility model and help them to think of their class as an online class

first that leverages the live class meetings to enhance the online portion. Again, this may be counterintuitive at first, but helping faculty to think about the online component as the time learning is taking place and the live component as the time they are giving directions and modeling, will enhance their planning.

- A variety of software tools are available that can be used for virtual test proctoring. Investigate the options at the institution and be ready to provide supports for their use by faculty. It may be necessary to purchase licenses for a variety of options.
- Look for programs like ANONYMOUS that serves working adults and consider those first for implementing the *Blended Plus* model. These students are more likely to have the maturity to take on the level of responsibility necessary. Also, look for programs that are likely to have buy in from all or most of the faculty.
- Relatedly, many students may not know how to interact or engage with one another if attending live through videoconferencing, in the classroom, and/or asynchronously online. For example, for students attending live via videoconferencing software, it is important to minimize audio and visual distractions. As students attending using a webcam are only a foot or so away from the camera, students and instructors can see and hear everything that student maybe be doing (e.g., eating, coughing, yelling at their dog to stop barking). Thus, knowing when and how to mute one's audio or webcam is essential. In addition, from the authors' experiences, students will likely need support on how to utilize technology related to participating in the course live through videoconferencing or asynchronously online. This includes having and knowing how to use the hardware and software (headphones, webcam, reliable internet service, updated internet browser, etc.).
- Finally, adjust your marketing plan to reflect the *Blended Plus* opportunities. Consider a campaign of video, radio, and print advertising to help the public understand what the blended offering means and can do to help them meet their educational goals.

DIRECTIONS FOR FUTURE RESEARCH

While this study aligns with the findings of previous studies, it also reveals some additional opportunities for further research. It stands to reason that other institutions can glean from and apply some of the key concepts presented here, but due to the intentional design of the study, are not necessarily globally generalizable. It would be interesting to see further investigation comparing the different modalities of student participation within the *Blended Plus* design including the live face-to-face, live online, and asynchronous online attendance of the class meetings. It would also be interesting to see how the model works within a variety of degree programs and classes. For example, would it be a good model for training counselors, nurses, or other professional programs? Further research could also be conducted to evaluate the use of the model to make higher education accessible to diverse student groups.

CONCLUSION

In the authors' estimation, the number of online and blended programs will continue to grow. As this occurs, it is important to evaluate the effectiveness of the use of various innovative technology tools. This study gives insight into how a *Blended Plus* model was implemented on a regional branch campus of a state university. This chapter began with relevant literature regarding the evolution and impact of blended learning approaches. This was followed by a report on an action research study in which a group of faculty members implemented an innovative approach to blended learning on a regional campus of a state research university. Next, the chapter discussed the viability and implementation of *Blended Plus* for better meeting the needs of working professionals through making courses more accessible. Lastly, this chapter addressed important lessons learned in implementing this approach along with some solutions and recommendations from the issues faced. Finally, this chapter provided recommendations for future research for implementing this modality.

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KEY TERMS AND DEFINITIONS

Blended: student instruction that contains some face-to-face class meetings and some online component (synchronous or asynchronous).

Blended Learning Strategy: includes a clear vision with common definition of blended learning, policies for implementation, and rationale for using blended learning.

Blended Learning Structure: includes institutional governance and how classes are scheduled and evaluated.

Blended Learning Support: includes how the institution facilitates the implementation of blended delivery, such as technology support, instructional support, and faculty incentives.

Blended Plus: student choice, each class meeting, in attending class in person (face-to-face), logging in live online (synchronous), or watching the recorded class meeting (asynchronous).

Consolidation Principle: a combination of live class meetings with online components that review concepts presented in the classroom.

Extension Principle: a combination of live class meetings with online components that require students to dive deeper into concepts presented in the classroom.

APPENDIX

Application Activities

Short Scenario: You serve as the coordinator for an undergraduate degree program serviced by 5 faculty members, including yourself. Student enrollment in the degree program has been declining for numerous years. The program has been very traditional and includes minimal use of online learning tools. After reviewing enrollment data, your department head asks you to implement a Blended Plus delivery model to address the diverse needs of your student population. This will be a great learning curve for many of the faculty, as they value face-to-face class meetings and have been resistant to online delivery models in the past. Two (2) faculty members have taught online for other universities; 2 have absolutely no experience with online learning; however, you have already implemented a similar model in your own classroom.

Activity 1: Describe how you would begin the process of moving the program to a Blended Plus delivery model. Discuss challenges that you may face with your faculty and how you will overcome them.

Activity 2: The Blended Plus model will require changes in how faculty deliver courses and may present technological challenges as well. Create a list of resources to support faculty knowledge and skill development in implementing online and blended modalities. This could include relevant literature, conferences, websites, or trainings.

Activity 3: Create a timeline for implementation of the Blended Plus delivery model, including steps that should be taken at each point.

Chapter 3
Leveraging Partnerships to Support Community-Based Learning in a College of Education

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ABSTRACT

This chapter presents a model for leveraging community engagement to support learning in higher education institutions. The model capitalizes on bi-directional and mutually beneficial school-university and university-community partnerships. It purposefully attends to local societal problem-solving. The model uses collaborative and problem-based learning as pedagogical approaches to promote interdisciplinary

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learning in and about the local and regional community. The chapter provides examples of how this model was applied in third space; utilized the distributed expertise of faculty, students, and community organizations and professionals; and developed technology-enhanced products and processes that impact formal and informal learning of individuals in P-24 and beyond.

INTRODUCTION

Institutions of Higher Education in the United States are committed to serving both the student and university population as well as the wider community in which the institutions are located. Through active engagement, institutions have the potential to serve the economic and cultural needs of a region by educating future citizens, teachers, and leaders (Fitzgerald, Bruns, Sonka, Furco, & Swanson, 2012). The Carnegie Foundation defines active community engagement as "collaboration between institutions of higher education and their larger communities for the mutually beneficial exchange of knowledge and resources in a context of partnerships and reciprocity" (Swearer Center at Brown University, n.d.). It addresses pressures to strengthen local engagement (Trickett & Espino 2004; Kellogg Commission 1999) and simultaneously establish global presence and impact (Douglass, King, & Feller 2009). While these seemingly distinct imperatives are often positioned in competition with each other, Silka, Teisl, and Settele (2015) argue that effective engagement must locate and advance "integrative opportunities between the local and the global" (p. 89).

In colleges of education, local approaches create spaces for learning about the expertise and funds of knowledge present in the university-community context (Moll et al., 1992) and support the development of educators' professional identity and justice-oriented teaching philosophies (Kretchmar & Zeichner, 2016). Local opportunities can also provide a structure for conceptualizing and operationalizing integrative opportunities for engagement by nurturing commitments to educating all citizens to think critically about both local and global issues (Lieberman & Hoody, 1998; Powers, 2004). Glocality, a construct that can support integrative engagement, promotes the development of future citizens who can participate in local, national, and international contexts (Banks, 2007; Brooks & Normore, 2010; Ladson-Billings, 2007). Robertson (1995) proposed the term "glocal" to describe how global and local forces act simultaneously in the field of economics. The term has since transcended the field of economics and is used to convey the importance of local contexts to understanding global ones, and the importance of global contexts to understanding local ones.

Whether local, global, or glocal, effective community engagement must occur in the context of reciprocal partnerships. Reciprocity calls for bi-directional relationships and benefits that purposefully attend to emerging and long-standing societal challenges (Fitzgerald, Bruns, Sonka, Furco, & Swanson, 2012, Ramaley, 2000). Societal challenges are complex, interdisciplinary, and their solutions require the distributed types of expertise that exist within and outside of the academy. As future educators are prepared to be leaders and change agents in their glocal communities, their professional education needs to afford them opportunities to use their knowledge and expertise to solve social problems that particular communities are facing. Because these opportunities often reside in non-academic settings, the importance of nurturing and leveraging university-community partnerships that advance the mission of all stakeholders is necessary. This chapter provides a rationale and several examples of how to leverage partnerships to support community-based learning at the undergraduate and graduate levels. The examples draw on the literature in the fields of university-community partnerships, problem-based learning, and collaborative learning. The chapter also presents a model to support community-based learning in higher education that emerged based on the authors' experiences with community-based learning in undergraduate and graduate courses. The chapter ends with recommendations for applying the model to support the education and professional development of education professionals and other adult learners.

THEORETICAL FRAMEWORK

This work uses Mezirow's (1994) transformative learning theory, Habermas' (1971) critical theory of human interests, and Knowles' (1968) theory of andragogy to frame learning, knowledge development, and community engagement in higher education. According to the transformative learning theory (TLT), learners' active interpretation and reinterpretation of experience and disorienting dilemma are central to the construction of meaning (Mezirow, 1991). A transformative learning environment must provide students with opportunities to critically reflect on their experiences, interact with a community of peers who are engaging in the same experiences, and apply their new perspectives and knowledge. TLT posits two types of learning: communicative and instrumental learning. Communicative learning is concerned with how learners interact and communicate regarding affective, moral, and value-laden constructs and decisions including freedom, love, and democracy. Instrumental learning occurs during problem-solving oriented tasks that highlight cause and effect relationships. As Mezirow (1997) states:

The essential learning required to prepare a productive and responsible worker for the twenty-first century must empower the individual to think as an autonomous agent in a collaborative context rather than to uncritically act on the received ideas and judgments of others. Workers will have to become autonomous, socially responsible thinkers. (p. 8)

Mezirow's work builds on Habermas' (1971) critical theory of human interests and ensuing types of knowledge (as cited by Cranton, 2001, 2002). Habermas' work is useful for considering the types of knowledge that result from transformative learning experiences. He posits that three basic human interests drive the construction of three different types of knowledge: instrumental, communicative, and emancipatory. Instrumental knowledge develops as a result of a technical interest to explain and manipulate the environment (Cranton, 1997). Communicative knowledge derives from humans' micro, macro, and global social circumstances and a desire to thrive within them. The development of emancipatory knowledge is driven by interests in progress, self-awareness, autonomy, and independence (Cranton, 2001).

Both transformative learning and Habermas' domains of knowledge provide a basis for framing how adults learn in higher education contexts. Knowles (1968) proposed andragogy as a theory of adult learning that places the learner at the center of the learning process, recognizes the role of prior knowledge and experience, and acknowledges that, during their lifetime, adult learners gain additional knowledge and experience that must be engaged in the learning process. Knowles (1984) subsequently elaborated the theory by advancing six principles of andragogy: the role of the learner, self-directedness, the learner's need to know, readiness to learn, orientation to learning, and intrinsic motivation. While all principles are interrelated, two emerge as especially relevant to community engagement. Self-directedness means holding learners accountable for their learning by positioning them as autonomous in what, when, and how they learn. Self-directedness promotes self-regulation, intrinsic motivation, and empowers learners to engage in decision-making (Conway & Zorn-Arnold, 2016b). Smaroo, Cooper, and Green (2013) define self-direction as:

a process in which individuals take the initiative, with or without the help of others, in diagnosing their needs, formulating their learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p.18)

Adult learners seek higher education, including advanced degrees, to accomplish particular goals that support their life and work situations. This form of readiness to learn prepares adult learners for problem and performance-based approaches to teaching and learning (Forrest & Peterson, 2006). Adult learners capitalize on orientations to learning that value immediate application of the content in ways that allow them to solve work-related problems. Knowles' principles of andragogy have been used to structure adult learning in traditional and online environments. (Conway & Zorn-Arnold, 2016a, 2016b; Zorn-Arnold & Conway, 2016).

BACKGROUND

In this section, a rationale for leveraging university-community partnerships to promote community-based learning is provided. First, university-community partnerships are addressed with attention to the affordances they advance. Then, problem-based learning and collaborative learning are discussed as pedagogical approaches best suited for adult transformative learning experiences.

University-Community Partnerships

As hubs of educational opportunities and transformative learning activities, universities are well situated to significantly contribute to their communities and the learners who live in them. Across all settings, but particularly in under-resourced regions, universities are well poised to improve educational and health outcomes for P-12 learners, aid in the development of sustainable community practices, and contribute to economic development (Barnes et al., 2009; Bosma et al., 2010; Hartman & Kahn, 2019; Northmore & Hart, 2011). Despite universities' potential for positive impact on communities and schools, university-driven partnerships are plagued by a longstanding history of power overuse; hence the reference to "town-gown challenges" that frequently appears in research about university-community-school collaborations.

Historically, universities have been viewed as users of local resources with the ability to make unilateral decisions that impact local history, culture, and economic development (Massey, Field, & Chan, 2014). In all settings, but especially in rural settings, universities typically own considerable property and have institutional resources that exceed local residents' buying capabilities, creating an unequal division of power. When universities make decisions about historic landmarks, green spaces, and businesses without the perception of community input, universities create further obstacles to true collaboration. Additionally, university faculty have a history of using community and school partners to further their research and outreach needs. Of university-school partnerships, Zeichner (2018) cautions, "for the most part these partnerships have been very university-centric and have replicated the power-knowledge relationships that have existed in traditional forms of university teacher education" (p. 271). As such, universities must work hard to eliminate the power dynamic that traditionally exists. When universities are seen as the main purveyors of knowledge and resources, true collaboration cannot exist. Partnerships that work to eliminate this power dynamic by creating a shared vision focused on identifying the needs of each partner are important ways to address equity between universities and their partners.

Developing and Sustaining Partnerships

Several practices are essential when developing and sustaining partnerships between universities, communities, and schools. While multiple models for successful partnership development have been presented in the research literature, several common characteristics of successful collaborations may be readily identified and generalized across partnerships.

Trust

Despite the time it takes to develop, trust is of paramount importance to the development of collaborative partnerships that are sustained over time. Trust between university, community and school partners, especially in rural contexts, takes time to develop and must be continually nurtured (Bosma et al., 2010; Hartman, 2017). It is especially important for university partners to demonstrate to community and school partners their desire to mitigate power inequities that often make community and school partners feel used and undervalued (Suarez-Balcazar, Harper, & Lewis, 2005). With this in mind, sustained outreach efforts that continue beyond single events are particularly important for university partners to pursue. Additionally, at the heart of the development of trust must be attention to community and school voices and acknowledgement of their perspectives (Barnes et al., 2009). When university partners place their own needs above those of community and school partners, trust is unlikely to be nurtured. Demonstrating care for community and school partners' needs and organizational challenges through active listening is essential for developing trust.

Deliberate Planning

Purposeful and deliberate planning approaches that utilize an assets-based approach create successful collaborative partnerships that are beneficial for all. Care to identify the unique expertise of each partner is consequently essential during the initial planning of collaborative endeavors (Suarez-Balcazar et al., 2005). In this way, power imbalances that typically favor university partners may be addressed organically and without one partner being valued above another. In describing an Inclusive Science Day that was hosted in collaboration between a university and community partner, Hartman and Kahn (2019) describe how planning the event capitalized on the strengths of each partner. For example, the community partner utilized their social media network to advertise the event, while the university partner was able to supply additional volunteers for the event. The partnership fulfilled the outreach needs of the university partner while also helping the community partner host a meaningful educational event (Hartman & Kahn, 2019). Deliberate planning should also include careful sharing of resources so community partners do not unequally shoulder the burden of paying for staffing, supplies, and other costs often associated with hosting university partners' outreach events (Bosma et al., 2010; Northmore & Hart, 2011).

Commitment

From attention to developing trust and deliberate planning, shared commitment to project goals may emerge between partners. In their description of a successful partnership model, Barnes et al. (2009) offer the following definition, "Commitment refers to a shared obligation to achieve project goals for the mutual benefit of both groups despite challenges" (p. 25). In particular, resource and power inequities may be mitigated by a shared commitment to collaborative goals (Suarez-Balcazar et al., 2005). Oftentimes, differences in organizational culture create barriers that impede collaborative processes, yet a commitment to shared goals may result in a willingness to address challenges collaboratively (Bosma et al., 2010). Consequently, project success and sustained collaborations may rest on collective commitment to partnerships that utilize the strengths and assets of each contributor.

PROBLEM-BASED LEARNING

Problem-based learning (PBL) can serve as one of several methods of fostering university and community collaborations. It has a long history in higher education and provides clear links to professional practice, making it a relevant and meaningful approach to use for the preparation and continuing education of professionals (Biggs & Tang, 2007, Da Silva & Dennick, 2010; Dolmans, De Grave, Wolfhagen, & van der Vleuten, 2005; Jersembek & Murphy, 2013; Rillero & Camposeco, 2018). Researchers suggest that PBL leads to long-term knowledge retention, skill development, and greater satisfaction with the learning environment (Strobel & van Barneveld, 2009). As a curricular approach, PBL presents learners with problems from practice intended to stimulate the learning process (Boud & Feletti, 1997). It allows faculty and students to take on different, non-traditional roles during the instructional process (Bridges, 1992). PBL also capitalizes on real-world opportunities to investigate phenomena and answer questions about them through a process of problem-solving (Sutton & Knuth, 2017).

Problem-solving is a complex, deliberate, cognitive thinking process that allows people to realize a desired outcome that is different from the starting point of thinking (Bassok & Novick, 2012; Dewey, 1910; Lovett, 2002; Martinez, 2010). Dewey (1910) laid the groundwork for a general model of problem solving that has been used in many domains including cognitive psychology (Anderson, 1993, 2005), biology (Anderson, Sensibaugh, Osgood, & Mitchell, 2011), chemistry (Bodner & Herron, 2002), engineering (Svinicki, 2011), physics (Docktor & Mestre, 2011), and teacher education (Moreno, Abercrombie, & Booker, 2008; Rillero, Koerner, Jimenez-Silva, Merrit, & Farr, 2017). Generally, problem-solving begins with problem identification and problem representation, proceeds with strategy selection and strategy implementation, and ends with an evaluation of the results of the process (Moreno, 2010).

In problem identification, learners must take time to recognize that a problem exists and not rush to commit to a solution (Larkin, McDermott, Simon, & Simon, 1980). Next, learners familiarize themselves with the problem, represent it multimodally (e.g., visually or by restating it in their own words), and integrate and organize the information included in the problem. Then, learners are ready to choose a heuristic strategy, an informal rule of thumb, to solve the problem. Examples of heuristic strategies include trial and error, analogical reasoning, and working-back strategy (Moreno, 2010). During the implementation step, learners execute their planned strategy. This is followed by evaluation, the last step in the model, where learners critically evaluate the appropriateness of the result and its effectiveness as a solution. Evaluation must go beyond the resultant product and attend to the process that was used. Both self- and peer assessment are integral to the evaluation process (Boud, 1985). Scholars have described case-based and problem-based approaches to PBL (Barrows, 1986; Savin-Baden, 2000). Problem-based approaches, as opposed to case-based ones, involve clients and respond to clients' needs and constraints.

Several conditions are proposed to ensure successful implementation of PBL approaches. First, the nature of the problem presented to students matters. The selected problem must be complex, ill-defined, and have multiple possible solutions (Barrows & Kelson, 1995; Kitchener, 1983). Meaningful and consequential problems that invite student inquiry are more desirable than superficial or artificial problems created to simulate a learning exercise. Such problems connect and integrate theory and practice (Boud, 1985). A meaningful problem is interdisciplinary, its solution requiring students to draw on more than one knowledge domain (Boud, 1985; Kolodner, Hmelo, & Narayanan, 1996). Solving meaningful problems entails collaborative work, application of problem-solving strategies, and effective instructor scaffolding (Hmelo-Silver, 2002, 2006; Quintana et al., 2004). Effective scaffolding acknowledges learners' past experiences and promotes self-directedness and autonomy (Boud, 1985). It requires instructors to act as facilitators who focus on the processes for knowledge construction rather than their end products. Collaboration reduces the complexity of the problem-solving task (Hmelo-Silver, 2002, 2006; Quintana et al., 2004). It also promotes the integration and advancement of learners' communication and interpersonal skills, which are key characteristics of PBL (Boud, 1985). The next section discusses collaborative learning in more detail.

Collaborative Learning

Collaborative learning refers to small group work dynamics germane to problem-based learning (Davidson & Major, 2014). Barkley, Cross, and Major (2014) defined collaborative learning as embodying three key features (p.4):

1. **Intentional design:** Faculty choose to use pre-structured or new activities to intentionally induce group dynamics, collaborative work, and learning outcomes.
2. **Co-laboring**: All participating stakeholders (faculty, students, administrators and community partners, etc.) should actively work together to achieve equitable engagement in realizing stated objectives.
3. **Meaningful learning**: Shifting responsibility to students and creating a student-centered group environment would make learning as a task more meaningful for both teachers and students. All in all, participants should progress toward intended learning goals.

Collaborative learning requires participants to work jointly to negotiate, solve problems, and accomplish tasks while being positioned in well-defined roles (Dillenbourg, 1999). Tasks designed in alignment with collaborative learning would typically feature brainstorming sessions, tackling of the problem, teamwork, and presentation of findings and solutions. Throughout collaborative learning, students are encouraged to take ownership of their own learning process whereas teachers serve in the role of a guide and facilitator. Collaborative learning affords students benefits on multiple levels (Barkley et al., 2014). On a social level, students involved in collaborative learning have the chance to receive social support by being exposed to a range of peer knowledge and expertise. Communities of practice and learning could thus be formulated. On an academic level, students in collaborative learning would become more autonomous, obtain academic improvement, boosted motivation and engagement, and have the opportunity to use higher order cognitive skills such as creativity, collective problem-solving, and critical thinking. On a psychological level, distributed expertise allows students to learn from each other and gain self-confidence while at the same time lower learning anxiety. On the level of assessment, collaborative learning allows for open-ended assessment, peer review, and other forms of evaluation that tap both into individual growth and group dynamics.

CONTEXT

The work described in this chapter occurred in the College of Education (COE) of a large university located in the rural midwest. The COE has a history of over 125 years in training and preparing educators, leaders, and human service professionals to serve communities around the world. A clinical model of educator preparation characterizes its programs. The clinical work of the college is coordinated by the Center for Clinical Practice in Education, whose aim is to positively impact student learning through intentional, structured, and supported field experiences in professional development school partner buildings. The work of the center fosters and supports outreach activities that connect the COE with regional schools, creating collaborative partnership programming for P-16 and beyond. The center overseas 12 school partnerships that subscribe to the nine essentials of a professional development school (National Association of Professional Development schools, 2008), including:

- A comprehensive mission that is broader in its outreach and scope than the mission of any partner and that furthers the education profession and its responsibility to advance equity within schools and, by potential extension, the broader community;
- A school–university culture committed to the preparation of future educators that embraces their active engagement in the school community;
- A shared commitment to innovative and reflective practice by all participants;
- Engagement in and public sharing of the results of deliberate investigations of practice by respective participants. (p. 2-3)

The COE's mission of outreach and engagement is also advanced by The Edward Stevens Center for the Study and Development of Literacy and Language (Stevens Literacy Center). This university center is renowned for its community outreach through relationships with schools, businesses, and a diverse group of community organizations. In the next sections, examples of how the authors leveraged the PCOE's long history of partnerships with schools and community agencies to promote community based-learning in graduate and undergraduate courses are provided. Each example is described in terms of the courses in which the PBL experiences were integrated, community partners, a brief synopsis of the PBL project, and sample products.

GRADUATE INTERDISCIPLINARY AND VIRTUAL VENUES FOR COMMUNITY ENGAGEMENT

In line with the background and theories described previously, the Graduate Interdisciplinary and Virtual Venues for Community Engagement (GIVVCE) was designed to provide opportunities for adult learners to apply and synthesize, in meaningful and authentic ways, the evidence-based practices that they are learning about in their coursework as well as the insights and expertise they developed as a result of their prior training and job experience. The impetus for the GIVVCE PBL approach was to move the learning experience provided at the university from the realm of the hypothetical to one that affects people and organizations with real-world problems and learning needs. Because real-world problems are interdisciplinary in nature and their solutions require the distributed expertise of different professionals, GIVVCE was intentionally developed to leverage the knowledge from multiple courses and provide students the experience of working in interdisciplinary teams to get a sense of the affordances of collaboration and communication around a common goal.

Courses

Three COE faculty members from two Departments collaborated to develop and implement GIVVCE in their graduate courses:

Advanced Studies of Children and Adolescents

This master's level course allows for an intensive study of research in child development from conception to maturity and its implications for education practice. The course is offered online several times during the year and is required by all Master's programs in the Department of Teacher Education. Major theories of development and learning provide a framework for the presentation of cognitive, social, cultural, and emotional influences on learning and on applications for the classroom. Graduate students enrolled in the course are expected to use research to analyze and critically evaluate the major learning and development theories, demonstrate applications of theories and research in the design of formal and informal learning experiences, analyze problems of practice and develop models to support learning and development, and investigate and design solutions for current issues that influence education in the P-12 sector. The GIVVCE community engagement project was a natural fit for this course, allowing a cohort of 26 graduate students to apply course constructs. The majority of students were seeking an advanced Master's degree in Reading and a few were seeking an initial master's degree with teacher certification.

Advanced Seminar in Instructional Technology

In this Department of Educational Studies PhD level course, instructional technology graduate students explore the extensive history of simulation and immersion in education as a foundation for potential future developments. They reflect upon past, current and potential future developments in the areas of artificial intelligence and automation, particularly as they inform virtual reality, augmented reality, simulation and immersion in education. Students are actively engaged in discussion about this changing landscape and they participate in a multidisciplinary instructional materials design project that significantly incorporates artificial intelligence, automation, virtual reality, simulation and/or immersion. Students participated in this project as instructional technology consultants. Working in teams with members of the other classes, they focused on approaches to integrate artificial intelligence, automation, virtual reality and augmented reality into the instructional projects. Students in the course are expected to contribute to a significant technology-based product or set of materials that address a specific pedagogical goal. The products are often indicators, or even prototypes, of future larger projects that these students will develop during their time in the program.

Leadership and Professional Development in Technology

This mixed PhD and Master's level course in the Department of Educational Studies prepares technology leaders and coordinators to be role models for instructional and administrative use of technology in schools and to develop visionary leadership. Primary course topics include adoption and diffusion of technology in P-16 settings, technology planning, policy consideration and design, hardware and software procurement. The course also focuses on professional development and technological leadership by addressing communication, needs assessment, program evaluation, adult learning models and strategies for professional and organizational development. Course assignments are scenario-based and designed to promote project-based learning and collaborative learning. The GIVVCE project allowed students to use course constructs to develop refined and clear positions toward engaging, motivating, and progressing learning around technology use in professional contexts.

Community Partners

Existing professional development school partners, the Stevens Literacy Center, and other community organizations were approached to identify needs and interests that could be served by the project. Seven partners were identified and included four community organizations, two school buildings, and the Stevens Literacy center described previously. Three of the community partners, their needs, and the ways in which they engaged with students in the PBL projects are described next.

Shade Community Center

Located in Appalachian southeast Ohio in a former school building that was repurposed for local use, the Shade Community Center aims to enhance the lives of Shade community members by identifying and responding to community needs. Center staff fulfill this mission by partnering with individuals and organizations to promote recreational and cultural events for different age groups and interests. For the GIVVCE project, the Shade Community Center identified the need to support children and youth's mathematics and literacy skills. They shared that these two areas are vital for economic development in the rural area and were identified by the local school district as areas for focus.

The Ohio Valley Museum of Discovery

The Ohio Valley Museum of Discovery (OVMoD) was founded in 2005 with a mission to inspire visitors of all ages to explore and discover the world through interactive exhibits and creative experiences. With the nearest discovery museum more than 75 miles away, the museum strives to increase access to informal learning opportunities for youth by fostering collaborative educational partnerships throughout the Appalachian region. As a rural museum in a region with high poverty levels, the museum faces accessibility barriers related to both funding and transportation. However, capitalizing on collaborative partnerships allows the museum to help mitigate both of these challenges. The GIVVCE project created interactive exhibits that are accessible online to visitors who are unable to travel to the museum, as well as physical exhibits that are easily utilized as a traveling exhibit for schools and community festivals. As the content for each exhibit component was developed in collaboration with museum representatives, the exhibits fit well within the museum's mission to be both interactive and creatively inspired. Partnerships such as the GIVVCE project are a key to sustainable practices for rurally-located museums.

Coolville Elementary School

Coolville Elementary School is located in Appalachian southeast Ohio. As one of two elementary schools in the Federal Hocking Local Schools district, it enrolls 286 students of which 98% are White, Non-Hispanic and 98% are designated as economically disadvantaged (Ohio Department of Education, 2018). 71% of teachers hold at least a Bachelor's degree and 33% hold a Master's degree. The principal described summer reading loss as a problem that students face on a yearly basis. The principal invited GIVVCE students to provide potential strategies for solving this problem and served as the main community partner contact. The principal and a team of school staff initially met with GIVVCE students to describe the problem, the school population, school resources, and their experiences with summer reading loss. They then periodically met with students to provide feedback on progress and shape the developing program.

Project

The GIVVCE project was designed to engage students in interdisciplinary collaborations to develop technology-enhanced informal learning objects (ILO) that support the mission and goals of community partner organizations. ILOs were defined as technology-based processes and products that facilitate learning outside the formal school or university classroom. ILOs can take the form of museum exhibits, infographics, and other multimedia-based activities and materials. Interdisciplinary student teams determine the type of ILO to be developed in consultation with community partners. This core element of the GIVVCE project was required in all three of the partnering courses.

GIVVCE also required students to complete course specific assignments. For example, *Advanced Studies of Children and Adolescents* students were required to write a paper to describe the empirical and theoretical bases for their decisions and the anticipated impact on the learning of the intended audience. Students were also expected to develop and present their work to their peers describing their community partner's need, target audience, constraints, problem-solving and design process, products, anticipated impacts, and reflections on learning. *Leadership and Professional Development in Technology* students were required to justify their GIVVCE project choices and development with reference to their understanding of policies, procedures, programs, and funding necessary to implementation, while also focusing on design, development, and delivery of an informal learning object or digital learning experience.

Because effective problem-solving requires time, the GIVVCE project was designed to be completed over the course of a semester. In the first two weeks, teams of students were organized to include members from all partnering courses. All teams and community partners met to explain and launch the project, provide an initial opportunity for community partners to describe their needs, intended audiences, and constraints, and allow student teams to ask questions to begin the processes of problem identification and representation. During weeks 4-11, GIVVCE teams engaged in problem representation, strategy selection, and strategy implementation. During this period of design and development, students were required to check-in with course instructors and community partners to share progress, ask questions and seek clarifications, receive input and feedback to inform the continuing design of the project. In the last two weeks, GIVVCE students were engaged in an evaluation of the process and its results as they reflected on their work and developed a presentation to share with peers and community partners.

Products

Ten ILO solutions were developed to address the problems and needs shared by the community partners. In this section, three ILOs are presented to illustrate the types of products that can result from such collaborations.

Moving with Math and Literacy

Through conversations with Shade Community Center representatives and the director of the Patton College of Education Stevens Literacy Center, teams decided to develop a summer camp program to engage children and youth participants of the Shade summer camp in informal learning activities centering on mathematics and literacy. Using Google Sites, the team created a website to house the resources and lesson plans for the summer camp. They adopted a multicultural and interdisciplinary approach to developing mathematics and literacy skills, integrating them with physical education, science, social studies, and technology-based concepts and practices. For each module activity, team members selected a book and developed activities to apply and investigate ideas from the book with students. Readings and activities were developed for a range of ages and abilities. For example, Magnificent 12 (Grant, 2010) is appropriate for children aged 8-12. Others, Ms. Sue Has No Clue! (Gutman, 2013) and Granny Went

Figure 1. Children engaging in sample moving with mathematics and literacy book-based activities

to Market (Blackstone, 2006) are appropriate for children aged 6-10. Figure 1 shows children engaging in camp activities.

Animals All Around

To support OVMoD's mission of increasing regional children's access to Science, Technology, Engineering, Arts, and Mathematics (STEAM) learning, the GIVVCE team developed a multi-activity interdisciplinary traveling museum unit focusing on animals. Unit activities integrated static electricity, designing and conducting experiments, Arctic Tundra animal adaptations (e.g., polar bears' fur color), augmented reality animal flash card games, and an animal habitat mat equipped with CamAR Animals, HP Reveal, and animal Sounds (Fig. 2).

Summer Reading Challenge

The Coolville Elementary staff requested assistance with the summer reading slide, whereby elementary students started the school year one or two reading levels below where they left school the previous year. Researchers continue to document how summer reading loss is exacerbated when children lack access to rigorous reading material or access to summer literacy opportunities/programs that foster not only their developmental reading skills, but also their reading engagement (Allington & McGill-Franzen, 2018; White

Figure 2. Sample animals all around mobile museum STEM exhibit materials

& Kim, 2008). In order to respond to this need, a GIVVCE team proposed a family-centered approach to combating the reading slide. They developed a reading challenge that engages elementary students and their caregivers in sustained reading over the summer in order to continue the growth and progress they made with their literacy development during the school year. The team used different technology tools to develop elements of the *Summer Reading Challenge*: Reality (reading challenge website and mobile application), enhanced reality (Amazon Echo Skills), and futuristic reality (augmented reality based reading games, reading material, and Summer Reading Camp).

To complete the challenge, elementary students had to read seven books during the summer. The team provided a list of books of varying reading levels, tips for parents, and several visuals to motivate reading. They incorporated interactive reading apps such as Bookly, Serial Reader, Good Reads, Litsy, and Libib. The team also used Moodle Cloud to design instructions and activities for the learning management system. To provide positive reinforcement and a visual method of tracking reading accomplishments, the GIVVCE team developed a technological reward system in which a monkey works his way to the top of the tree to earn his reward (Fig. 3). They also created school Summer Reading Challenge social media sites and an email form to allow families and caregivers to share their children's progress with school administration and the school community.

LITERACY, SCIENCE, AND COMPUTER SCIENCE

Through an interdisciplinary collaboration, undergraduate students in education and computer science created a physical and computer-based game combining literacy and science-based concepts. The development of the physical game originated in a literature-centered developmental reading course and culminated in its use to support informal learning at a festival hosted by a local school. Game development required students to confer with their content-area professors and mentor teachers to receive feedback and guidance regarding their games. The development of the digital game emerged from conversations between the science and literacy educators and a computer science educator. Partnerships with the computer science team supported the development of the digital game.

Figure 3. Sample summer reading challenge reading game prompts

Quizzify

Jeopardy-style game based on the books in the challenge to check your comprehension

Feed the monkey

Feed the monkey is a game based on day of dragon book in the summer challenge.

Courses

The literacy, Science, and Computer Science (LSC) project occurred in two COE courses and one course from the School of Electrical Engineering and Computer Science.

Literature-Centered Developmental Reading Instruction

Through this fall semester COE course, undergraduate teacher candidates immerse themselves in course readings and activities that strengthen their understanding of developmental reading and their ability to integrate various aspects of literacy and reading into multiple content areas. A major element of the course provides the space for teacher candidates to design and implement interactive literacy-games intended to engage elementary and middle school students and families during informal events at their schools. Several researchers report that such facilitation of informal learning experiences promotes future teachers' professional development (Dani, Hartman, & Helfrich, 2017; Bottoms, Ciechanowski, Jones, de la Hoz, & Fonseca, 2016).

Teaching Middle Childhood Science

This fall semester COE course prepares middle childhood teacher candidates with an understanding of central issues involved in the learning and teaching of inquiry-based science. Course concepts are integrated into practical activities intended to support teaching in actual science classrooms. Candidates

Figure 4. Biomes of Zootopia game developed for the West Elementary Fall Festival

integrate course concepts into the design of short and long-term curricula that are used to facilitate student learning of science formal and informal locales.

Software Design and Development

Offered in the School of Electrical Engineering and Computer Science, this year-long capstone design course sequence focuses on software engineering topics and team capstone software design projects. Topics include software lifecycle, software architecture, software development tool chains, software specification and documentation, and software testing techniques. All students are required to participate in a team project developing a solution for a real-world problem for an actual client. This project engages students in using course knowledge and skills to develop a product based on a client's need in a team that lasts for the entire duration of the course.

Community Partners

The LSC project leveraged existing professional development school partnerships to support literacy education and engage teacher candidates in community-based learning experiences. The literacy educator reached out to the faculty coordinator and teacher liaison of West Elementary, a local school with which the college of education has a formal, clinically based partnership. Additional partnerships were internal to the university and consisted of cross-college collaboration between the college of education and the college of engineering.

West Elementary

West Elementary School is located in Appalachian southeast Ohio. As one of four elementary schools in the Athens City School District, it enrolls 198 students of which 91% are White, Non-Hispanic and 36% are designated as economically disadvantaged (Ohio Department of Education, 2018). All teachers hold at least a Bachelor's degree and 73% hold a Master's degree. When approached by the literacy educator, the teacher liaison suggested that the literacy-focused games can add informal learning opportunities to the annual fall festival that the school hosts as a celebration for students and their families.

Project

Through this collaboration, teacher candidates created seven games for the fall festival focusing on a range of literacy topics including social studies and comprehension, math problem solving and writing, and science and comprehension. As a part of the semester-long process of creating the games in the developmental reading course, teacher candidates scheduled meetings with their content-area professors as well as their mentor teachers at their school-based field placements to receive feedback and guidance regarding their games. Three teacher candidates created a rigorous, detailed and engaged science biome game, entitled *"Biomes of Zootopia,"* that supported elementary students' understanding of biomes, math concepts, and analytical thinking (Fig. 4). Given the importance of constructing science classrooms as sites for literacy learning and vice versa (Pearson, Moje & Greenleaf, 2010), this game allows elementary students to increase their knowledge of science concepts while advancing their vocabulary and comprehension skills. It also supported teacher candidates' ability to meet learning outcomes associated with effectively developing and creating literacy activities for elementary students.

Based on the success of the game and its potential to engage children in informal learning, the teacher candidate developers were invited to serve as clients to a team of five computer science students who were tasked with designing a computer-based game to fulfill the requirements of their computer science course. Faculty nurtured an interdisciplinary and continued collaboration between the two groups of students by facilitating face-to-face and online meetings, supporting the design process, and serving as additional members of the client team.

Product

The student teams worked together to develop the new *Biome Game* by building on the content from the board game and transferring it to a web-based platform utilizing JavaScript, CreateJS basic design library, and HTML 5 (Fig. 5). Gimp and Photoshop were used for image editing. The project team adopted the Scrum approach, which is an agile software development process. Scrum is lightweight, iterative, and incremental. It enabled the software development team to seek frequent feedback from the educational clients and ensure the end product met the expectation of the clients. Project development was divided into bi-weekly incremental intervals. At the end of each interval, the student teams performed a short, to-the-point demo of incremental design features that they specified or implemented in the current interval. Feedback was provided at that point to help student teams fine-tune their activities in the next interval.

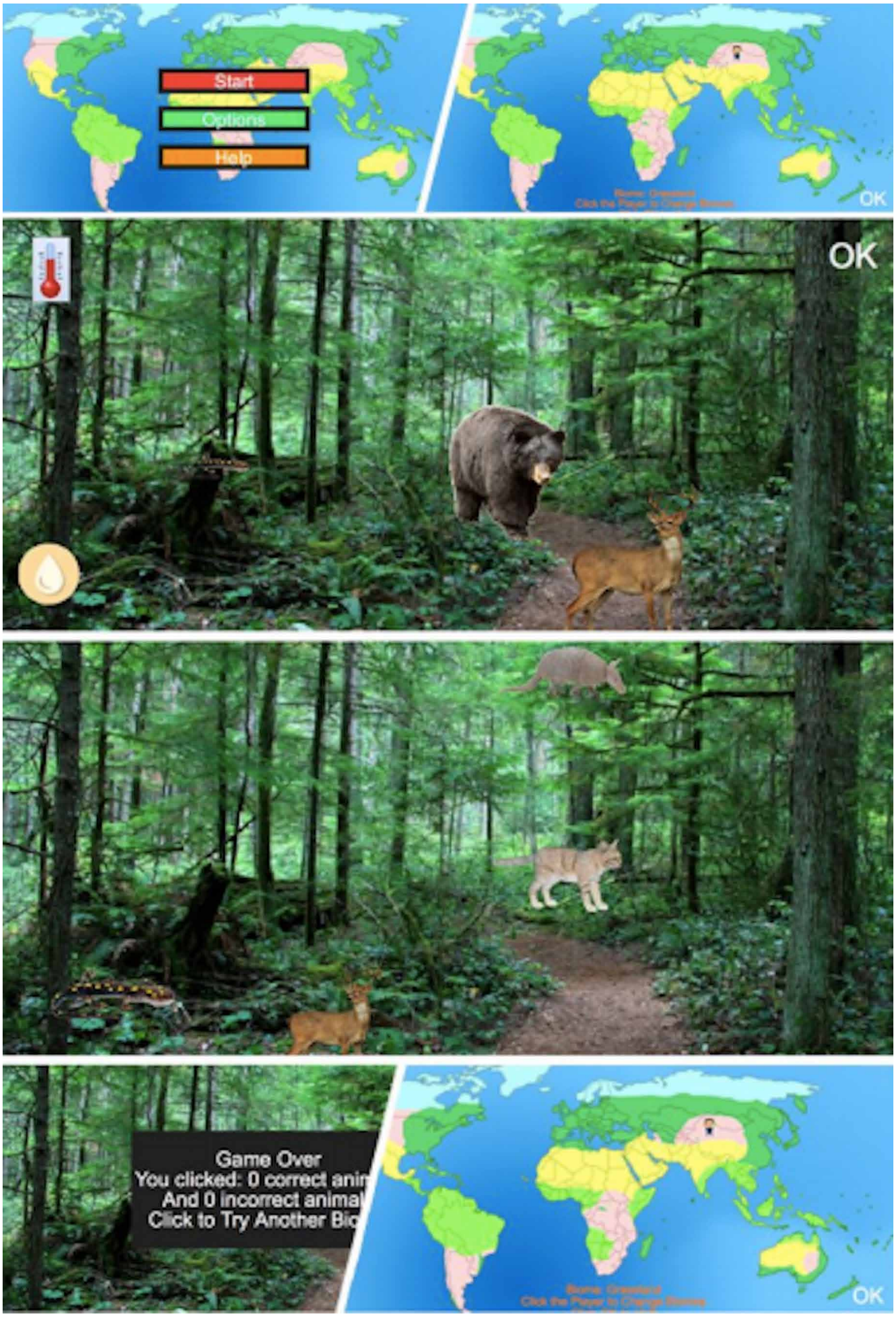
The purpose of the online game was to independently teach elementary aged children about biomes as ecological communities of organisms adapted for survival in particular geographical, climatic, and environmental conditions. Each level of the game was focused on a particular type of biome (e.g., tundra, desert, or tropical forest) and provided visuals and facts about biome elements including flora, fauna, and abiotic characteristics. The game challenged multiple players to correctly identify the highest number of biome elements. Players with the highest score for each biome (or overall) win. Players are only able to move from one biome to another if they successfully complete the level, by making no more than three mistakes. A final element of the Biome Game, the sandbox feature, was designed to allow customization of the game by informal learning providers to suit the needs and development levels of specific groups of learners.

The iterative and collaborative design process helped Computer Science students learn effectively from the project, the teammates, and the clients. It also enabled them to have more opportunities to interact with the Computer Science instructor. Successful project delivery and positive teamwork experience led to additional collaboration after the class ended. One of the students in the team continued to work with the Computer Science faculty member in another successful project that lasted over a year.

MODEL AND RECOMMENDATIONS

In this section, the model that emerged from the authors' experiences implementing collaborative and problem-based learning approaches that leverage university-community partnerships is presented. The Collaborative and Problem-based Model for Community Engagement (CPB-CE) consists of six phases (Fig. 6). In what follows, each phase of the model is explained and recommendations that draw on the experiences of students, community partners, and faculty are provided to support model implemen-

Figure 5. Snapshots from the Biome Game developed by B. Reynolds, A. Mayle, E. Keep, R. Smith, and F. Ogundare in collaboration with S. Bown and E. Coleman



tation across diverse contexts. Quotes are used to illustrate stakeholders' perspectives about project implementation, not as evidence from evaluation or effectiveness research. Quotes were derived from communications between faculty, students and faculty, and community partners and faculty. Quotes were also derived from course evaluations completed by the undergraduate and graduate students who engaged in the previously described CPB-CE projects.

Defining Goals and Purposes

In the first phase, a purpose for CPB-CE student engagement must be defined. For example, technology-enhanced informal learning was selected for the work described in this chapter. The United Nations Educational, Scientific and Cultural Organization Institute for Statistics (2011) defines Informal learning as:

Forms of learning that are intentional or deliberate but are not institutionalized. They are less organized and structured than either formal or non-formal education. Informal learning may include learning activities that occur in the family, in the workplace, in the local community, and in daily life, on a self-directed, family-directed, or socially-directed basis. (p. 8)

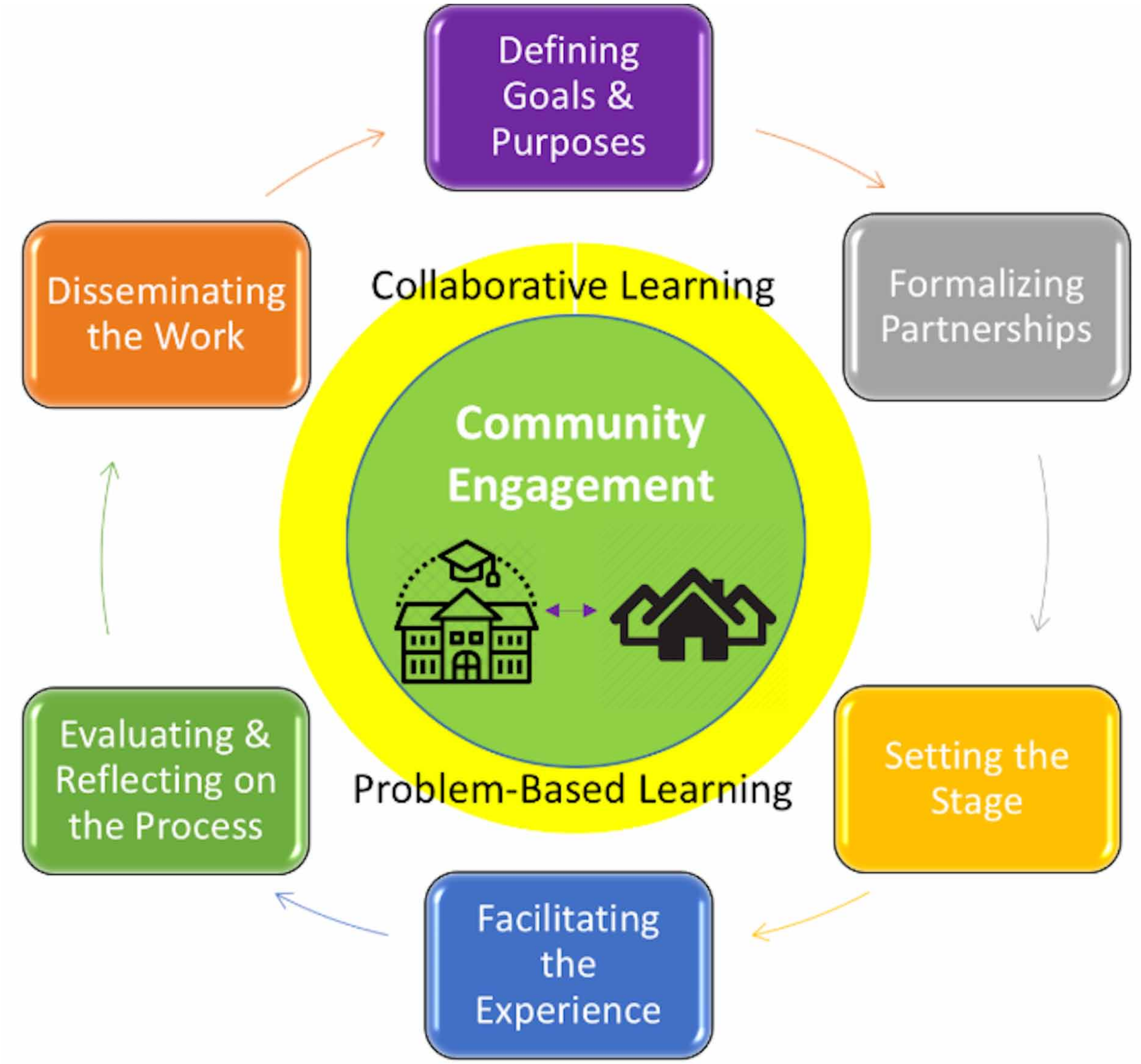
Capitalizing on the power and ubiquitousness of technology to advance informal learning is paramount in the 21st Century. The access technology provides to connect people with each other and utilize increasingly intelligent tools is transforming the very nature of education, particularly in adult-based informal learning contexts (Kessler, 2019). For these reasons, technology-enhanced informal learning can be an appropriate CPB-CE purpose for many higher education academic units.

Next, the courses that will be the basis for the interdisciplinary collaboration must be identified. In the examples presented herein, the authors partnered with each other, crossing disciplinary boundaries within a college of education and to a college of engineering. In today's globally oriented world, university partners can be identified from within the university or from other universities worldwide. Key considerations at this point are that CPB-CE experiences align with course outcomes and are context-specific (as opposed to decontextualized) to enable students and faculty to answer the critically important "so what" question that speaks to the relevance of the higher education curriculum. Speaking to the authenticity and relevance of the experience, a GIVVCE student participant states, "The instructor assigned group projects that were real-life problems and required us to provide solutions to be used by the identified institutions. It provided an opportunity for us to provide tangible solutions and not imaginary answers." While many students described similar sentiments, a few expressed reservations about the relevance of the experience to their professional preparation as reading specialists. For example, a GIVVCE student shared, "The project had nothing to do with literacy, so I really don't know why this was a part of our course." Identifying the CPB-CE purpose and aligning it to course outcomes allows faculty to show connections between what students are asked to do and the wider scope of what their graduate degree is preparing them to do.

Formalizing Partnerships

In this phase, community partners are identified. Institutions with missions that align with the identified purpose (phase 1) and with whom the university or college has ongoing partnerships can be considered first. For example, GIVVCE and LSC faculty invited professional development school partners to

Figure 6. The collaborative and problem-based model for community engagement (CPB-CE) that leverages university-community partnerships



participate. Beginning with existing partners leverages previously established trust (Hartman, 2017) and reinforces their commitment to engage in mutually beneficial collaborations (Barnes et al., 2009). Because glocal impact is desirable (Silka et al., 2015), partners can be identified locally and globally. This phase also presents opportunities to nurture new university-community partnerships.

As deliberate planning is a key characteristic of effective partnerships (Suarez-Balcazar et al., 2005), all partners must agree about the nature of the experience, desired learning outcomes for students, and desired outcomes for community partners. At this phase, community partner needs that are best suited for the content of the partnering courses are identified. Because the outcomes of the partnership are intended for use by the community organization, representatives must feel ownership of the project and be invited to shape the project guidelines and expectations. The CPB-CE approach can only be successful if both faculty and community partner representatives commit time to meeting with student groups and with each other. Clarifying roles, expectations, and time commitments is essential and can occur through conversations and a formal memorandum of understanding.

Setting the Stage

After partnerships are formalized, stakeholders within the partnership can collaborate to create the project description and set the timeline for completing the work. A common assignment prompt and rubric that is aligned with the purpose of the CPB-CE should be used in all partnering courses. Additionally, each instructor must create course specific CPB-CE expectations and developmentally appropriate (graduate or undergraduate) learning outcomes that require students to develop and apply knowledge, skills, and dispositions in authentic contexts. In the featured projects, students ranged from beginning undergraduate students learning to create lesson plans, to advanced graduate students immersed in educational theories and research. Thus, the nature of projects differed, as well as the guidance and support instructors provided to ensure not only the success of the projects, but the strengthening of students' skills as future educators and community partners. As a GIVVCE faculty member shared, "The project provided my students with an authentic and practical context in which they could plan, design and implement technology-based materials."

The collaborative nature of the CPB-CE requires clear and open channels for communication. Selecting a communication infrastructure is vital to the success of the approach. The learning management systems (LMS) typically used by universities work well for within and across course communication among faculty and student team members. However, these systems are not readily accessible to community partners. Additional synchronous and asynchronous tools (e.g., Zoom.Us., Adobe Connect, Google Hangouts) can be helpful to students, faculty, and community partners alike. The need for a communication infrastructure becomes more salient in collaborations involving online courses or geographically dispersed partners. For example, given the varying nature of GIVVCE courses (face-to-face, blended, and fully online), many students defaulted to collaboration using online communication tools such as VoiceThread, Google Doc, and Facetime. Similarly, LSC students used the GroupMe application to communicate with each other and with faculty. Such spontaneous technology usage helped overcome the barriers of time and space, allowing students out-of-class alternate backchannels through which they can effectively communicate, collaborate, problem-solve, and reach out for needed assistance. In short, the technology communication tools create a space for "just-in-time" feedback, allowing for more efficient CPB-CE co-laboring (Barkley et al., 2014).

Setting the Stage also involves identifying and gathering resources for project development. The type of resources will depend on the nature of the CPB-CE project. Faculty can seek internal or external funding to support CPB-CE projects. For example, GIVVCE and LSC used funds from competitive COE awards to purchase digital devices (e.g., Amazon Echo Dot, Kindle Fire), video-conferences applications (e.g., Google Hangout, Zoom.Us), and other consumables. Community partners may also be able to procure materials. For example, OVMoD provided the materials that were used for the physical elements of the *Animal All Around* exhibit. Finally, when possible, the use open source applications should be encouraged.

Facilitating the Experience

Once the CPB-CE experience is underway, the role of faculty members shifts from planning to facilitating (Hmelo-Silver, 2006). As facilitators, faculty support students' problem-solving process as they discuss, model, and provide feedback about students' conceptual and skill development. Checkpoints can allow faculty to formatively assess students' developing ideas and use their findings to inform teaching and CPB-CE progression. Facilitation also necessitates sustained communication between all stakeholders. For this reason, checkpoints between student teams and community partners must be implemented. Checkpoints can consist of mini demonstrations of progress, requests for clarification, or requests for changes based on developing or existing constraints.

For effective facilitation, students must be positioned as professionals with well-defined roles and expertise to contribute to the collaborative project (Boud, 1985; Dillenbourg, 1999). As a GIVVCE student shared, "Getting to work with other students on [GIVVCE] was pretty exciting and educational." Clear positioning ensures that students learn from each other, respect and value the knowledge and expertise that others bring to the table, and can help prevent conflict. Relatedly, facilitation can involve conflict resolution. GIVVCE conflict mostly occurred when team members' expertise was undermined or when group member contributions were not regarded as substantial and meaningful. Clarifying roles and expectations among student team members is necessary to ensure contributions are equal to the amount of work required. It also mitigates feelings of frustration as the ones described by the following student:

I should not be graded on my work as a group member, that is not fair. In my group we had some [members] people who did nothing at all. [Also,] as an education major I don't understand the tech portion of the project.

While conflict engenders feelings of frustration, it can also lead to positive outcomes including leadership and negotiation skills that are necessarily for collaborative learning (Dillenbourg, 1999). As one faculty member shared, "I know this involved challenges but that was a valuable experience for [students]. They benefited from learning to negotiate with others through the creation and implementation of these materials."

Evaluating and Reflecting on the Process

Consistent with problem-based approaches to learning (Moreno, 2010; Rillero et al., 2017), it is essential to evaluate and reflect on the process and resulting product of CPB-CE. All stakeholders must be invited to participate in this phase of the model: Students, community partners, and faculty. In individual courses, students must be provided explicit opportunities to reflect on their learning, the problem-solving process, collaboration, and the potential impact of the product. Three levels of evaluation and reflection are recommended: Individual, group, and course. The first two levels can be accomplished through presentations and individual or group reflection papers. At the course level, instructors can facilitate a reflective discussion about the value of problem-based approaches to learning and the affordances of community engagement to advance social change and transformative experiences.

Community partners' evaluation and reflection can be explicitly solicited through surveys and interviews. Evaluation can focus on the level of satisfaction with the ways in which student teams communicated and collaborated with them as well as level of satisfaction with their own involvement in the process. Reflecting on the importance of providing students with clear and directed support, one GIVVCE partner stated:

[A challenge] was defining the exact type of product/activity that students could develop that would be useful for [organization] programming… With enough structure, the teams could focus in on how to best deliver that information. Without a clear picture of what we wanted - for instance, an idea that was maybe a little too open-ended, the team struggled a bit to develop something that fit with [organization] activities.

This focus on process addresses how community partner participation in CPB-CE experiences can help them maximize the impact of the products for the audiences they serve. Considering the specialized knowledge, skills, and dispositions that they possess and how they could be used to enrich the CPB-CE process, a community partner representative shared:

In the future, having PCOE students attend a [organization]-sponsored event would be very helpful to increase their understanding of the types of programming and hands-on educational activities that we provide. [This would allow] PCOE students the opportunity to dream a little more about what could be possible - stepping away from the constraints of standardization in "formal" in-school settings.

Reflection on the product must be invited at the completion of the process (potential impact) as well as following implementation (actual impact). Focusing on the scale of impact can be useful (e.g., short vs. long term; single vs. multivalent purpose or use). Describing the scale of impact and multivalence of a GIVVCE product, a community partner shared:

GIVVCE products have been used at several community events throughout the region, including our first [Fair] last August… Material is very useful for students, but also evolved into professional development for teachers. I am hoping to expand some of the ideas into activities we can bring to more local educational events.

Similarly, another partner commented about how the CPB-CE products were used multiple times, sparking additional university-community partnerships:

This past Friday, I partnered with [another department in the college] to present at their annual conference. We shared ways of infusing literacy through STEAM. We shared the books and virtual reality viewers used for the summer Moving with Math and Literacy camp at Shade Community Center. The [student] participants LOVED it! In fact, one of the Deans from [another university] was in attendance and commented that this was the most effective way to teach."

Evaluation and reflection also allow faculty to determine the benefits and challenges of CPB-CE engagement and use their findings to inform the design and alignment of the CPB-CE requirements to course outcomes. For example, reflecting on student development with respect to the leadership focus of his course, a GIVVCE faculty member shared, "I was able to observe firsthand how my students embraced and practiced the idea of distributed leadership and engaged in community-based work that impacted people's lives and reframed new ways for young students to approach the task of learning."

Faculty can then recognize unintentional (or incidental) learning outcomes that benefit particular groups of students. As a GIVVCE faculty member described:

[My students] got to work with teacher education majors and got a better sense of the world view and perspectives of these students and the schools in which they work. Since most of my students are international, this was even more important as a window into US P-12 culture.

Through systematic analyses of presentations, final reflections, and course evaluations, faculty must consider the cost and benefit of the CPB-CE experience. As an example, one faculty member stated, "There were communication hiccups and collaboration challenges, but the groups persevered, overcame obstacles, and delivered digital artifacts that solved real-world problems and created far-reaching effect." In short, evaluation and reflection allow all stakeholders to critically consider the benefits and challenges of the CPB-CE projects and make improvements in preparation for future implementations of the approach.

Disseminating the Work

Once the CPB-CE is complete, it is recommended that partners and students share the work widely. Student teams can disseminate their work to the university community. Depending on the nature of the work, appropriate outlets can consist of student scholarship or creative activity expos, conferences, unconferences, and meetings of student chapters of professional organizations. Faculty and community partners are also encouraged to share their work at the college, university, and community level. Sharing can occur at meetings, colloquia, local conferences, or to particular entities in the community (e.g., school board, mayor's office). Finally, faculty must lead efforts to disseminate the work and its impact in the academy. Publications and presentations present examples that can support others intend to apply this model and engage in similar work.

FUTURE RESEARCH DIRECTION

This chapter has described a research-based rationale for the Collaborative and Problem-based Model for Community Engagement (CPB-CE) that leverages partnerships to support community-based learning. The chapter additionally made recommendations for implementing this model in various contexts. Future research should evaluate the effectiveness of the model across levels and contexts. It should explore the ways in which the model promotes undergraduate and graduate student learning of course content, the collaborative group processes that support their work, and the ways interactions with faculty and community partners can scaffold the learning experience. Future research should also explore the benefits and challenges of implementing this model from the perspectives of students, faculty, and community organizations. Because university-community partnerships are at the center of the model, investigations of how faculty and community partner interactions support the development of strong university-community partnerships are recommended.

CONCLUSION

Leveraging partnerships for collaborative and problem-based community engagement supports university students' development as leaders and engaged citizens by modeling ways that professionals from a variety of disciplines can productively collaborate around social problems. This approach can promote equity and access to formal and informal learning opportunities in the local community while providing adult learners authentic experiences for applying the knowledge gained from university coursework. CPB-CE experiences strengthen existing partnerships, renewing commitment to mutually beneficial work that acknowledges partners' expertise and strengths. It nurtures positive relationships and attitudes about the college and university partnerships, challenging traditional power dynamics that typically plague such collaborations.

The six-phase CPB-CE model presented in this chapter provides a road map for guiding students (via weekly schedule and corresponding tasks) and scaffolding their learning (by peers, faculty, and community entities) through intentionally designed tasks to accomplish scalable efforts of community outreach. Along the process, faculty, students, and community partners co-labor in terms of communication, collaboration, and implementation. As a result, the learning environment created for adult learners is student-centric, engaging, productive, and meaningful to the varying purposes of all involved. The model additionally provides a space for faculty to learn with each other and to see how collaborations add value to the work of individuals. Together, faculty initiate collaborations, learn through trial and error, and create synergy with community organizations around their mission for outreach.

While the CPB-CE model provides a useful framework for continuing this work, the authors acknowledge the importance of identifying challenges. Online collaboration and community engagement can present challenges such as an inability to synchronize schedules for whole group meetings, unbalanced contributions, postponed task execution, and communication breakdowns. In preparation for these and other challenges, partners must institute preventative measures and implement plans to recover quickly when such challenges arise. In spite of the challenges, the collective benefits of the overall process far outweigh the challenges. All participating members stand to gain valuable experience and impact the local community, college, students, and faculty partners. As such, CPB-CE and projects like it realize the vision of higher education as a public good by showcasing the commitment of colleges and universities to social development.

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KEY TERMS AND DEFINITIONS

Adult Learning Theory: posits that adult learners are intrinsically motivated and ready to learn by using the knowledge and experiences gained during their lifetime to shape future learning.

Augmented Reality (AR): A form of educational technology that allows users to superimpose digital content on the physical world to facilitate interactions with the natural surroundings with the benefit of additional information, including images, video, text and other media.

Collaborative Learning: An instructional approach that emphasizes student-centeredness, teamwork, and shared responsibility to the co-construction of knowledge and skills. Team members have defined roles, tasks and work together towards a common set of goals.

Community Engagement: A reciprocal collaboration between universities and their larger communities centered on a mutually beneficial exchange of knowledge and resources.

Educational Technology: A field in education that involves the use of various technologies to address instructional goals and objectives.

Informal Learning: Educational opportunities that occur outside of traditional classroom and/or school settings.

Interdisciplinary Approach: Collaboration among two or more academic disciplines to investigate a central problem, inquiry, or theme.

Literacy: The ability to use reading and writing skills to effectively and productively function in society.

Problem-Based Learning: A curricular and instructional approach that engages learners in problem-solving centered on authentic problems from practice.

Teacher Education: Formal policies, procedures, and curriculum that are designed and used to equip future teachers with the knowledge, skills, and dispositions that enable them to support student learning through instructional practices in elementary, middle, and secondary schools.

University-Community Partnerships: Collaborations that advance the mission and goals for each contributor through mutually beneficial strategies and outreach practices.

APPENDIX

APPLICATION ACTIVITIES

1. Critically discuss the philosophical and theoretical justification for using community engagement to advance academic excellence in higher education.
2. Use your understanding of equitable university-community partnerships to summarize the features of at least one formal university-community partnership at your institution.
3. Provide two learning activities that exemplify problem-based learning in your discipline.
4. The Collaborative and Problem-based Model for Community Engagement (CPB-CE) uses collaborative learning to support student, faculty, and community development. Critically evaluate this statement by drawing on the tenets of collaborative learning and the phases of the CPB-CE model.
5. As a faculty member at an institution of higher education, design a project that applies the Collaborative and Problem-based Model for Community Engagement (CPB-CE) in your local context:
    a. Define the goals and purposes of student engagement including potential higher education partners,
    b. Identify and describe prospective community partners and the strategies you will use to support their buy-in and engagement in deliberate planning,
    c. Illustrate how you would set the stage by providing examples of a project description and timeline, communication infrastructure, and resources, and
    d. Create three assessments that would allow you to evaluate the effectiveness of the project.

Chapter 4
Challenges, Issues, and Trends in Adult Education

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ABSTRACT

This chapter explores how adults think, learn, and apply knowledge in their daily lives to effectively design a curriculum, create activities, and integrate valuable technology into the course design. The chapter summarizes adult learning theories, including self-directed, transformative, and experiential learning, as well as the concept of andragogy. Instructors are provided with practical tools and methodologies which will help them to produce effective adult learning experiences.

INTRODUCTION

Adult education maintains a diverse history in the United States. "Adult education is a practice in which adults engage in systematic and sustained self-educating activities in order to gain new forms of knowledge, skills, attitudes, or values" (Merriam, 2007, p. 7). According to a recent National Center for Education Statistics (NCES) survey (2019), the number of hours adult students work in a week has increased from 20 hours to 34 hours per week since 1970 in the U.S. Moreover, in 1970 undergraduates spent 25 hours per week on their studies, but that number decreased to 15 hours per week by the year 2016 (NCES, 2019). Data from the NCES clearly indicates undergraduates spend more time working and less time studying.

More and more adults are returning to institutions of higher learning to advance their skills in search of better careers. It is, therefore, crucial that instructional designers at educational institutions reconsider what they deem to be appropriate strategies when designing and delivering instruction to fulfill the expectations of adults in the age of technology.

No single instructional design meets the needs of all students, and adult learners are no exception. In order to effectively deliver information to adults, one must understand how adults learn, the differences between adults and traditional students, and the issues adult learners face. While designing instruction

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for non-traditional students, adults' current circumstances and values must be considered in order to fully meet their needs.

The objective of this chapter is to create an adult learning instructional model that takes the various adulthood perspectives into consideration as delineated below. The essence of the chapter critically reviews existing literature in adult education, addresses inconsistency in adult learning, and discusses variables that affect adult learning.

The author also analyzes various theories of adulthood, including biological, legal, psychological and sociological perspectives. The purpose is to examine how such theories influence adult learning and to develop an effective paradigm (model) for designing and integrating technological activities into adult education, keeping in mind the characteristics unique to adults during the instructional delivery.

In summary, this chapter uncovers a model that defines theories of adulthood and analyzes their implications for learning.

DEFINITION OF ADULTHOOD

Authors tend to define adulthood differently, with each perspective centering upon a different aspect. However, the most common theories agree upon the following definitions.

- **Biological Adulthood:** An adult is classified as a human or other organism that has reached sexual maturity. Cross-culturally, adulthood has been determined primarily by the start of puberty in both sexes.
- **Legal Adulthood:** The typical age of a legal adult is 18 in the United States. Legal rights vary among other countries and for those between the ages of 18 and 21.
- **Psychological State:** According to Erikson (1975), the stage in human development can be divided into three progressive eras: young adult (early 20s to 30s), middle adulthood (ages 40-64), and old age (65 years or older).
- **Social Adulthood:** Social adulthood deals with social roles. It refers to self-concept and the ability to responsibly and independently care for oneself. An adult can perform certain roles such as completing education, working, buying houses, living independently, marrying, and raising children, etc. (Hogan & Astone, 1986).

The definition of adulthood (or adult) varies from one culture to another. It includes biological, psychological, and social aspects. Regrettably, these concepts are not observed in mainstream education. Merriam and Brockett (1997) define an adult as a person who can intentionally perform a series of activities, abide by social norms, and demonstrate understanding of concepts to others. Possessing awareness or self-perception equally defines adulthood. It is important to note that neither physical maturity nor biological, psychological, or social standards are the sole criteria an adult must meet to achieve his or his goals. For adults to succeed, they must be prepared to learn and grow in knowledge and continue to strive for improvement as part of a lifelong learning activity.

REVIEW OF ADULT LEARNING THEORIES

Various adult learning theories exist to help instructors design courses and teach efficiently. TEAL Center (2011), lists the most common adult learning theories and provides insights to instructors. Andragogy, self-directed learning, and transformational learning are discussed in the TEAL Center report. Schwartz (n.d.) also points out that experiential learning theory has been adapted for widespread use in the areas of teaching and learning. To ensure a solid transfer of knowledge, adult learning theories must be the discussed before developing instructional content. In the following sections, readers will see these theories put to practical use for the integration of technology into instructional design.

Andragogy

TEAL Center (2011) defines andragogy as set of assumptions regarding how adults think and learn. The term can be referenced back to German educator, Eugen Rosenstock, who used it to describe Plato's educational theory (Knowles, Holton, & Swanson, 1998). Rosenstock claimed that "adult education required special teachers, special methods, and a special philosophy" (Knowles, Holton, & Swanson, 1998, p. 59).

Knowles was the pioneer who discussed the concept of andragogy in the United States for the first time since its birth. Knowles (1980) defines an adult learner as a human who is problem-centered, intrinsically motivated, and is willing to increase self-directedness by using life experiences to aid learning. From that point forward, Knowles grew to become the principle expert of andragogy. Numerous adult educators including Craik and Lockhart (1972), Clement (1982), Brookfield (1986), Mezirow (1991), Lawler (1991), and Merriam and Caffarella (1999) have proceeded to explain how the assumptions of andragogy facilitate adult learning.

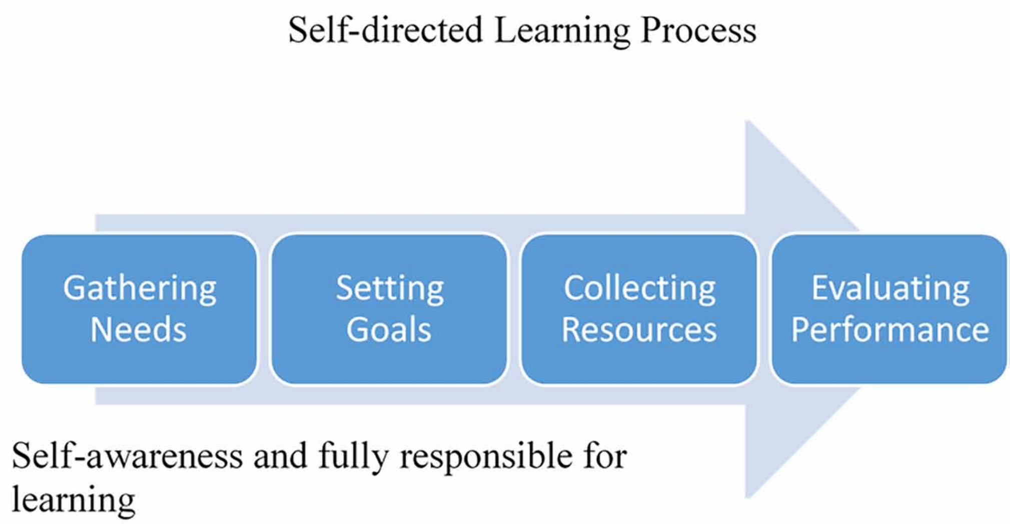
Self-Directed Learning

Self-directed learning focuses on the process by which adults take control of their own learning through setting their own learning goals, locating appropriate resources, deciding on which learning methods to use, and evaluating their progress. Goddu (2012) defines self-directed learning as the ability to learn and then improve upon personal values and beliefs. Tough (1971) stated that about 90 percent of all adults have been led by internal drive to conduct at least one learning project, whether formal or informal. Around 70 percent of adult learning is intrinsically motivated and self-directed (Cross, 1981).

Self-directed learning (SDL) is a "process in which individuals take the initiative, without the help of others" in planning, carrying out, and evaluating their own learning experiences (Knowles, 1975, p. 12). Fundamentally, self-directed learning is a process that largely manifests informally outside the classroom; the learners are in control of their education. To qualify as a self-directed learner, a person must make personal decisions about what content to study, which methods to use as an approach (visual, aural, verbal, or physical), which resources to employ, and how to evaluate the outcomes of the learning process. Figure 1 details the process of self-directed learning. Individuals take responsibility for their own learning process through determining their needs, setting goals, collecting resources, and evaluating their performance. See Figure 1. This chart was created by the author to illustrate the self-directed learning process.

However, self-directed learning can be difficult for adults suffering from low self-esteem or low self-efficacy. Mruk (1999) reveals a strong correlation between these three constructs. Those who have

Figure 1. Self-directed learning process (Created by the author, 2019)
Source: Created by the author



low self-esteem or self-efficacy tend to lack independence, confidence, and internal motivation as well. Brookfield (1985) suggests that not all learners prefer a solely self-directed approach. Many self-directed adult learners choose to enroll in formal education programs with teacher-directed courses as well. On the other hand, individuals who opt for a formal educational setting initially, such as a traditional face-to-face or online classroom, also supplement their formal classes with self-directed learning. This is an asset to educators.

Within a formal education setting, an educator may integrate a variety of techniques and technologies into the instruction that will foster self-directed learning for students who are ready and willing to experience a new variety of personalized, independent learning (Long, 2000). The benefit of self-directed learning is that it integrates into the learner's daily routine, centered around convenience and personal learning preferences.

Transformative Learning

Transformative learning is a process in which a person, through learning, changes his or her way of thinking (Mezirow, 1991, 1995, 1996; Cranton, 1994, 1996). This type of learning actually alters the way individuals view themselves. TEAL Center (2011) discovered individuals undergo a shift of consciousness, resulting in a modified frame of reference. Transformative learning is composed of two dimensions: habits of mind and point of view. King (2000) found that English language learners often allow for a shift in their view of U.S. culture in order to gain confidence communicating with native English speakers. Another example is when Freire (2000) teaches Brazilian workers to read by engaging them in meaningful conversation, as also referenced in the TEAL Center's report (2011). Following discussions regarding working conditions and poor compensation, workers changed their thinking and began striving for social change.

Theorists define transformative learning differently, but generally, there are four processes for a learner to go through in order to experience transformative learning. The first process is to build and elaborate upon an existing point of view. In this phase, learners seek further evidence to support an existing initial bias. The second process is to recognize a new point of view. The learner encounters a challenge that differs from previous experiences, which then results in the learner developing an additional point of view. The third process is to transform the existing point of view. Learners reflect upon and compare their existing perceptions to the change in point of view, becoming more tolerant and accepting of the other members (concepts). When this process happens repeatedly, it results in a new habit of mind. The last process is to transform the new habit of mind. Learners adopt the new point of view and are aware of the changes to their existing views. It should be noted that there will be no evidence transformative learning has occurred if learners do not accept the new concept or cannot feel connected with the new frame of reference. Transformative learning has only occurred once learners are willing to adopt a new mindset that fits comfortably into their preexisting frames of reference.

To Mezirow (2000), transformative learning is a rational process. As individuals reflect on and discuss their assumptions about the world, they often experience a shift in their frame of reference or world view. For this to happen, individuals engaging in reflective discourse need to challenge each others' assumptions and encourage group members to consider various perspectives. A criticism often leveled at Mezirow's transformative learning theory is that it does not account for the effect of the individual's race, class, and gender, or the historical context in which the learning occurs (Corley, 2003; Sheared et al., 2010; Taylor, 1998; Wilson & Cervero, 2001). The theory has also been criticized as hyper-rational, meaning it ignores feelings, relationships, context, culture, and temporal aspects (Silver-Pacuilla, 2003).

Experiential Learning

"Experience is the adult learner's living textbook" (Lindeman, 1926, p. 7). According to Lindeman, adult education is a continuing process of evaluation (p. 7). Experiential learning focuses on personal experiences and how they impact each individual's learning process differently. Adult learners tend to connect new information to their existing knowledge rooted in life experiences. Experiential learning allows adult learners to make practical use of their knowledge and apply it in a context similar to the way that knowledge would be used in real life (Goddu, 2012).

Kolb (1984) claims the four steps of the experiential learning process are analogous to riding a bike. See Figure 2. When the learner is still in the stage of concrete experience, the learner physically experiences the bike is "here" and "touchable". In the second stage, the learner observes and considers what could cause this bike-riding event to become a success or failure (reflective observation). The learner develops a basis for observation and reflection in stage three. After a few failed bike-riding attempts, the learner will think about ways to improve upon the next attempt (abstract conceptualization). The last stage is centered around thought and reflection (active experimentation). The learner will modify the action based upon the prior failure. Each new attempt is informed by a cyclical pattern of previous experience, and eventually results in successful riding.

EFFECTIVE TEACHING METHODS TO SUPPORT ADULT LEARNING

Jarvis (2004) identifies the primary concepts that must be utilized to create effective teaching methods for adult learners. He believes that teachers should facilitate the learning process by creating a healthy learning environment providing choice, method, content, and assessment to guide students. For example, students "should be free to work at their own speed, choose to study particular aspects of a course, choose to study particular aspects of a course, adopt whatever learning style suits them best, and be free to choose what they learn" (Jarvis, 2004, p. 154).

Rubenson (2011) states teachers should share power and decision-making roles with their students. Teachers should "avoid being in the position of providing right answers." They should include self-evaluation in graded courses, ensure there is equal access to all resources, involve students in managing the learning environment, and be open and explicit about what is happening and why (Rubenson, 2011).

Many unique instructions and learning techniques can be used to foster adult learning. This study merges Schwartz's methods (n.d.) with those of other learning theorists and organizes them into the following seven categories: didactic teaching, Socratic teaching, problem-based teaching, experiential teaching, active (self-directed) teaching, narrative teaching, and group and collaborative teaching.

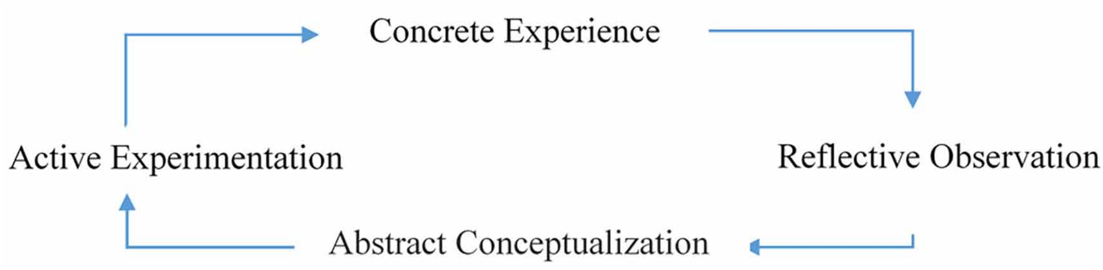
Didactic Teaching and Learning

A didactic approach can be very effective when used to encourage adults to analyze the course content, rather than just memorize the information. In this approach, the teacher encourages learners to ask questions, thus initiating the learning process by themselves (Schwartz, n.d.). If a student asks a question to which the teacher does not know the answer, it provides the teacher with an opportunity to ask the rest of the class if anyone knows the answer. This encourages students to take the initiative to find the answer for themselves. When a teacher admits to not knowing an answer and trusts students to be able to find a solution, this establishes respect for the students' knowledge and experience. Furthermore, it facilitates students' independent learning as well (Jarvis, 2004).

Socratic Teaching and Learning

The Socratic approach centers around inquiry and introduces questioning into the teaching and learning process. The Socratic method is an effective method for teaching adults because it helps the learners

Figure 2. Experiential learning model (ELM) (Kolb, 1984)
Source: Adapted from Kolb, 1984



"create" rather than "reproduce" knowledge. It also fosters engagement in adult learners by utilizing their life experiences (Jarvis, 2004).

Problem-Based Teaching and Learning

The problem-based method includes both active and self-directed variables. Students are provided with a real-life case or scenario to solve. In this teaching method, the teacher is not the center of attention. Instead, the teacher is a facilitator who provides students with guidelines for their problem-solving exercises (Schwartz, n.d.). Students are the center of this process and take the lead in analyzing problems and developing solutions. Adult learners tend to take advantage of their prior life experiences when problem-solving, greatly benefiting from this teaching method. Students, identify their own learning needs, apply novel information to the original problem, and evaluate their own learning process. The idiosyncratic feature of problem-based teaching is this learning process focuses on the identification, exploration, and attempted resolution of realistic problems (Tight, 2003). Students (adult learners) are engaged with relevant scenarios and are granted responsibility to utilize and value their existing knowledge and experience (Tight, 2003). Originally, this teaching strategy was used in nursing, medical, law, and computer science fields. However, it is commonly acknowledged across all subjects now. Students gain knowledge and correct or build upon existing assumptions by utilizing their prior experience, initiating their own research, and engaging in peer collaboration (Karge, Phillips, Jessee, & McCabe, 2011).

Experiential Teaching and Learning

Similar to problem-based teaching, experiential teaching allows adult learners to apply their knowledge in a context similar to the way that they would use in real life (Goddu, 2012). The experiential method utilizes discussion, simulation, case study, and problem solving, as techniques to engage adult learners (Caminotti & Gray, 2012). When coupled with experiential teaching, simulations encourage students to apply their existing knowledge and develop critical thinking skills. Simulations provide students with an environment in which they can reflect on their choices, "review what was learned… and contemplate what could have been done in other ways" (Rutherford-Hemming, 2012, p. 132).

Active (Self-directed) Teaching and Learning

Active learning or self-directed learning fosters internal motivation as a gateway to provide students with opportunities to gain knowledge. It is a self-driven learning process that enhances learners' skills, improve learners' critical thinking, and inspires learners to "gain knowledge in an efficient way" (Karge et al., 2011, p. 55). Not only does self-directed learning encourage students to reference their own background knowledge and experiences, it also provides instructors with the opportunity to assess pre-existing student knowledge.

Active learning grants independence and allows the learner to make choices, to take responsibility for their own learning and personal values or beliefs (Goddu, 2012). In active learning, the instructor becomes a facilitator and a resource for learners (Robotham, 1995, as cited in Goddu, 2012).

Active learning is a reaction to new knowledge, which reflects that learners are self-willing. Students are granted the opportunity, freedom, and resources to decipher what material is relevant to their goals based on their own self-knowledge (Alex, Miller, Platt, Rachal, & Gammill, 2007). Active learning often presents itself through an online or blended learning environment where students can go beyond the content presented by the instructor. Students with motivation to advance intellectually are allowed to explore content, engage with classmates, share the additional resources, and provide feedback through the learning process (LeNoue, Hall, & Eighmy, 2011).

However, this process requires learners to maintain attention during isolated activities, such as independently researching information on the Internet, and may not be applicable to every adult learner. Strong communication skills are also required to interact with experts and peers in either an online environment or traditional classroom. A foundation of pre-existing research techniques and critical thinking skills is also necessary. Active (self-directed) learning is a crucial part of the learning process across all methods. The educator need only intervene by means of providing guidelines to refine the learning process if students are not performing as expected or failing to meet learning objectives.

Narrative Teaching and Learning

Another similar teaching method is narrative teaching. In narrative learning, adults are given the opportunity to form links between lived experience and curricular content (Schwartz, n.d.). Adults generally strive to understand the purpose of the task and how the information relates to their lives in order to make decisions. Learners must see a “connection” within the process (Clark & Rossiter, 2006). Storytelling is one way that narrative learning can be introduced into the classroom. Storytelling encourages learners to identify where their value systems line up with ideas being presented in the course content (Clark & Rossiter, 2006). Social work, psychology, consultant, and communication subjects frequently adapt this method into their content design. When introducing storytelling into the classroom, one must keep in mind that the story, fiction or nonfiction, should always relate to the goals and topics of the lesson (Caminotti & Gray, 2012).

Setting rules and creating a supportive classroom environment is especially important when utilizing this teaching method. Students must know that their story will not be targeted for disagreement, judgment, or argument so they will volunteer to share and participate freely. Receptive and respectful listening from both listeners and the instructor is imperative (Clark & Rossiter, 2006). Storytelling may also be integrated as part of an online learning environment. Stories can be illustrated in text or video format via discussion board. The main purpose of the narrative method is to encourage all students and instructors to link their life experiences together so they may enhance their repertoires for making future decisions in similar situations (Caminotti & Gray, 2012).

Group and Collaborative Teaching and Learning

Group or collaborative learning is effective for adult learners because it allows them to use their connections and experiences to explain and build upon concepts from class in ways instructors cannot (Davis, 2013). Adult learners present with a broad variety of experiences and may draw connections from past professions. Through collaborative learning, students foster communication and the transfer of ideas within an interactive environment pre-prepared by the instructor (Schwartz, n.d.). For adult learners already maintaining professional positions, collaborative group work sharpens skills and broadens their view of the world. Furthermore, it benefits the entire class by resulting in “group affiliation and the development of academic identity” (Davis, 2013, p. 70). In a supportive online learning environment, the instructor assigns collaborative projects or team debates to allow for communication and interaction among students, reducing feelings of isolation and constructing a sense of mutual engagement (Scherling, 2011). The following activities can be utilized to facilitate group and collaborative learning:

- **Classroom Discussion:** Classroom discussion is a collaborative activity that requires students to actively participate and think critically when formulating their questions and responses. This activity fulfills the adult learner's need to find relevance in his or her studies (Davis, 2013). When the instructor plans to integrate a discussion activity, it is important to first determine the purpose and expectation for the discussion (Davis, 2013). The instructor must set precise guidelines, as well as model a specific format and instructions for students as an example. Furthermore, the instructor should provide meaningful questions to kindle an insightful classroom discussion while ensuring students construct independent responses as evidence of their own understanding (Davis, 2013). This modeling should include "asking questions that help the students access higher-levels of thinking, and then providing opportunities for students to craft similar questions of their own" (Davis, 2013, p. 72). The instructor should periodically intervene to guide the discussion. The instructor may also assign a group report or require learners to write a short reflection regarding the discussion at the end of class (Davis, 2013). These assignments provide students with an opportunity to organize their thoughts and solidify viewpoints to build upon later after each discussion.
- **Online Discussion Board:** Making the switch from a classroom discussion to an online discussion can be challenging. In a classroom setting, the instructor actively guides and monitors the conversation in real-time; however, this is not the case for an online discussion board. In order to encourage deep learning, online discussion tasks should provide clear instructions with structured, specific questions that encourage students to develop different perspectives and explanations of a topic or scenario in a highly collaborative environment (Ke & Xie, 2009). Discussion topics should vary and may include close-ended discussion, where students apply their knowledge from the course content to respond to questions; open-ended discussion, where students must reflect on their learning process to develop different perspectives; or integrated discussion utilizing a combination of both open and close-ended techniques (Ke & Xie, 2009). In an online discussion, the instructor should avoid asking right or wrong questions. Questions thought to have correct or incorrect answers will limit students thinking and stifle the conversation. Questions should be designed in a way that promotes conversation and stimulates critical thinking. The instructor should also be careful to "question if a particular discussion is ethnocentric, dismissive or offensive to other cultures" and to provide alternative material, such as from popular culture or current events, to serve as a foundation for discussion (Milheim, 2011, p. 25).
- **Flipgrid:** Flipgrid is a social learning platform that allows educators to ask a question and students to respond in a video format. It is different from a traditional "text online conversation." Students have the opportunity to respond to one another by creating videos as well. Adult students retain knowledge best when they collaborate with others. Asking or responding to questions in an audio-visual format leads learners to feel connected and reduces isolation. In a video chat platform, every student has a voice. Learners can record and share their topics or reply to each other with videos. When adults see other people's work and understand the purpose of a task, they feel more connected and motivated (Scherling, 2011).
- **Packback:** Packback is an AI-supported online discussion platform that enables curiosity-based student discussion. This platform has been adapted to fit many online school discussion settings and it is compatible with most learning management systems. The platform delivers a unique meth-

od of scaling feedback through the use of algorithmic coaching or "AI". Packback's algorithms automate moderation of posts, empowering professors to provide higher-level coaching. There are three tiers of feedback and review that can be provided to students on Packback (Packback, 2019):

- **Algorithmic Flagging**
  - § Students are monitored in real-time while they write. They converse with a coach and receive immediate feedback. Every post is reviewed and subject to community guidelines.
- **Moderator Review**
  - § Any post flagged as a community violation is reviewed by an automated community violation moderator. Students are given the opportunity to adjust their post if possible so it may remain public.
- **Professor Feedback**
  - § Thanks to the automated moderators, Packback's professors are free to spend the majority of their time providing individualized feedback to students.

TECHNIQUES FOR ADULT EDUCATION

The previous section details effective teaching methods for introducing new material. It is noted that adult learners benefit from sharing and associating personal life experiences with the curriculum. They are more likely to engage in a new lesson when they know they can contribute. However, there are also instances in which students may have already experienced or reviewed certain content. Vandenberg (n.d.) in her "how to teach so people learn" handbook identifies various teaching techniques that facilitate adult learning. The following section clarifies and elaborates on four techniques that are used to build upon students' prior knowledge.

Knowledge Check and Reflection

Student outcomes will improve if they are given a chance to check, reflect, and review the material they have already been exposed to because it provides them with an opportunity to incorporate the information into their personal lives (Brookfield, 1986). The instructor may ask adult learners to create a blog, vlog, or journal through which they periodically reflect on how to apply what they've learned in the real life. This refers to the transfer of knowledge from one domain to another. This technique can be implemented numerous times in a single class session, such as in the middle of a lesson, when the instructor changes topics, or at the end of the class as a summary.

Summarize Content

Having learners summarize the main points of a lesson or document the content that most appeals to them is yet another powerful strategy teachers may use to solidify new concepts. This strategy encourages students to establish connections between new material and pre-existing constructs in their minds (Vandenberg, n.d.). The summary can be a whole paragraph or just a few sentences. However, some learners may struggle to perform this type of activity. Hosting an open-ended question session is another approach educators may use to scaffold instruction and prompt learners to engage with the content (Merriam & Bierema, 2014).

At the conclusion of class, the instructor may pose an open-ended question for students to discuss with peers. The instructor should alert students to the assignment at the start of class to promote greater attention and participation. This method aids learners in developing critical thinking skills and encourages openness to a variety of solutions.

Sharing Knowledge and Receiving Feedback

Adult learners carry a host of knowledge and experiences that can be linked back to the subject they are studying (Cross, 1981), and they thrive on receiving feedback (Karge et al., 2011). A viable method to enhance adult learners' knowledge is to give them opportunities to share experiences and receive feedback or reinforcement. This validates learners' expertise.

Discussion may stem from a simple concept or a question and then branch out further as ideas develop during the sharing process. Feedback can be either formal or informal. In utilizing this technique, instructors empower learners to take an active stance and adopt responsibility for their own education.

Teaching Peers

Next is a practical activity. Adult learners excel when teaching others. Not only do they practice transfer of knowledge, but they incorporate their own experiences as they re-teach content to their peers (Henderson, 2010). Learners absorb new bits of knowledge because they experience the material in a different capacity, and as a result, they produce more varied outcomes resulting from their strengthened foundation. In practice educators divide participants into small groups and assign each group a portion of material to review. This is a good time for learners to evaluate their understanding. "Show and tell" provides another valuable opportunity for learners to organize and reproduce the material.

TECHNOLOGY FOR ADULT EDUCATION

Technological advancements like the introduction of the Internet and the World Wide Web have impacted the world both socially and economically throughout the 20th century. Additional technologies, such as virtual reality, simulation, and gamification, may also be used to enhance adult learning. When a curriculum designer decides to integrate technology into adult learning, both educators and learners face a number of challenges, including how to operate the technology, how to integrate technology with the content, and how to utilize the technology in a way that positively impacts the learning experience (Field, 1997).

Ginsburg (1998) addresses concerns regarding how to approach technology as a curriculum, a delivery tool, and an instructional tool. Benefits and limitations of each approach are summarized in the sections below. The given information regarding technology as a curriculum, a delivery tool, and an instructional method is built on Imel (1998).

Technology as Curriculum

Technology is considered a curriculum in and of itself. Students do not only grow to understand content via technology, but they also learn more about the actual subject of technology in the process and develop skills needed to use technology competently (Merriam & Brockett, 1997). Institutions of higher learning target adults by providing courses for the use and management of different technologies. For instance, as a means of instilling technology into the curriculum, the Georgia Center for Continuing Education offers a 10-hour, noncredit evening course called “Exploring the Internet”. It is designed to develop necessary skills for using Internet applications such as e-mail and the Web (Cahoon, 1998).

The benefit of adding technology as a curriculum subject is that it allows teachers to address each individual aspect of the technology being studied. Students acquire a specific set of technology skills that can be applied across different settings. One major limitation of this approach is the narrow focus it lends to technology as a subject. When technology skills are acquired in an isolated environment, they may not efficiently transfer to other domains for application by the learner. In addition, if the learner lacks opportunities to practice, newfound skills may deteriorate (Ginsburg, 1998).

Technology as A Delivery Tool

A second approach for integrating technology into adult learning is to use it as a means to transmit knowledge (Ginsburg, 1998). In this approach, for example, personal electronic devices such as tablets, e-readers, and smartphones are tools designed to provide content, practice, and evaluation for an entire curriculum. These devices require certain programs to run some applications, but devices themselves are just tools on a platform. The benefit of these tools is they can easily be carried physically, and learners can study content at their own pace, anytime and anywhere. However, it is a challenge for educators and learners alike to judge which content is best suited for these devices (Cowles, 1997). Technology has the potential to increase flexibility, provide access to experts, facilitate discussion among long-distance learners, reduce feelings of isolation in nontraditional learners, increase learner autonomy, and support or promote constructive and collaborative learning (Burge, 1994; Cahoon, 1998; Eastmond, 1998; Field, 1997). However, because “technology in and of itself does not promote learning” (Burge & Roberts, 1993, p. 35), its use does not reduce the educator’s responsibility to scaffold or intervene during the lesson while monitoring for appropriate outcomes.

Technology as An Instructional Tool

When used correctly as a tool, technology is integrated into the method of instruction. Primary instructional goals, objectives, and outcomes remain the same, but technology is an add-on tool designed to aid in the transfer of knowledge (Ginsburg, 1998). When technology is used as an instructional tool, advancing learners’ technology skills is not the primary focus. Instead, the focus is on essential instructional activities; technology is just a support tool to facilitate learners’ development and a means to produce desired outcomes. To clarify, if used during a student presentation, PowerPoint, Google slides, Sway, or any other slide tools will not impact or change any learning outcomes associated with the project. The ultimate goal of assigning a presentation project is to assess learners’ comprehension and determine how much of the content they retained. The spread of the Internet and the World Wide Web has made using technology as an instructional tool common for distance educators. For instance, an instructor may ask learners to submit a project via a learning management system (Eastmond, 1998).

Technology has also been used to enhance adult literacy programs. It creates an “invisible and widened” classroom, just like a formal classroom setting, which grants students access to Internet resources and offers personally relevant content (Cowles, 1997, p. 11). This approach allows learners to develop skills and experience technology in ways that a traditional classroom setting cannot. Learners benefit from technology tools even while away from the instructional setting (Cahoon, 1998).

A limitation of this approach is the willingness of instructors to adapt or develop technology-based activities. Success also depends upon the instructor's technical skills. (Ginsburg, 1998). Inaccessibility to certain forms of technology or hardware may also cause difficulty for both instructors and learners. An instructor's skill level may also pose a limitation when designing technology-based content.

These three approaches are all currently used to integrate technology into adult learning. Like any other instructional tools, technology can either serve as a crutch or it can transform the learning process. However, technology is not one single, all-encompassing tool. How it is used reflects the values of the educator and his or her relationship with learners. (Burge & Roberts, 1993).

TECHNOLOGIES IN TEACHING AND LEARNING

Discovering how to integrate technology into a curriculum can be challenging to educators. Online learning or eLearning is the term used to reference the use of the Internet, learning management system, or other digital platform to induce learning (Eastmond, 1998). As referenced in Figure 3, eLearning has witnessed an extraordinary expansion across many subject domains and levels in developed countries over the last decade. On the contrary, the use of eLearning as an educational tool decreased in developing and third world countries during this time. It is undeniable that technology and the Internet create opportunities and grant access to knowledge. Of course, one cannot assume that effective teaching and learning will occur directly from Internet access. There is a gap between the high demand for better education and the limited useful educational resources available (Zhu, Gu, & Wang, 2003). With the right combination of instructional design, electronic learning material, and proper guidance, the Internet and its related technology can enhance learning (Wang, 2007).

The Internet and online learning applications are rapidly becoming vital in the quest for optimal educational application. Educational institutions and teachers alike must be aware of both sides, technologies' strengths and opportunities as well as their weaknesses and threats.

Current Technology Trend I: Simulation in Learning and Teaching

Simulation technology is an adaptable tool that can be useful in areas relating to performance, safety control, testing, training, education, and video games and is a growing trend in the fields of medicine, nursing, engineering, military, and education. A simulation, often used for training or study, can be defined as an analogous representation of a scenario, mimicking the same behavior, process, or variables as its counterpart. By definition, a simulation is simply a system representing or standing in for another system (Ronen & Eliahu, 2000). The purpose of simulation technology is to allow for the exercise and exploration of process, procedure, or skills in a controlled environment (Keskitalo, 2012). Learners can increase performance via practicing the same behavior, task, or skill repeatedly in a safe, controlled environment until acceptable success rates are achieved. In nursing, simulations take the form of a human body that can experience a heart attack and then reset for a different scenario for the next group of nursing students. In the air force and airline companies, simulation is used to artificially re-creates an aircraft flight environment for pilot training, aircraft engineering, or other purposes. In the military, simulations allow soldiers to experience the same events they will face in the field. Law enforcement officials receive forensics training by way of computer-based simulation or online gaming. Cities employ the use of large-scale disaster scenarios involving numerous volunteer victims to prepare its fire fighters, EMTs, and police for emergencies. In short, simulation allows for the transfer of knowledge across domains. Learners gather new information while solidifying concepts they already know. They explore variables in new dimensions and learn from both success and failure without risking harm to real people, environments, or property.

The field of nursing is in a constant state of flux and in desperate need of both instructors and students. The demand for qualified nurses continues to climb as the public ages, requiring more frequent and extensive access to health care (Rosseter, 2014). Nursing simulations or scenarios help alleviate this burden. They aim for realism and create environments as similar to those experienced in on-the-job training as possible (Bland, Topping, & Wood, 2011). These types of simulations utilize human actors in scenarios. For example, an actor may portray a mentally-ill patient being interviewed by the healthcare team in a simulated office or clinical environment (Roman, 2014). Despite the growing demand, nursing schools face shortages in faculty, facilities, and internships for their students (Gerardi, 2013). As Rosseter (2014) noted, these shortages coincide with increasing enrollment numbers resulting from the high demand for licensed healthcare providers. Students ready themselves to meet this need, but instructors lack resources to provide a high-quality learning environment unless they integrate simulated clinical activities into the curriculum. Presently, substituting simulation hours for clinical hours in nursing programs is a common and growing trend (Gerardi, 2013).

Simulation allows students to engage in active learning and transform knowledge acquired during class into tangible activities. It provides opportunities for practice without risk to the environment or other living organisms. Students can make mistakes, re-set the scenario, and try again. Real life or death situations do not allow for risk and mistakes. In reference to students with no prior nursing experience, these first practice sessions, absent of human participants, construct a safety net (Keskitalo, 2012). Most importantly, proper use of simulation in a lesson allowances time for reflection. Instructors guide students individually or as a group to reflect on the event, view themselves performing procedures, and discuss their individual roles in the simulation event. According to research, this reflective portion of the simulation, called debriefing, is valuable in transferring new information into long-term memory storage (Petranek, Corey, & Black, 1992).

Simulation events are more often associated with adult learners rather than younger learners. Adult learners generally harbor more maturity, are self-directed, carry a host of referenceable life experiences, and demonstrate a desire to understand why specific questions or topics should be explored. Adults prefer to be active and apply their newfound knowledge as a gateway to experience the material on a deeper level (Fanning & Gaba, 2007). Simulation fulfills these desires with the added benefit of rehearsing skills for mastery and experimenting with procedures before putting them into practice.

Current Technology Trend II: Virtual Reality in Learning and Teaching

Virtual reality technology is widely attractive to the younger student community. Research in virtual reality and education is novel and has marvelous potential for expansion in the coming years. Virtual reality is largely used in military training, automotive and aerospace design, medical training, and entertainment (Zyda, 2005). 3D digital technology is a popular topic of applied research and is readily being adopted for commercial application in the automotive industry. Companies integrate virtual reality into the early stages of the design process to create prototypes before making final decisions. Virtual reality offers a suitable environment in which to review designs, reducing the time and cost of development while still improving product quality.

Virtual reality serves as an innovative educational instrument that enables students to assess the value of their solutions because it requires them to apply relevant knowledge and demonstrate understanding by solving a complex, real-life problem (Kartiko, Kavakli, & Cheng, 2010). The interactive 3D environment also serves as a tool to scaffold a complex problem into sections and establish relationships between them to create a unique and practical solution. 3D models familiarize students with features of different shapes and objects and can be particularly useful in teaching engineering or subjects requiring strong spatial reasoning skills.

Online collaborative learning environments are examples of virtual reality being used for educational purposes. In a traditional online discussion board, learners use text, images, and external links to share experiences and complete projects (Bouras et al., 1999). The Educational Virtual Environments (EVE) project as described by Bouras, Giannaka, and Tsiatsos (2003) also explores the use of shared virtual environments for learning and has similar functionality to systems previously discussed. In the EVE project, each student takes the form of a character on screen. Students can either create a 3D scanned customized character or opt for a premade avatar.

The 3D character or persona allows users to easily recognize each other while discussing or completing virtual projects. Features in this learning environment include two distinct 3D areas for students, a personal desk space and the training area. Students can access course and profile information, upload and download files, and reply to personal messages. The training area is the virtual classroom in which synchronous learning takes place. A presentation table and whiteboard are provided with text and audio communication supported. In this virtual learning environment, everything is comparable to a traditional classroom. See Figure 3.

VALUE OF CURRENT TECHNOLOGY IN ADULT LEARNING

Universities question the value of integrating technology into an already fully-functioning curriculum. The benefit lies within the progress students make resulting from exercises in experiential and social learning. Experiential learning is "learning by doing, thinking about, and assimilation of lessons learned into everyday behaviors" (Fanning & Gaba, 2007, p. 115). David Kolb's model of experiential learning is made up of concrete experience, reflective observation, abstract conceptualization, and active experimentation. When a learner draws from a concrete experience, he or she is pulling memories from a past event. The learner then engages in reflective observation to identify the variables of the previous event. Abstract conceptualization occurs when the learner uncovers weak spots within the previous experience. Finally, in active experimentation, the learner incorporates skills or ideas generated from the analysis of the prior experience into his or her current practice (Fanning & Gaba, 2007). Simulation and virtual reality give adult learners the experience to practice skills and procedures in an immersive environment.

Effective simulation experiences require the participants to be active learners, and to some degree, be responsible for their own learning. Ideally, adults are self-directed and self-motivated during simulation activities, which can lead to stronger ownership of the learning outcomes (Jeffries, 2005). Experiential learning is vital because it fulfills adults' needs for active and self-directed learning. Adults find connection in what they learn and rehearse before applying their new skills or knowledge to the work environment or life. By designing a foundational simulation experience, instructors give adult learners

Figure 3. Educational virtual environment (EVE) platform (Bouras, Giannaka, & Tsiatsos, 2003)
Source: Bouras, Giannaka, and Tsiatsos, 2003

the opportunities they crave to build on their preexisting repertoire and begin thinking critically about their actions and reactions within the simulation. This reflection is unique to simulation and perhaps its most valuable aspect. Real world experiences do not always allow for reflection at the time of event, but educators simulate the event instead, time can be allotted for the learner to debrief, reflect, and critically consider his or her role in the experience (Conrad, Guhde, Brown, Chronister, & Ross-Alaolmolki 2011).

An avenue through which technology establishes social learning in a curriculum is through the sharing of experiences. Educators can create small discussion group simulations across disciplines in order to better serve mental health patients in the real world. Even though students or colleagues are not always served at the same location, the online virtual learning environment, discussion, and simulation opportunities created by technology allow for the sharing of information and experiences. In healthcare, patients are usually cared for by a team of people, especially in a hospital setting. Collaborative simulation, which incorporates different caretakers working as a team, can help each learner understand group roles and improve communication skills (Clapper, 2010). Social learning encourages individuals to learn with and from each other, and simulation technology paves the way for this type of learning.

TECHNOLOGY CHALLENGES IN ADULT LEARNING

Providing technological support for the design and maintenance of a virtual reality classroom or simulated exercise usually requires a tremendous combination of school resources, designers, and technicians that many schools cannot afford (McInnerney & Roberts, 2004). Securing specialized technology in learning institutions can become financially, physically, and mentally draining if not approached constructively. Before implementing advanced technology in the courses, both creators (teachers, instructional designers) and learners (students) must be trained in how to use it. Professional development is lacking for teachers when it comes to training in how to integrate new technologies into their classrooms (Rosenthal, 1999). Simply requesting a teacher add technology to a lesson plan without giving him or her in-depth training and resources first is ineffective.

Teachers and school administrators alike fall into a comfort zone where both parties believe initiating the use of new technology does not fall under their job description. Some adults carry legitimate fears of losing data or photos, corrupting files, or having their personal lives exposed on the Internet. Adults who have not been exposed to technology many times focus on “scary stories” spoken by friends or the media detailing massive hacks or scams. If an adult is fearful of technology, he or she most likely will not be able to use any form of eLearning tool, even if it is of the latest technology. Equipment also requires a long-term maintenance by specialized technicians. These are all the challenges that integrating new technologies into adult learning may present.

DIGITAL DIVIDE ISSUE IN ADULT LEARNING

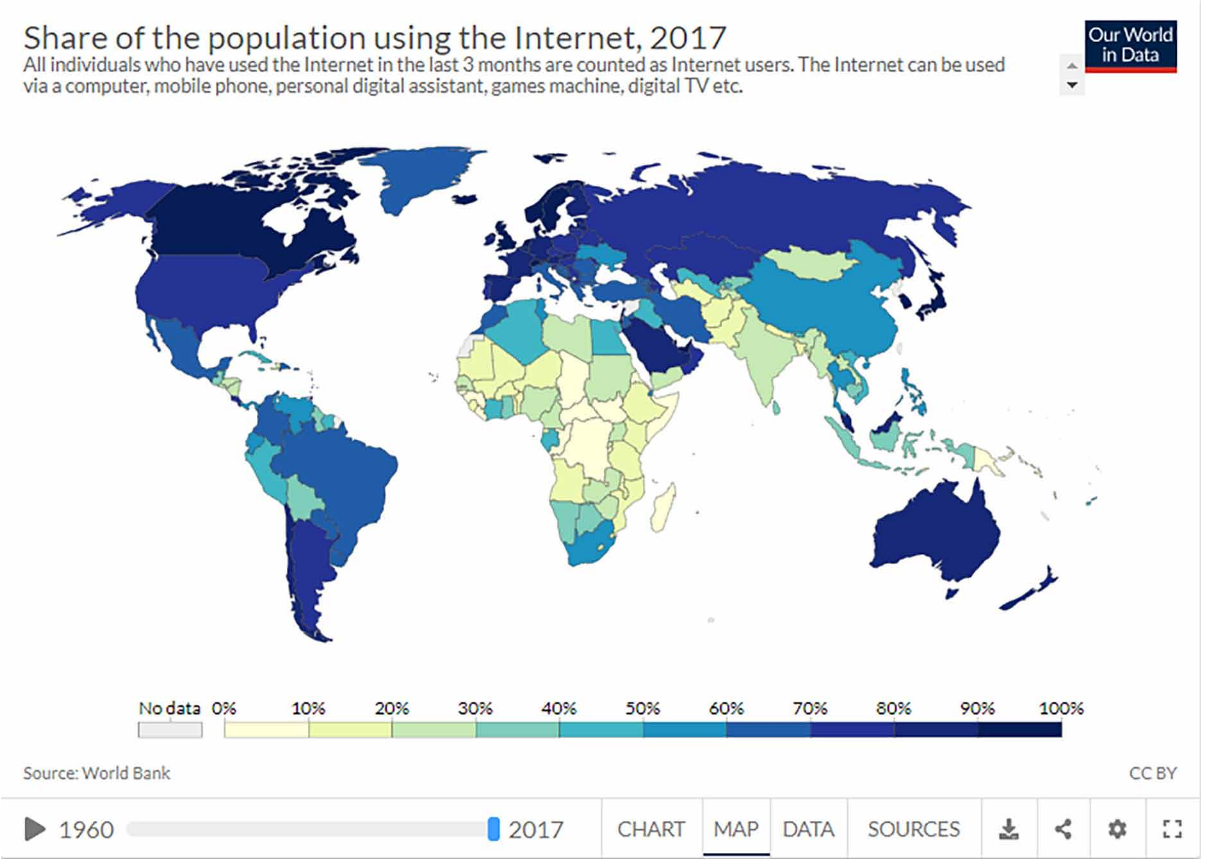
Digital divide is one of the technology issues in adult learning. Adult learners who do not have access to digital technologies are becoming increasingly disadvantaged in the digital information age (Hayes, 2007). Unequal access to digital resources is termed the “digital divide” (Castells, 2002; Van Dijk, 2005). Researchers have discovered this divide is significantly correlated to social indicators. For instance, low economic status, insufficient education, and other social disadvantage indicators are both the cause and consequence of digital illiteracy. The divide between differing countries or regions of the world is referred to as the “global digital divide”. Data from Ritchie (2019) indicates the estimated number of internet users worldwide reached 3.4 billion in 2017. See Figure 4.

According to Van Dijk (2005), developed countries are already closing the gap among themselves in terms of physical access to computers and the Internet. However, in underdeveloped societies, the gap is growing larger as the skill level required to operate new technology becomes more demanding. As technology evolves daily, advanced knowledge is required to meld technology into daily life. Research reveals that the digital divide is not caused simply back lack of access to technological equipment. Instead, there are three factors at play: information accessibility, information utilization, and information receptiveness (Kim & Kim, 2001).

The issue extends beyond accessibility; individuals need to understand how to utilize the information and communication tools when accessible. Researchers claim that both access to digital technologies and the understanding required to benefit from said technologies contribute to social inequality (Hargittai & Walejko, 2008; Mossberger, Tolbert, & Stansbury, 2003; Warschauer, 2004).

Studies show that when given the opportunity to share content by means of technology, learners become more engaged with the material (Hargittai & Walejko, 2008). Findings also suggest that even when all the tools and benefits of technology are offered to online users, few people take advantage of them. Hargittai and Walejko (2008) also reveal a link between socioeconomic status and creating and sharing. This suggests that the acts of content creation and content sharing rely heavily upon the technological adeptness of both creators (educators, instructional designers, or curriculum developers)

Figure 4. Share of the population using the Internet, 2017 (Ritchie, 2019)
Source: Ritchie, 2019



and learners. Merely granting access to digital technologies does not guarantee that those technologies will be used meaningfully.

RECOMMENDATIONS

New technology can be harnessed to provide various learning opportunities to adults who have little to no experience in a formal education setting. Technology also serves as a vital means for providing information, guidance, and counseling to individuals. Online learning has taken giant steps in the last decade. Researchers recognize the main qualities and opportunities of online learning, as well as distinguish eLearning from traditional approaches. However, open-ended questions remain regarding how to integrate current technology into traditional settings, how to train personnel in the effective use of online tools, and how to establish a connection among content (objectives), learners and their tutors.

Arguably, the most significant long-term need left to alleviate is non-universal access to the Internet. The host of digital technologies mentioned in this research are useless if individuals cannot readily access them or lack foundational skills to use these tools effectively. Large demographic and socio-economic gaps plague the world. Unfortunately, no universal solution has been agreed upon to solve this problem in developed or developing countries, leaving researchers with an important challenge in the years to come.

Recommendation for further study

To facilitate the assumptions of andragogy in the information age, instructors must use technology to its fullest potential. Proponents of technology argue in favor of its flexibility and the autonomy it offers the learner to move through lessons anytime, anywhere, and at an individualized pace. These arguments also include logical explanations for how learners may modify lessons to cover only material they need to learn and eliminate objectives that are unneeded or repetitive. In order to meet the needs of adult students, educators must understand and implement these assumptions, definitions, and tools to make curriculum interactive, learner-centered, and self-directed. Educators who use adult education concepts to create lessons inherently transform into facilitators of learning. These creators sculpt opportunities for communication and student feedback into their designs, and they develop relevant, technology-based lessons which can be adapted to meet the individual needs of students. These are the major topics that can be discussed for further research. When higher educators adhere to these developmental guidelines for curriculum instruction, the product is not only practical in the eyes of the adult learning institution, but also valuable from the learner's perspective.

CONCLUSION

Precious time and money are being devoted to the design and development of content that prepares the newest technologies, such as virtual reality and simulation, for implementation within the higher education curriculum. The purpose of this research is to analyze the existing literature on adult education and address inconsistencies in adult learning, as well as discuss issues that affect adult learning, such as how to integrate both technological and communicative activities into the curriculum. The methods and theories presented in this research grant both educators and students access to new learning technologies and possibilities. As the UNESCO Institute for Lifelong Learning report (2009) explains, significant progress has been made in bringing many of these goals to fruition. However, challenges remain, particularly in developing digital literacy and widening access to online learning. Duke and Hinzen (2011) states that notions of literacy skills must be expanded beyond simply reading, writing, and numeracy to also include skills that are required to effectively utilize information technology. Such skills have become a prerequisite for daily life; people need them in their private lives, at their places of employment, and for effective learning in general.

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KEY TERMS AND DEFINITIONS

Adult Learning Theories: Adult learning theories is a series of concepts to give instructors or instructional designers a framework and guidelines for developing content for adult learners in different contexts. Adult learning theories include andragogy, transformational learning, and experiential learning.

Instructional Design: The systematic process of design and develop of instruction for specific goals and objectives based on theoretical and practical research. It is a process to build a bridge between instructors and learners to facilitate the teaching and learning.

Instructional Technology: Instructional technology can be either a software or hardware which is used to facilitate learning and improving performance by creating, using, and managing appropriate technological processes and resources.

Teaching and Learning: Teaching and learning is an educational setting environment of instructors who providing content, objectives, and goals; learners whom receiving knowledge, performance, and produce outcomes.

Virtual Reality: Virtual Reality is realistic, happen in real time, and three-dimensional computer simulation of physical objects and space. It represents an extraordinary experience to users by interacting with the avatars, images, and sounds to bring the experience.

Simulation: Simulation is using a computer software or physical settings to act out an actual or probable real-life condition or situation to find a cause of a past occurrence (such as an accident), or to forecast future effects (outcomes) of assumed circumstances or factors.

APPENDIX

Application Activities

1. Discussion board activity:
   a. Relate virtual reality to your real experiences (personal or professional) by telling a brief story about it and discussing the experiences you have had with virtual reality in an online discussion. If you have had no personal experience with virtual reality, then discuss how you might experience it. Participate in the discussion about the vignettes.
2. Discussion board activity:
   To the submitters:
   a. Create an active learning activity in Word document relevant to your profession that uses virtual reality.
   b. The activity should include:
      i. Activity Title.
      ii. Subject/Topic - (e.g. Math - Addition, History - Civil War, Business – Employee Training).
      iii. Activity Description (brief).
      iv. Description of users.
      v. Duration:
         How long will it take to conduct this particular activity? (30 minutes, 1 hour, etc.)
   c. Learning Objectives:
      i. Learning Objectives should describe what the user will gain from the activity (e.g., users will identify how to compute fractions from decimals).
      ii. Objectives make clear the types of performances that you expect from users, including performances that indicate user knowledge, understanding, skills and abilities, and attitudes.
      iii. Limit your activity to one or two objectives.
   d. Materials/Hand-Outs:
      i. List the materials and resources needed for the activity.
      ii. Cite resources in APA 6th edition.
   e. Evaluation:
      i. List the method(s) by which you can assess the effectiveness of your activity and whether or not your users grasped the concept.
      ii. This should assess the objectives for your activity.
   To the reviewers:
   a. After you have been assigned by the instructor, review two of your peers' paper and provide feedback.
   b. Write your critiques in a Word document and reply to the person whom you reviewed.
3. Discussion board activity:
   a. In this discussion activity, discuss experiences you have encountered or heard about as related to school (district), university, or corporate acceptable use and other technology related policies that limit or prevent innovation with technology integration. (For example, I have

experienced some technology checkout procedures so time consuming that I would rather not check out the technology because of the hassle. In addition, I find that schools waste a lot of time disciplining students for using smart phones instead of findings ways to use the smart phones as instructional tools.)

b. Provide suggestions for changes to the policy that would allow more innovation or integration.

c. This discussion is designed to release frustration about policies that inhibit or prevent the integration of technology. Also, remember that all of these postings are in reference to school districts, universities, and companies in a "hypothetical" world, so do not mention the exact names of either in which you are writing about their policy.

d. You may consider the following questions:
   i. Cell phone use in the classroom
   ii. Overprotective firewalls
   iii. A communist IT department
   iv. Outdated acceptable use policies
   v. Policies that treat teachers and students as though you are incapable of using technology responsibly in a school environment or even using school equipment.

e. Each student must post a minimum of three (3) discussion questions or comments for the discussion to three different peers.

Chapter 5
Project-Based Learning (PBL) in a Higher Education Project:
Introduction of an Accelerated PBL (A-PBL) Model

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ABSTRACT

A Senior Design course in an urban Engineering Technology (ET) program was examined to propose an Accelerated Project-Based Learning (A-PBL) model, guided by three research questions: (1) What is the extent to which Self-directed Learning (SDL) skills were applied by final-year ET students using PBL, as determined quantitatively through the Self-directed Learning Readiness Scale (SDLRS-A®)?; (2) How are Self-directed Learning (SDL) skills, Project Management (PM) efficiencies, and Change Leadership (CL) effectiveness applied in implementing ET capstone projects?; and, (3) What are the best practices to accelerate PBL by employing SDL skills, PM efficiencies, and CL effectiveness? This mixed-methodology research resulted in an accelerated PBL model geared to significant time, cost, and quality efficiencies in rapidly evolving, technological environments for optimal outcomes in 21st century higher education. The study concluded that this A-PBL model could also minimize the employment gap, fuel self-motivation, enable skill-building, and instill a deep commitment to lifelong learning.

INTRODUCTION

Higher education in the 21st century is impelled by competitive global forces that require pedagogies, technologies, structures, and research to become truly innovative for dynamic progress. According to the International Labor Organization (ILO), innovation and technological changes are recognized as powerful drivers of economic growth (ILO, 2019). Consequently, technology diffusion is also transforming higher education at an accelerating rate (Dennison, 2013). Educators at all levels are being called upon to meet this challenge, and to equip students with multiple skills to enable them to adapt to these irre-

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versible changes (Lane, 2007; Merriam, Caffarella, & Baumgartner, 2007; Parr, 2015). Indeed, change is a constant that happens fast in the world of work today.

Driven by innovation and rapid developments in technology, keeping up with this pace of change is indeed a continuing challenge for learning institutions (ILO, 2019; Miller, Martineau, & Clark, 2000). Evidently, technological innovation as applied to 21st century higher education needs to be harnessed and leveraged efficiently and effectively (Gonçalves & Pedro, 2012; Kelley, 2005). For this, effective change leadership (CL) has become the source, catalyst, and driver of change, energized by organization-wide creativity and innovation (Abgor, 2008; Fullan, 2011). CL thus enables the diffusion of innovation (DOI) to result in changes in the educational ecosystem—despite possible resistance to change that could be manifest in absenteeism, non-cooperation, and even insubordination (Fullan, 2011).

While most countries have seen an unprecedented expansion of their educational competencies and skill bases over the past decades, there seems to be a persistent gap between the kind of knowledge and skills that are most in demand in the workplace, and those that training systems continue to provide (ILO, 2019). Therefore, in a rapidly evolving educational ecosystem (Hagan, 2019) it is important to ensure that education and training focus on closing this employability gap between precise workplace needs, and the content, quality, and validity of educational programs geared for the workplace.

With innovative technology as a key economic driver to close the prevalent skills and employment gaps in the economy, it is necessary to streamline and focus the process of technology diffusion in higher education (Dennison, 2013; Hall & Elliott, 2003). In this context, the triple constraints of time, cost, and quality that comprise the core parameters of project management can be gainfully applied for improved processes and positive results (Sohmen, 2007; Turner & Müller, 2005). This is because project management (PM) has inherent efficiencies: a rigorously planned approach; goal-orientation; resource optimization; time compression; and, phase-by-phase progress toward economical execution and successful realization of project goals. PM could therefore be a critical contributor to optimizing project-based learning (PBL) efficiencies.

An accelerated model of Project-based Learning (A-PBL) is introduced in this study that is applicable to intensive higher education programs with the express purpose of combatting the shortfalls in skill levels, and thus promote employability. It is proposed that Change Leadership (CL), Project Management (PM), and Self-directed Learning (SDL) be incorporated into this model to derive efficiencies in hands-on learning, self-motivation, adoption of change, and acceleration.

Indeed, appropriate use of PBL would aid delivery of both technical content and generic professional skills toward specialized learning such as in the Senior Design course of an Engineering Technology (ET) program (Hosseinzadeh & Hesamzadeh, 2012). This enables learners using PBL to become employment-ready by building solid bridges between the world of learning and the world of work (ILO, 2019). Such innovative technology projects should fulfil both available and emerging employment opportunities for engineering and technology graduates, as well as for those in other areas of study.

BACKGROUND AND PURPOSE OF THE STUDY

The past decade can be considered more technology-infused than previous decades, precipitating employment challenges with persistent disparity between job openings and employability (Ryan, 2018). Therefore, it can be argued that infusion of technology into the economy has increased the demand for graduates from post-secondary, technology-intensive training programs. Innovative technology will therefore be a key economic driver and catalyst for both employability and for closing the employment gap—as two sides of the same coin (Gonçalves & Pedro, 2012; Kelley, 2005; O'Kane, 2010). It is therefore incumbent upon both educational institutions and industry to thereby increase employability, thus closing the employment gap through astute educational strategies and preparation of leaners and future leaders (O'Kane, 2010).

Against this background, it is germane to consider the learning process as a facilitator of technology diffusion in higher education (Dennison, 2013). Learning, an activity and process central to human behavior and progress, has been of interest to philosophers, educators, psychologists, and politicians for centuries (Merriam et al., 2007). Today, more scientific research is being done to understand the role of learning in terms of hard sciences such as neuroscience—and emerging cognate areas including neuroplasticity—that look at the relationship between the human brain and the dynamics of learning (Tandon & Singh, 2016).

Theorists of learning have also studied the behaviorist, humanist, cognitivist, constructivist, and social cognitivist traditions. In general, learning brings together environmental, cognitive, and emotional experiences for absorbing, building on, and modifying the learner's knowledge—as well as the learner's values, skills, and worldviews (Bessen, 2014; Illeris, 2004; Ormrod, 2012; Parr, 2015). When it comes to adult learning, there seems to be a propensity toward the humanist and constructivist ontologies due to the preference for experiential, transformational, and self-directed learning.

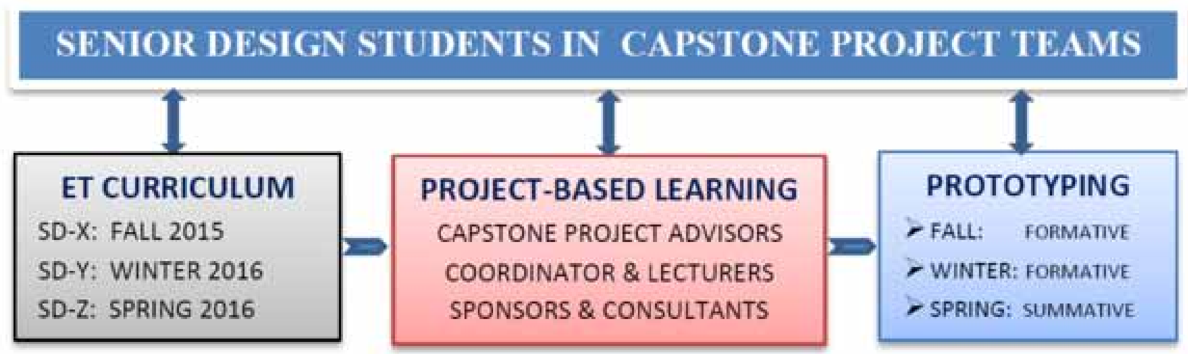
The purpose of learning in the humanist approach appears to be for learners to become self-actualized, mature, and autonomous—whereas, in the constructivist domain, the purpose is to construct knowledge. Both perspectives—the humanist and the constructivist—are germane to adult learning and made available in post-secondary education today. Thus, Self-Directed Learning (SDL) is a natural choice, especially for nontraditional adult learners.

In this context, Project-Based Learning (PBL), with intrinsic elements of SDL, is a popular model derived from the field of PM that systematically and purposively organizes education around hands-on projects (Thomas, 2000). Yet, the tenets of project management (PM) including time, cost, and quality efficiencies are only sparsely incorporated into existing PBL models. In recent decades, PBL has gained significant attention as a conduit for andragogy or a learner-centric approach. This perception has been due to the pragmatic, self-motivated, and result-oriented approach of PBL—ideally, with a formally structured regimen. Such an orientation signals a clear departure from traditional learning or pedagogy (Thomas, 2000).

The purpose of this study was to examine an existing, informal framework of PBL in an Engineering Technology (ET) program, and to propose a literature-based model of PBL synthesizing and infusing SDL, PM, and CL as key enablers and accelerators of innovative technology diffusion. This research was empirically accomplished by studying the implementation processes of eight capstone ET projects by small groups, each consisting of four final-year students. These projects were slated to apply a loosely structured, generic PBL framework to produce innovative prototypes of technological projects as a requirement for successful graduation. Figure 1 presents this generic framework for PBL as applied to the Senior Design capstone projects. Such innovative technology projects represent constructive attempts to close the employability gap through hands-on, self-motivated, and employment-focused PBL.

A sobering reality to underscore here is that a large part of the existing subject knowledge of the workforce will be outdated in just a few years (Miflin, Campbell, & Price, 2000). In fact, it is even

Figure 1. Generic PBL in an engineering technology (ET) senior design course



estimated that nearly 50% of subject knowledge acquired during the first year of a four-year technical degree could become obsolete by the time students graduate (World Economic Forum, 2016). This rapid turnover calls for both escalation of best practices and acceleration in the delivery of innovative technology education (Gonçalves & Pedto, 2012; Kelley, 2005; Zenger, 2015).

A global survey of more than 41,700 hiring managers in 42 countries seeking to identify the proportion of employers having difficulty filling positions found that the mismatch between industry-relevance of training and actual employer needs is a perennial problem. In recent years there has been a clear shortage of talent, especially in the technical professions (Manpower Group, 2015). Indeed, lifelong learning critically depends on strong integration among education, training, and work (ILO, 2019).

Therefore, students, employees, employers, and educational institutions must adopt a lifelong commitment to learning new skills in cooperation and collaboration with each other (Yang, 2015). This can best be achieved by equipping students with the 21st century skills needed to adapt to rapid change. Among these are: a global mindset, curiosity, self-motivation, and, a propensity to life-long learning (O'Neill, Deacon, Larson, Hoffart, Brennan, Eggermont, & Rosehart, 2015; Rajasingham, 2010).

THE RESEARCH PROBLEM

According to Rugarcia, Fielder, Woods, and Stice (2000), "Successful engineers will be those who can manage change—especially when change is thrust upon them" (p. 10). Therefore, a rational solution needs to be found to the research problem of how to harness innovation diffusion in academia requiring change leadership (CL) through pragmatic methods (Booth, Colomb, & Williams, 2016). This will include overcoming conflicts and resistance to change through effective CL, optimizing competitive resources through PM efficiencies, and, providing significant autonomy to learners through SDL skills. Thus, SDL, PM, and CL could contribute to a robust model of PBL.

Significance of the Research

It is estimated that in the foreseeable future, a wide range of occupations will require a higher degree of cognitive abilities—such as creativity, logical reasoning, and problem-solving—as part of employees' core skills-set (World Economic Forum, 2016). It can be surmised therefore, that most of these versatile abilities and skills will need to be imbibed by potential employees through post-secondary training and would be expressly applicable to a wide range of innovative technology projects. The proposed accelerated PBL model (A-PBL model) in this study could be a suitable composite tool for such competent, hands-on training in a higher education environment.

In view of these facts, the research problem in this study is significant because the corpus of literature suggests that PBL is seen to be ineffective or suboptimal without the core constituents of SDL, PM, and CL (Fullan, 2008, 2011; Stewart, 2007; Thomas, 2000). This study investigated and explained best practices in SDL, PM, and CL for learners employing PBL to pursue innovative technology projects. The research has also explored the roles of SDL, PM, and CL in accelerating PBL by studying eight final-year capstone projects in an ET program of a reputed university.

Rationale for the Research

It is proposed in this study that if SDL, PM, and CL are incorporated into PBL, learning of innovative technology in higher education projects and programs could be facilitated, as well as accelerated. Consequently, this could translate into systemic, systematic, and accelerated diffusion of emerging technologies in an increasingly technology-infused and competitive higher education environment (Dennison, 2013).

Employers are becoming concerned about work-related practical skills or competencies that prospective graduates can employ to successfully perform various on-the-job tasks (Bessen, 2014). A core set of 35 work-relevant skills and abilities from basic to cross-functional to complex problem-solving skills are recognized to be widely used across all industry sectors and job groupings; these will be subject to accelerating change and significant constructive disruption in the foreseeable future (World Economic Forum, 2016). Keeping pace with this trend will require well-planned, targeted, and accelerated training. This can be accomplished through rigorous application of the proposed Accelerated PBL (A-PBL) model composed of streamlined SDL, PM, and CL.

Research Questions Focused on Solutions

This study examined the relative roles of Self-Directed Learning (SDL), Project Management (PM), and Change Leadership (CL) within Project-Based Learning (PBL) as key drivers and accelerators in the proposed A-PBL model. These four research streams in the contemporary literature were found to significantly interlink and overlap with each other (see Figure 2).

In concert, the research streams of SDL, PM, CL, and PBL impinged on the research problem of how to go about investigating and explaining the critical roles of these four constituents for learners pursuing innovative technology projects employing an accelerated PBL (A-PBL) model. To unravel the research problem and to enable its systematic resolution, three inter-related research questions were posited:

1. What was the extent to which Self-Directed Learning (SDL) skills were applied by final-year Engineering Technology (ET) students in generic Project-Based Learning (PBL), as determined quantitatively through the Self-Directed Learning Readiness Scale (SDLRS-A®)?
2. How are Self-Directed Learning (SDL) skills, Project Management (PM) efficiencies, and Change Leadership (CL) effectiveness applied in the implementation of Engineering Technology (ET) capstone projects?

3. What are the best practices to accelerate Project-Based Learning (PBL) by employing Self-Directed Learning (SDL) skills, Project Management (PM) efficiencies, and Change Leadership (CL) effectiveness?

The Conceptual Framework

The main ontological stance in this research was that of relativism—whereby truth is constructed by humans and situated within a social context. In this research, the social interactions among the students and faculty participants were studied, and truthful observations, reflections, and interpretations were made. The researcher's epistemological stance was that of understanding the experiences of research participants by constructing knowledge together with them through empirical study (Creswell, 2014). Such a stance was buttressed by the fact that the researcher as well as the participants were garnering and building new knowledge together throughout the research process by exchange of ideas and experiences.

As for the methodological stance, the mixed research methodology was adopted to enrich the research, geared to yield both breadth and depth of the research findings (Creswell, 2014). This was accomplished through a validated quantitative instrument (the SDLRS-A® Survey) supplemented by three qualitative, open-ended questions on change leadership and change processes, as well as an in-depth interview agenda targeting student leaders and faculty advisors of the eight Senior Design projects that were studied.

The participants did not act in isolation, but in groups of four students in a technologically innovative social setting. This was aided by interactions with advisors, sponsors, lecturers, and consultants (Figure 1). The participants were thus a networked community of interpreters of socially constructed phenomena, harmoniously integrating ontological, epistemological, and methodological stances.

In sum, the ontological, epistemological, and methodological paradigms have been congruent to, and commensurate with, a philosophical stance that suited this mixed research methodology with its essential pragmatism. What follows is a brief overview of the literature review undergirding this study that formed the setting for the research methodology and the empirical research that followed.

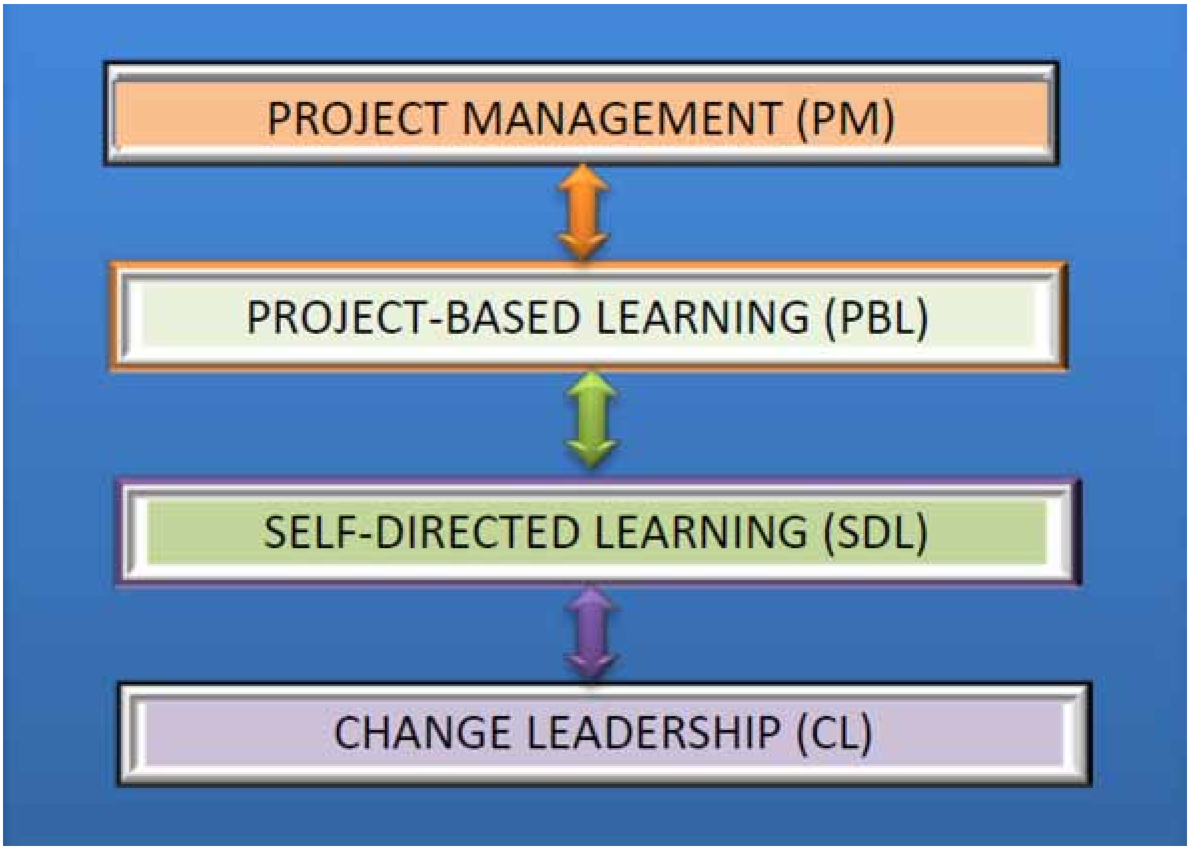
LITERATURE REVIEW

In this literature review, four broad research streams were succinctly examined in terms of background, antecedents, and solutions to explore, evaluate, critique, synthesize, and build upon, the underlying paradigms presented above. The four research streams were iteratively examined in logical sequence as follows (Figure 2): (a) Project Management (PM); (b) Project-Based Learning (PBL); (c) Self-Directed Learning (SDL); and, (d) Change Leadership (CL). These four streams were shown to overlap and iterate to draw substance from each other and to capture nuances, complementarity, and interactions for synergy and synthesis toward creating an accelerated PBL model.

Project Management (PM)

Project management necessitates thorough front-end planning, execution, and closing—all within constraints of the dynamic 'Triple Constraints' of cost, time, and quality. Yet, these must be accomplished through changes in the project. Indeed, two axioms have been forwarded and widely accepted as essential

Figure 2. Iterative sequence of literature reviews of the research streams



to project management: (a) change is inevitable in a project; and, (b) communication is the lifeblood of a project (Sohmen, 1990).

Project management research and practice have drawn from a pool of interdisciplinary studies among the social sciences—including management, technology, group dynamics, economics, logistics, and engineering (Sohmen, 2010; Turner & Müller, 2003). A viable theoretical basis for PM is the Theory of Temporary Organizations which describes projects as temporary organizations, with a stated goal and output of value to advance the strategy of the parent organization that spawns the project (Söderlund, 2000).

A project has also been described as not only a temporary endeavor, but also as one undertaken to create a unique product or service (PMBOK®, 2017). This is emphasized by Turner and Müller (2005) who describe a project as a unique, innovative, and transient endeavor to achieve novel objectives, and involving considerable risk and uncertainty. In a nutshell, projects are viewed as complex tasks broken down into smaller parts, resulting in a successful outcome—within the constraints of cost, time, and quality (PMBOK®, 2017; Sohmen, 2007, 2010; Thomas, 2000; Turner & Müller, 2005).

This description of the unique and innovative aspects of a project were applicable to the eight time-bound ET capstone projects in this study. The lifecycle of these capstone projects spanned three consecutive quarter terms of the final year—with a limited budget, unique design requirements, and, a scheduled completion deadline of May 20, 2016. Students and advisors mutually became co-learners as they transferred knowledge among them. Thus, students' attitudes and actions were geared to innovation, economy, and efficiency. Most of the students were deeply instilled with a penchant for life-long learning as a sequel to the valuable hands-on experience gained in the capstone projects.

Project Management (PM) is applicable to the ET capstone projects, as planned (and unplanned) changes with possible risk elements can be expected to occur in these evolving, innovative, unique, and temporary ventures; also, optimal communication is necessary among team members and their project advisors to maximize knowledge-sharing and to minimize conflicts while promoting successful project execution. This hands-on approach enabled creative and efficient knowledge acquisition by the students along the experience curve—for real-life application, ready employability, and life-long learning (Puccio, Murdock, & Mance, 2011).

Turner and Müller (2005) have taken a panoramic review of various modern leadership styles and have clearly identified the need for emotional intelligence (EQ) as a strong contributor to project success. It was conjectured that successful implementation of technologically intensive PBL for diffusion of innovation would ideally be complemented by the crucial soft skill of EQ (Salovey & Mayer, 1990). Thus, students and advisors in the ET capstone program would have been well-advised to utilize and develop crucial EQ skills in every aspect of PBL—not only in the interpersonal aspects of PM, but also for the application of people skills intrinsic to SDL, CL, and PBL.

Project-Based Learning (PBL)

Project-Based Learning (PBL) refers to any programmatic or instructional approach that utilizes multifaceted projects as a central organizing strategy for educating students. It is among several inquiry-based teaching methods in which students execute a project to investigate and respond to a complex, real-life problem (Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palincsar, 1991).

Deriving from the principles of project management, PBL has been recognized as an appealing instructional strategy whereby students solve real or simulated problems. This is accomplished through experiential learning, critical thinking, and collaborative efforts within a planned timeframe. PBL is thus a powerful educational strategy resulting in learners acquiring new knowledge and skills that would be transferable to the real-world workplace—and even beyond this, into life-long learning (Mergendoller, Maxwell, & Bellisimo, 2006).

From a learning theory perspective, PBL employs a social constructivist paradigm, in that knowledge is built through experiential and transformational learning. This is facilitated by the hands-on experience of the learner to construct meaning and knowledge. PBL has been successfully used in education for over a couple of decades, emphasizing a knowledge-intensive, student-centered strategy (Blumenfeld et al., 1991; Thomas, 2000). Indeed, PBL promotes meaningful, enriched learning that enhances inquisitiveness and problem-solving skills in a rich, authentic environment. In this context, optimized and streamlined designing of capstone projects can benefit both the study and diffusion of technology to facilitate and accelerate successful educational outcomes for employability (Guy, 2009).

In a meta-review of published literature on PBL, academic projects were viewed as vehicles resulting in a successfully executed product, event, or other outcome related to an academic goal (Thomas, 2000). PBL is based on student initiative and is constructive, knowledge-building, and investigative toward innovative resolution of a problem (Larmer, 2014). As students are held responsible for choosing, designing, and managing their own projects, the learning through PBL (as well as SDL) they experience is expected to be superior and more profound than that of students engaged in traditional learning.

PBL research spanned nearly a decade at the time of the meta-review by Thomas (2000). His theoretical study explored underpinnings, effectiveness, evaluation, and future directions of PBL. The succinct meta-review also served as useful background reading to the pragmatic subject of PBL and confirmed the role of technology in its successful delivery. Thomas (2000) abstracted several themes within PBL and commented succinctly on the development of the field since its inception in the 1990s. He sought to answer the question: "What must a project have in order to be considered an instance of PBL?" with five essential criteria for what PBL should evidence: (1) centrality; (2) driving question(s); (3) constructive investigations; (4) autonomy; and, (5) realism (Thomas, 2000, p. 4). However, these questions only partially addressed the dynamics of cost-time-quality constraints geared to achieve project management (PM) efficiencies.

Through rigorous PM efficiencies infused in PBL, students can be expected to adopt a hands-on, disciplined approach to lifelong learning and critical thinking (Mergendoller et al., 2006). This is precisely what would be optimal for ET students undertaking their capstone projects that are designed to equip them for evolving technological challenges in the real world. In this study, the ET advisors guiding the capstone projects acted as facilitators of change (with the student leaders of groups functioning as de facto change leaders). Thus, the faculty advisors monitored and mentored groups of students in each of the innovative and unique capstone projects.

As PBL is intensely practitioner-oriented, researchers Larmer and Mergendoller (2001) took a pragmatic view of PBL and abstracted two essential tenets from it: (a) students must perceive the given project as a personally meaningful task; and, (b) a pragmatic project should fulfil an educational purpose to prepare learners for real-world applications. Thus, a well-designed and executed PBL experience should fulfil both personal and educational goals with a constructive focus and student autonomy.

Fittingly, yet another study crafted seven guidelines for effective implementation of PBL: (a) 21st century skills; (b) inquiry and innovation; (c) free choice of expression; (d) a keen desire to learn; (e) a driving question that captures the heart of the project; (f) feedback and revision; (g) public presentation; and, (h) accountability (Larmer & Mergendoller, 2001). These practical insights by Larmer and Mergendoller (2001) were inspired by a real-life project that was successfully carried out by students in San Diego, California, and comprised a PBL framework that reflected an existing structure for the executed ET capstone project. Whereas Thomas (2000) traced the conceptual evolution of PBL over a decade, empirical researchers contributed to a holistic picture of PBL as a pedagogical exercise from both theoretical and pragmatic standpoints.

Further, Gratch (2012) examined teachers' perceptions of the use of PBL technology in a nontraditional environment. The authentic, economical, and pragmatic approach of PBL evidenced was seen to resonate with students' preferred method(s) of learning and consequent productivity inside and outside the classroom. Gratch (2012) observed that at the Texas high school studied, the entire curriculum was based on this technology-infused PBL approach. In similar vein, ET students at the undergraduate level were relied upon by industry to not only apply technology, but also to vigorously drive its implementation for the real world (Vanajakumari, Johnson, Lawrence, & Menon, 2015).

It is evident from these theoretical and empirical studies that the key ideas of pragmatism (in PM), autonomy (in SDL), and, collaboration (in CL) drive the PBL approach toward rapid knowledge-building and experience along a steepened learning curve. PBL thus promises progressive outcomes that can be achieved in similar academic environments open to applying a hands-on, experiential approach. The intense pragmatism in PBL is thus a clear departure from traditional, pedagogical practice in teaching and learning. The PBL method can also be linked to the subject areas of PM (for economy), SDL (for self-motivation), and CL (for change). Thus, pragmatism, autonomy, collaboration, economy, self-motivation, and change leadership can accelerate the practice of PBL.

Self-Directed Learning (SDL)

The earliest definitions of self-directed learning (SDL) show that it is a continuous engagement by an individual in acquiring, applying, creating, and harnessing knowledge and skills through personal initiative, self-motivation, and autonomy (Stewart, 2007). There are four dimensions to SDL: (1) personal autonomy; (2) learner self-management; (3) independent learning; and, (4) the learners' control of their own learning (Brennan, Eggermont, Rosehart, Deacon, Larson, & O'Neill, 2015; Candy, 1991). Consequently, SDL has existential elements steeped in individual freedom, responsibility, and authenticity.

As self-directed, lifelong learners, SDL practitioners have been studied in terms of their degree of self-control as individual learners—apart from the skills, competencies, and abilities they seek to possess for optimal learning (Brennan, et al., 2015; Candy, 1991). Consequently, SDL reflects elements that attract self-motivation, innovative thinking, creativity, and a desire to change the status quo (Stewart, 2007). In this study of the ET capstone program using PBL, these qualities were underscored by such SDL initiatives as self-management and autonomy, which contributed significantly to student learning and competence.

From a learning theory perspective, SDL comes under the humanist and social cognitive paradigms. Thus, it promotes autonomous, transformational learning with a focus on andragogy—which is learner-centric with only essential supervision by an instructor or advisor (Knowles, 1968). The relationship between SDL and PBL thus connotes significant overlap. It is reflected in the assertion that SDL is "the preparedness of a student to engage in learning activities defined by him- or herself, rather than by a teacher" (Schmidt 2000, p. 243).

Thus, planning, identification of learning needs, time management, and self-discipline are springboards and drivers of SDL. It stands to reason that these SDL attributes and activities are also critical for successful PBL. When SDL is integrated into PBL, deep-level processing takes place, and the learner decides how and when to learn (Candy, 1991; Stewart, 2007). Indeed, through information-seeking, these learners become flexible and adaptive. Therefore, the nature of SDL skills as contributory to readiness for PBL is patently obvious. Learners who seek to enhance their learning experience through PBL should ideally have a propensity toward the autonomy of SDL, which can be integrated into PBL. This in turn can accelerate technology diffusion in higher education settings such as the ET capstone projects executed by small groups.

Change Leadership (CL)

Change leadership (CL) concerns the driving forces, vision and processes that fuel change and transformation in an organization (Fullan, 2008, 2011; Kotter, 1995). It has been noted that the prime purpose of the project as a temporary organization is to effect constructive change with a defined output (PMBOK®, 2017; Turner & Müller, 2005). Thus, Kotter's 8-Steps Change Model (Kotter, 1995) and the CL framework by Fullan (2008, 2011) contribute to the theoretical support undergirding the CL research stream.

Taking a historical view across the centuries—up to recent decades of technology-infused developmental surges—society seems to have magically rearranged itself into radically different scenarios of the 21st century. In both its incremental forms, and in its turbulent manifestations as propounded by the farsighted economist Schumpeter (1954), unprecedented change has significantly altered our environment.

When we consider the paradoxical, Heraclitan (535 B.C.-475 B.C.) cliché that change is a constant, it seems surprising that people tend to resist change (Kahn, 1979). Yet, this should not discomfit us because people prefer to seek the known and the tried and tested, for security and maintenance of the status quo. This is so, despite the vision and promise that may be inherent in the proposed or potential change. The essential dilemma herein is captured in the theories of chaos and organizational change which consider a measure of chaos as an inevitable harbinger of change (Wheatley, 1996).

The paradox of change is that even when the benefits become discernible, change is not easy at any level (Lamar, 2003; Poole & Van de Ven, 2004). Considering that change itself is a learning experience, CL is by default also a process that intuitively involves learning—with due allowance for some failure as a catalyst in this learning process. Indeed, self-directed learning efforts under some uncertainties could be considered as inherent stimulants for changes in the ET capstone projects of this study.

As Fullan (2011) in his prescriptive book ("Change Leader") has asserted, the essence of the change process is the capacity of organizational leadership—in the face of uncertainty, chaos, and rapid change—to generate organization-wide energy and passion through action (Kouzes & Posner, 1987). Therefore, for lasting impact, effective change leaders need to examine and drive best practices through continual learning with allowance for mistakes as part of the learning process. According to Kotter (1995), sustainment of change is based on incorporating and applying this multistage process enshrined in the 8-Steps Change Model via "leadership, leadership, and still more leadership" (p. 31). The need for CL in PBL cannot therefore be overemphasized.

Thus, change leaders courageously transform familiar, present reality into a new, unfamiliar, and altered state of envisioned reality. To leverage change effectively, the leader needs to "ask tough questions, get people to come out of their comfort zones, and actively encourage positive change." (Heifetz & Linsky, 2002, p. 111). These ideas find resonance with contemporary issues for progressive implementation of PBL in an educational setting (Larmer, Mergendoller, 2001; Larmer, Mergendoller, & Boss, 2015; Thomas, 2000).

It can be concluded that effective, pragmatic, and resolute CL could be the catalyst that will render PBL effective in the long run. This is because CL is needed to overcome inertia and resistance to changing the current state through innovation. This reinforces the stated research purpose in this study, of accelerating technology diffusion in a higher education setting through PBL while overcoming the inevitable resistance to change (Fullan, 2008, 2011; Senge, Cambron-McCabe, Lucas, Smith, & Dutton 2012).

In looking at accelerating the diffusion of innovation, it needs to be reiterated that caution must be exercised against indiscriminate speed without sustainable results (Kotter International, 2011). The exposition of the complexities of organizational change as propounded skillfully by Kotter (1995) needs to be weighed alongside the ideas (and ideals) of Fuller (2011), Senge et al. (2012), and other thought leaders of change.

This will enable garnering a balanced perspective on how innovative change initiatives can utilize a systematic, phase-by-phase approach as proposed by Kotter (1995); indeed, a headlong rush to change could be unproductive. Therefore, such a systematic approach to CL should serve to accelerate the diffusion of technology resulting in innovation and sustainability.

SYNTHESIS OF PM, PBL, SDL, AND CL

The sequence of the research streams (PM, PBL, SDL, and CL) studied in this cogent literature review has clearly demonstrated the significant logical and systemic linkages among them. The efficiencies of PM with the dynamic Triple Constraints of cost, time, and quality undergird the pragmatic PBL methodology with its time-limited mandate as a temporary, organized, and goal-oriented educational and training endeavor.

The self-motivation and desire to change the status quo that is inherent in SDL is naturally embedded in PBL to help overcome the likely resistance to change in an uncertain environment. The resoluteness needed for forward-looking momentum through collaborative and persistent efforts to overcome resistance finds resonance in CL. Nonetheless, Kotter's 8-Steps Change Model (Kotter, 1995) and the empirical study of incremental change by Kennedy (2013) have reinforced the need for more sensitivity and caution regarding change leadership and change processes in higher education settings.

It has been demonstrated through concise review of the four inter-related streams of literature (PM, PBL, SDL, and CL) that disciplined, self-motivated change leadership and acceleration of an innovative technology project in higher education is possible. Indeed, it can be accomplished by incorporating contemporary best practices in PM, PBL, SDL, and CL to craft an accelerated PBL (A-PBL) model.

DISCUSSION OF THE RESEARCH

Research Methodology

A mixed research methodology approach (Creswell, 2014) was used for the research, with the research problem and research questions as the basis that determined the research methodology. A sample of 30 students in the Senior Design course of an Engineering Technology (ET) program comprised the sample for the quantitative research, and six student group leaders and six faculty advisors supervising the student groups represented the qualitative research subjects. The research design, population, samples, and data collection methods spanned both Phase 1 (quantitative and qualitative), and Phase 2 (qualitative).

Phase 1 was primarily a quantitative survey using the widely-tested and validated SDLRS-A® instrument (Long, 2006). Nested within this phase were three open-ended questions for qualitative (textual) analysis, along with anonymous demographic data for quantitative analysis. Phase 2 was entirely qualitative, with identical semi-structured interviews of six senior undergraduate student project team leaders and six capstone project advisors in the Engineering Technology (ET) program. Results of the SDLRS-A® questionnaire in Phase 1 were analyzed using the SPSS 24.0 software. For the Phase 1 open-ended questions, and for the Phase 2 interview questions, the popular textual software NVivo 11 and Leximancer 4.5 were respectively used with graphical support. Ethical considerations mandated by the Institutional Review Board (IRB) at the host university were strictly adhered to in the entire conduct, data storage, and dissemination of the research findings.

Research Findings

The two consecutive phases of the research—Phase 1 and Phase 2—are summarized below to reflect a rigorous mixed-methods approach (Creswell, 2014) toward resolving the three research questions to inform an accelerated PBL (A-PBL) model.

Summary of Phase 1

Phase 1 of this study comprised a mixed research methodology approach, yielding interesting findings. The Phase 1 findings were substantially aimed at throwing light on the SDL skills and CL effectiveness of the 30 Senior Design students of the ET program. The six encapsulated findings from Phase 1 were compiled as follows:

Finding #1. ET students have a demographic profile that mirrors that of the low campus-wide female student population in engineering and technology programs. This under-representation of females is also reflected on a national scale as there are currently only around 25% of females among US engineers.

Finding #2. Based on the SDLRS-A® Survey, ET students in the sample have on average, self-directed learning skill levels that are slightly above those evidenced by overall mean scores for the adult population in predominantly higher education academic environments.

Finding #3. Based on the SDLRS-A® Survey, ET students in the sample can manage their own learning well, evidence a high desire for learning, and demonstrate adequate self-management in their learning experience.

Finding #4. The change leadership and change processes during the Fall 2015 term were shaped by team development and team dynamics, frequent changes, and team success, despite struggles through the formative first term.

Finding #5. During Winter 2016, iterative changes had to be made to the work-in-progress prototype, with shared work by team members, and constructive, advisory input by faculty advisors.

Finding #6. During the final Spring 2016 term, residual changes had to be accelerated to meet the completion deadlines for the work-in-progress prototypes to arrive at an 'elegant' solution before successful project presentation and graduation.

Summary of Phase 2

Phase 2 of this study comprised a qualitative approach with one-on-one, semi-structured interviews with six student leaders and six faculty advisors, yielding interesting findings. The Phase 2 findings were aimed at throwing light on all the three research questions and their four embedded research streams: PM, PBL, SDL, and CL.

The five findings from Phase 2 added to the six findings from Phase 1 above to make a total of 11 findings. These 11 findings are captured in the five themes under 'Research Results and Interpretations' of the study in the following subsection.

These Phase 2 findings confirm that PBL was practiced informally in the capstone projects with viable design and team dynamics through each term. The overall impression though, is that there was no formal integration of the generic Project-Based Learning (PBL) framework through the three terms of the Senior Design course. Yet there were indications of informal practice of PBL with some planning, design, teamwork, and learning with the help of the team advisors. The findings from Phase 2 of the study are presented as follows:

Finding #1. The Senior Design capstone project had a loosely structured, informal, and generic PBL model, yet with initial research, a project plan, design of an innovative prototype, milestones, and final report to complete the project within the timeframe. Significant changes and iterations were needed through the uneven phases of the project, despite technical expertise on the part of the team members.

Finding #2. SDL skills expressed comprised communication, a competitive spirit, autonomy, an altruistic motive, and initiative to seek knowledge; SDL is not a solo effort, but one that requires interdependence, encouragement, and self-discipline.

Finding #3. PM efficiencies could be driven by strong project leadership and multi-pronged efficiencies with thorough front-end planning, tight deadlines, modularization, relentless cost-cutting, stakeholder support, regular monitoring and reporting, and, acceptable quality.

Finding #4. Effective CL accepts the inevitability of change but takes proactive measures to succeed through goal setting, collaboration, cooperation, scheduling/ rescheduling, and constant communication under strong change leadership.

Finding #5. Acceleration of PBL can be less stressful and doable under the following conditions: strong leadership; competent and adequate human resources; networking support with sponsors, consultants, advisors, and other stakeholders; speedy conflict resolution; clear communication; tight scheduling; unflinching discipline and hard work; and, relentless momentum.

Research Results and Interpretations

This explanatory study of project-based learning (PBL) employed a comprehensive, mixed methodology approach to derive both breadth and depth of findings. The essential goal was to tackle the research questions from multiple angles. Where appropriate, this holistic endeavor drew from previous research and practice and plural investigative perspectives. The mixed-methods research (Creswell, 2014) thus included the in-depth, contextualized, and natural insights of qualitative research (Patton, 2015), coupled with broad-based quantitative research for new evidence as well as a priori congruence with contemporary literature.

In Phase 1, the focus of the quantitative and qualitative methods employed was on SDL and CL respectively, as these two were specifically covered through the quantitative questionnaire (for SDL) and the qualitative open-ended questions (for CL), of the SDLRS-A® Survey. The SDLRS-A® questionnaire gathered quantitative information to assess the current SDL skills, values, and attitudes of all 30 Senior Design students targeted in the ET program studied. It was determined that the overall mean score of the students was nearly 7% higher than that of the mean SDLRS-A® questionnaire scores of the population of adult learners at large. This may suggest that the ET students surveyed were adequately prepared in SDL skills through their previous scholastic work, internships, and other work experiences.

The three open-ended questions on change leadership and change processes at the end of the SDLRS-A® questionnaire attracted textual responses from nearly all the 30 students. Many valuable ideas were garnered through these written responses of the students—including the need to be proactive and resolute in tackling changes in the project, to communicate clearly, and to resolve conflicts speedily. It was also deemed necessary to maintain enough momentum and resolve to overcome any possible resistance to change, and to execute the changes collaboratively.

A key statistical finding was that the internal reliability of the sample was high at 0.92 (comparing favorably within the a priori range of 0.79 to 0.96). The ET student sample drawn from the campus-wide population reflected low female representation (10%). This was a microcosm of the general trend of gender disparity among US engineers with only around 25% of female representation nationwide (Camera, 2015).

The study conformed to these a priori SDL factors from the SDLRS-A® questionnaire: Self-Management of Learning (SM); Desire for Learning (DL); and, Self-Control in Learning (SC). Components of these three factors were clearly manifest in positive SDL experiences, skills, and attitudes of the 30 ET students in the Senior Design program.

The Phase 1 qualitative research findings from the three open-ended questions confirmed that a strong foundation in Term 1 of the three-term Senior Design program was imperative for the students to sustain the momentum in their PBL experience, and thus succeed in timely delivery of an innovative and working prototype. Changes were inevitable and iterative in nature through the planning, design, and construction phases. The pooling of knowledge and experience with the advisor and external experts and peers was necessary to ensure significant learning, hands-on expertise, and actionable knowledge that could be built upon for life-long learning.

The qualitative research of Phase 2 findings provided rich data on SDL, PM, CL, and PBL from the responses of both student leaders and faculty advisors. Proactive planning, designing, and resource management were deemed to be necessary to enhance adequate control of changes and cost-and-time overruns. According to the Senior Design students, the expertise of external stakeholders such as the project sponsors, industry experts, and consultants could not be underestimated; indeed, these entities can be valuable sources of needed funding, technical expertise, well-equipped workspaces, and time-saving innovations.

Frequent face-to-face meetings among team members and advisors enabled more transparent and fluid communication, minimized conflicts, and enhanced problem-solving skills. A major benefit of PBL is the opportunity to share valuable knowledge and experience with peers, experts, and educators. Thus, project efficiencies, timely expertise, and proactive leadership can contribute significantly to acceleration of PBL through efficiency, economy, and momentum. The overall results of the study of Senior Design students in the ET program were compiled and interpreted as follows:

Result #1: SDL skills are essential to PBL as it motivates autonomous performance, desire for learning, self-efficacy, and interdependencies in a project team.

Result #2: PM efficiencies are needed in PBL for optimal cost, time, and quality management to minimize cost overruns, avoid delays, and enhance quality.

Result #3: CL effectiveness enables tackling of inevitable and necessary changes proactively, collaboratively, and resolutely to maintain forward momentum.

Result #4: Best practices in PBL require strong leadership, coupled with holistic competence in SDL, PM, and CL.

Result #5: Acceleration of PBL maximizes SDL skills, optimizes PM efficiencies, and enhances CL effectiveness to enable competitive outcomes.

Overall, these results of the empirical analysis have been presented in depth, and they have substantially provided theoretical and empirical support to prepare the ground to convincingly address the three research questions. The overall results of the Phase 1 SDLRS-A® Survey were presented using: Microsoft Excel for the demographic computations; SPSS 24.0 for the quantitative data; and, NVivo 11 for the qualitative information. Additionally, the results of the semi-structured interviews in Phase 2 were analyzed using the sophisticated textual software Leximancer 4.5 (developed by The University of Queensland, Brisbane, Australia). These succinct and focused exercises enabled completion of the findings, themes, results, and interpretations in the study of PM, PBL, SDL, and CL. These in turn comprised a solid basis for presenting the cogent findings of this study, as well as thoughtful recommendations for current and future practice and research in higher education.

Resolution of the Research Questions

Research Question #1: Were SDL Skills Personally Applied in PBL?

The SDLRS-A® Survey in Phase 1 answered Research Question #1 as to whether SDL skills were personally applied to PBL. From the Phase 1 results of the SDLRS-A® questionnaire, it was seen that the students were reasonably familiar with SDL skills and attitudes as compared to the mean adult population in the academic community at large. The originators of the globally tested SDLRS-A® instrument have asserted that SDL skills are not innate but can be cultivated and improved with training.

Therefore, the proportion of students who had average (6 out of 30 students=20%) and below average (5 out of 30 students=17%) scores on the SDLRS-A® Survey had ample scope for enhancing their SDL skills. With 50% of students having a cumulative GPA of above 3.00 it was evident that they entered their final year with above-average scholastic preparation for undertaking the challenging Senior Design course involving the innovative, technology-based capstone projects.

The necessity to have academic and technical competence prior to embarking on PBL is seen to be critical for application of SDL skills requiring considerable autonomy and self-motivation, as well as adequate technical competence. It is also crucial to have an early, solid foundation in STEM education to fully harvest the benefits of innovation.

It was theorized by Knowles (1975) that SDL skills are necessary for students entering academic programs as adult learners; otherwise they are likely to become frustrated, anxious, and afraid of failure in a fast-paced, competitive, and complex academic environment. This will also be a challenge for educators, as students with low SDL skills could fall behind those who have inculcated SDL skills to competently undertake PBL. The SDLRS-A® Survey results were congruent to the following three a priori SDL factors that were convincingly evident in the sample of 30 students surveyed: [1] Self-management of learning (SM) [2] Desire for learning (DL); and, [3] Self-control in learning (SC). A keen desire for learning and knowledge-seeking is essential for learners to pursue PBL, as learner initiative and autonomy are critical to PBL. Also, the self-efficacy, self-confidence, and self-control rooted in SDL can give learners the necessary boost to achievement springing from self-motivation (Pajares, 2002). When working without direct supervision, autonomous knowledge-seeking, self-management, and time management become essential SDL/PBL skills.

As noted earlier, the demographic profile of the undergraduate senior students reflected an imbalance in the representation of female students in the ET capstone program, as they comprised only 10% of the sample. This was not representative of the general 50-50 gender split in the university-wide student population from which the sample was drawn. Orientation to STEM education (in Science, Technology, Engineering, and Mathematics) by female students early in their scholastic career (middle/high school) may serve to achieve this goal. There is evidence that STEM-trained students are more likely to enter and succeed in technology-intensive programs such as ET (Camera, 2015).

In the personal application of SDL skills by students, it was interesting to note that a ‘competitive spirit’ was a motivator for SDL—even though this was not an item included in the SDLRS-A® instrument. Having a competitive spirit does seem to be a plausible harbinger of SDL success, as it can enhance self-motivation, drive, and focus toward goal achievement in the higher education arena. It can also accelerate PBL as a competitive spirit promotes speed.

Empirical evidence from this research also suggests that interdependence—as distinct from the independence inherent in autonomous learning—is a valuable trait in the socially constructive setting of a capstone project. Team dynamics and cohesion are intrinsic to successful PBL. Finally, profession of an altruistic motive in SDL—as opposed to a self-seeking motive—was a laudable outcome of this empirical research. Interdependence and altruism are not traits included among the items in the SDLRS-A® instrument, but they do provide food for thought. Clearly, ‘self-directed learning’ is not quite synonymous with ‘self-seeking learning’! This study has shown that rather than being a focus on self, SDL in practice has a strong social constructivist element that seeks interdependence, competition, and altruism toward goal-attainment.

Research Question #2: Were SDL, PM, and CL Concepts Applied to Projects?

Houle (1961) identified three possible, related categories of adult learners:

(a) goal-orientated, whereby the learner is focused on a specific goal; (b) activity-oriented, wherein intrinsic satisfaction is derived from physical or mental activity and its social impact; and, (c) learning-oriented, wherein the learning experience is of paramount importance. Guglielmino, Long, & Hiemstra (2004) contended that it is the third group (learning-oriented) that is priority in SDL. Goal-orientation and activity-orientation, though needed for SDL, are intrinsic to project management (PM).

This research has thus demonstrated that for Senior Design projects using innovative technology, multiple approaches to learning are required, thus expanding the scope of SDL. This is because the academic goal of earning the undergraduate ET degree through PBL requires a strong learning-orientation; students have to be goal-oriented to complete their capstone project as a condition for graduation; and, intensive group dynamics and change processes in the projectized environment require high activity-orientation. Such a passionate desire for learning is needed for complex theoretical study (evidenced by high cumulative GPAs from the very inception of the ET program). This triangulation of SDL components (Learning-oriented®¬Activity-oriented®¬Goal-oriented) for innovative technology projects deserves due consideration for buttressing an accelerated PBL (A-PBL) model.

From the analysis of the textual, qualitative component of the Phase 1 study through three open-ended questions on change leadership (CL) and change processes, there was consensus that change is inevitable in a project (Sohmen, 1990). This was because of the high levels of uncertainty, risk, and unpredictability inherent in events, resources, logistics, and human performance during the project lifespan. Primarily in the construction phase of the project, the prototype had to be re-designed, re-built, re-tested, and refined for presentation in May 2016 at the end of the Academic Year 2015-2016. These activities involved significant changes and iterations.

Therefore, key conclusions of the open-ended responses revolved around the need to be proactive, collaborative, and resourceful regarding inevitable changes in the project. There was also the need to seek and share knowledge, experience, and expertise with peers, advisors, lecturers, sponsors, and consultants. Furthermore, it was important to do thorough front-end planning and early project control toward a successful project outcome. Waiting for disaster to strike—and then to react—would be unwise: without the critical front-end planning and preparation, the unexpected can be damaging or devastating to the project and its stakeholders.

It was also clear that iterative changes to the capstone project were inevitable through the three academic terms; and exchange of ideas drawn from the knowledge and experience among students, faculty advisors, sponsors, lecturers, and consultants was necessary for problem-solving and sustained progress (see Figure 1). At least one-third (36%) of all jobs across industries worldwide are expected to involve complex problem-solving as one of the core skills needed for success (World Economic Forum, 2016). This skill would be critical to navigate bottlenecks in a dynamic project, as unexpected problems are inevitable due to high uncertainties in the early project phases.

From the Phase 2 interviews, project team leadership was proven to be critical. Predetermined milestones and the final deadline for project completion in Spring 2016 were key drivers for the projects to stay on schedule, under budget, and of acceptable quality. Under such extrinsic motivation, the tendency was to be reactive in PM, rather than be proactive—contrary to the self-motivation intrinsic to SDL. Obviously, a proactive rather than a reactive stance is needed for successful project outcomes.

Indeed, there are many benefits to adopting a robust PBL model: students will become well-prepared for project work when they secure employment; they will have learned the practical routines of companies; and, they would be able to communicate better with customers and users (Gjengedal, 2000). A student leader (SL4) rued and highlighted the lack of a formal PBL model in the ET program by stating that, "the PBL model was not strictly clarified; rather, it was assumed to be 'inherently' understood." This was echoed by a faculty advisor (FA2) who confessed that he was "unaware of the existence of a 'PBL framework' until late in the third and final (Spring) term". However, there were indications of informal practice of PBL with employment of planning, designing, teamwork, and learning. Advisors helped to shorten the students' 'learning curve' by sharing their expertise in innovative technology.

The conclusions of the Phase 1 SDLRS-A® Survey and Phase 2 interviews of six student leaders and six faculty advisors enabled a grassroots-level understanding of the challenges of the capstone project work. Specifically, Research Question #2 asked if SDL, PM, and CL were applied to the projects (hence, to PBL). The short answer to the question based on participants' responses was that they were indeed applied to various extents—but "unevenly" through the project phases, according to faculty advisor FA5.

It was good to have the perspectives of both advisors and student leaders. The candid reflections of the student leaders and faculty advisors highlighted some of the challenges and promises in applying SDL, PM, and CL to academic projects. Several faculty advisors (FA1, FA3, FA4, and FA5) made a few suggestions for best PBL competencies and practices based on their PBL experience as follows:

1. Proactive conflict management by helping the project team to resolve any disagreement quickly and efficiently through discussion and voting;
2. Strong team leadership by appointing or approving a competent leader and motivating the team to exceed their own expectations;
3. Better stakeholder management by early identification, engagement, and communication with stakeholders throughout the project life;

4. Clear goals and agreement amongst the team members, advisors, and other faculty;
5. Timely feedback from the advisor(s) that would be both constructive and actionable;
6. Project controls to avoid unplanned and undue extension of the original scope— commonly known in PM parlance as 'scope creep'; and,
7. Proactive logistics management with detailed, proactive guidance on specifications, milestones, and deliverables in a timely and cost-effective manner.

Research Question #3: Was PBL Accelerated Using SDL, PM, and CL through Best Practices?

Technology can be infused to enhance PBL competencies, as acceleration is facilitated by use of modern learning technologies such as the Internet, cloud computing, and use of 'smart' devices such as tablets—as well as audiovisual software, platforms, and websites (Parr, 2015). Suitable use of technology would certainly facilitate acceleration of PBL, both onsite and remotely (Howard, 2002; Parr, 2015). To increase project efficiency, one faculty advisor (FA1) suggested more use of modular components to increase speed, lower costs, and improve quality. The lecturers and advisors facilitated planning of the projects, whereas willing and available sponsors assisted with financing and cost-cutting measures including provision of lab facilities. As student leader SL4 suggested, a key to cost-efficiency would be to create the prototype product speedily at the lowest possible cost, consistent with competitive quality. Telecommuting also helped with controlling the schedule whenever possible by utilizing commuting time towards parallel offsite project activity to move the project forward.

A working relationship with enhanced team dynamics was thus established with team members. Allocating work according to the skills and strengths of team members enabled acceleration through astute division of labor. This injected efficiencies in executing the prototype employing PBL through the planning-design-implementation phases. Such regular, face-to-face meetings could also expedite problem-solving and decision-making through methods such as brainstorming for creative solutions.

Economic use of time was also necessary through motivation and team dynamics, including prioritization of selected elements of the project work. For this, faculty advisor FA3 suggested that maintaining a tight schedule with some slack for contingencies, and to "stick to the schedule" would be crucial to ensure acceleration of PBL. According to faculty advisor FA3, the project schedule needed to be "locked down" rather than be "allowed to float". For this, formal planning, goal setting, collaboration, control, and scheduling/rescheduling were critical. Adequate human resource support was considered essential by both student leaders and faculty advisors for acceleration of PBL. Thus, assigning clear roles for each person, and setting performance standards and accountability through meetings, could help in keeping the project on target—with minimal wastage of time, funds, and tangible resources.

Networking with outside sources of assistance such as the project sponsors, experts, and consultants from inception and throughout the project life could save much time by minimizing trial-and-error in the design and construction of the prototype. According to student leaders SL1 and SL4, sponsored projects generally moved forward faster, as sponsors' advanced facilities were made available for more efficient and speedier work.

Also, proactively meeting with experts prior to the project for their advice enabled accelerated progress with PBL. In this context, prior acquisition of foundational and specialized knowledge by the project leader and project team members could speed up PBL by obviating the need to learn relevant material anew during the project phases.

In sum, both student leaders and faculty advisors of the capstone projects conceded that acceleration of PBL was quite possible with hard work, discipline, prior preparation, control of changes, and, biweekly face-to-face meetings—as well as a relentless focus on time management. Therefore, an accelerated approach to SDL, PM, and CL should contribute constructively and cumulatively to an accelerated PBL (A-PBL) model.

KEY CONTRIBUTIONS OF THIS STUDY

By design and serendipity, this study yielded a few contributions to academia, practice, and to the literature. These contributions need to be tested under a variety of situations to confirm, modify, or refute them, based on objective evidence and usefulness.

1. **Proposal of a New, Literature-Based Model of an Accelerated PBL.** A diligent search of the literature did not yield any literature-based model or validated instrument to operationalize PBL. A meta-review of PBL (Thomas, 2000) and cognate literature revealed that PBL is a complex and interdisciplinary social phenomenon, incorporating self-directed learning, change leadership, and project management. Employing distillation and parsimony, four streams of literature (SDL, PM, CL, and PBL) were identified for deep study to compose an accelerated PBL (A-PBL) model.
2. **Introduction of an Iterative Model of Project Phases.** The iterative model of project management phases employed in this research was a unique variation of the conventional waterfall model. Unlike the typical industrial project with such stair-step fashioned 'waterfall' configuration and overlapping phases, the Senior Design project is an iterative, learning project. Learning is in fact "an iterative process of questioning, data collection, reflection, and action" (Argyris & Schön, 1978, p. 50). The projectization of PBL naturally requires an iterative loop of planning-design-implementation, with each of these phases linked to the overarching task of monitoring and controlling the project. Imbued with creativity, these iterations were also impelled and informed by expected and unexpected changes in the planning, design, and implementation of the prototypes in the innovative technology projects.
3. **Simultaneous Use of Two Competitive Textual Analysis Tools.** For the qualitative analysis of the study, NVivo 11 and Leximancer 4.5 were employed respectively for Phase 1 and Phase 2 of the study. Rather than being redundant, these two advanced tools have in fact served a complementary function to promote both breadth and depth of the findings.
4. **Design of a Projectized Model of Accelerated Interview Design.** As the window of qualitative research in the form of semi-structured interviews was limited to three weeks at the end of Spring 2016 before the students graduated, the interviews had to be accelerated. For this qualitative research, a projectized, time-compressed interview program in three stages was designed for rich textual data collection. In all, 168 individual responses to questions were recorded and transcribed across three intensive weeks.

THE ACCELERATED PBL (A-PBL) MODEL

Models represent reality in a purposeful manner. They are theory-based, yet simplify theory by making intangible concepts more tangible, visual, and pragmatic. Models can combine compatible theories as in this study, bringing into convergence the diverse yet cognate constructs of PM, SDL, CL, and PBL. The proposed model of accelerated PBL (A-PBL model) has been based on literature evidence focusing on cumulative efficiencies across PM, SDL, CL, and PBL—and subsequently informed by a complex mixed-methods research approach (Creswell, 2014) and operationalized by empirical support. The model has been developed here considering the earlier discussion of themes, subthemes, findings, results, interpretations, and conclusions. These progressive developments and reflections have resulted in crafting the Accelerated Project-Based Learning (A-PBL) model.

The quantitative and qualitative analyses of the primary data resulted in identification of essential themes of an accelerated PBL (A-PBL) model—through enhanced SDL skills, streamlined PM efficiencies, and, dynamic CL effectiveness. Accelerated PBL is thus represented as a synergistic combination of 'Accelerated SDL', 'Accelerated PM', and 'Accelerated CL'.

In considering 'Accelerated **SDL',** the passionate desire to learn must be genuine. Confidence in the learner's ability to learn will enhance self-efficacy. Also, self-motivation, self-management, and autonomy of the learner are key skills for the acceleration of SDL. Furthermore, competitiveness and altruism are helpful in SDL.

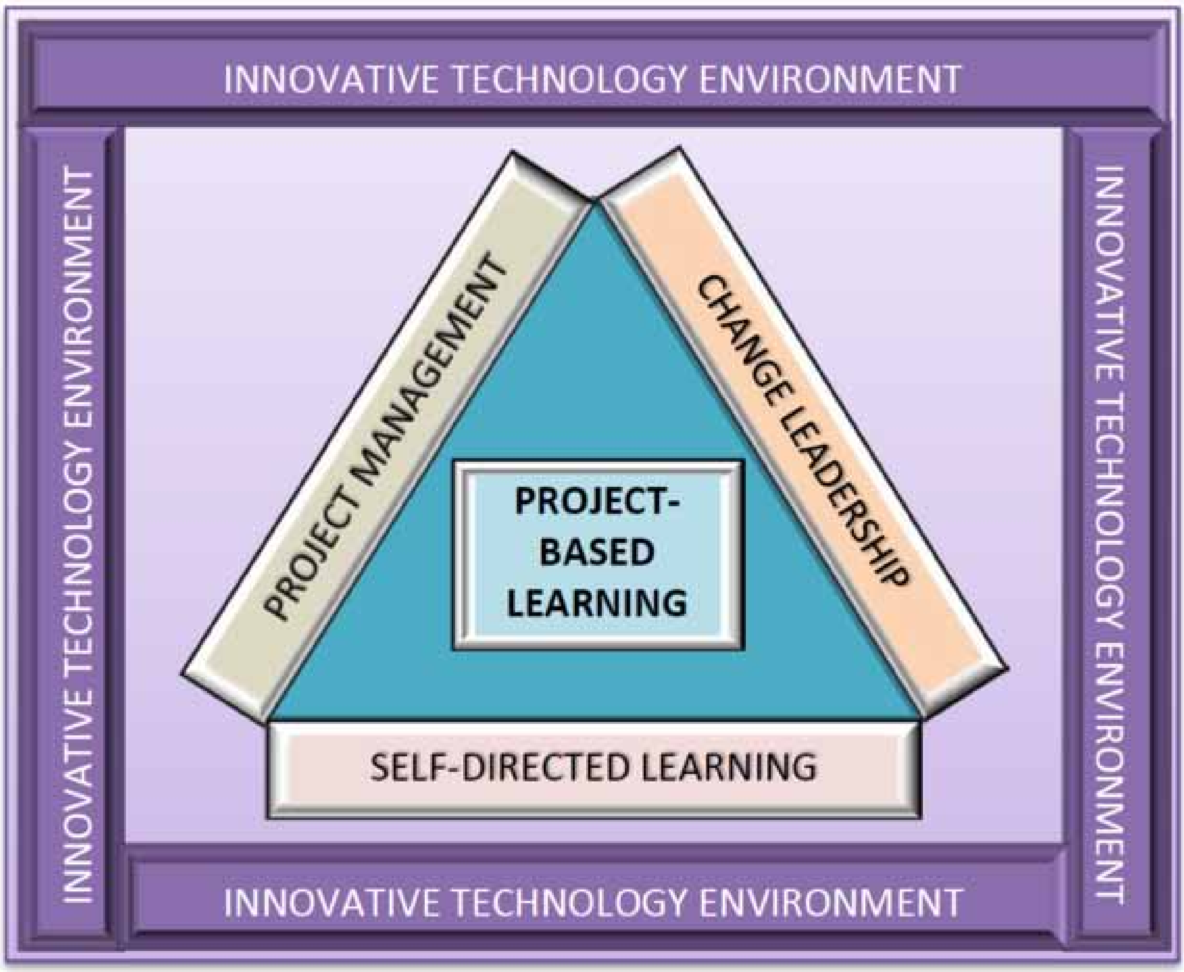
Secondly, 'Accelerated **PM'** involves thorough front-end research and planning, early harnessing of scarce resources—and, the identification, engagement, and cultivation of stakeholders—even from the very outset of the project. Accelerated PM also requires speedy and efficient project execution through optimization of the Triple Constraints of time, cost, and quality (Sohmen, 2007). Thus, the potentially iterative loop of planning-design-construction can be relentlessly reduced by adequate forethought and early marshalling of resources in a systematic and systemic manner.

Thirdly, 'Accelerated **CL'** proactively minimizes inevitable changes, and fosters the imperative need to persistently and resolutely control these changes. This requires early risk assessments and precise planning for expected and unforeseen risks and contingencies, and the avoidance of needless changes. Indeed, accelerated CL calls for swift, focused actions with a sense of urgency and momentum toward project success. Additionally, strong collaboration with the project team through effective communication, interdependence, and cooperation would be critical for accelerated CL.

Finally, 'accelerated **PBL**' is a synergistic combination of 'accelerated SDL', 'accelerated PM', and 'accelerated CL'. The resultant accelerated PBL (A-PBL) model is geared to yielding optimal outcomes with minimal loss of time or wastage of resources in rapidly evolving, 21st century higher education environments. Thus, costs are minimized, resources optimized, and quality enhanced. This study concludes that an accelerated PBL (A-PBL) model can also work towards: minimizing the employment gap; fueling students' self-motivation; enabling rapid skill-building; and, instilling a deep commitment to life-long learning—in a technology-infused, information-intensive, and competitive global arena.

Therefore, formal infusion of streamlined SDL, PM, and CL into a PBL framework could contribute to tangible, enriched, and autonomous composition of a robust, dynamic, and accelerated PBL model (A-PBL model). Whereas SDL provides self-motivation for the learner, Change Leadership (CL) comprises a 'soft' skill and a leadership competency that is useful for overcoming resistance to innovative ideas and actions to move the project forward. CL enables the steering of SDL, PM, and PBL toward

Figure 3. Accelerated PBL (A-PBL) model



successful outcomes through needed changes, as it is axiomatic that constructive change is inevitable in a dynamic project (Sohmen, 1990).

Furthermore, PM is a goal-oriented and efficiency-driven approach toward task accomplishment of the time-limited educational project. It aids in economizing on resources and compressing time to accelerate the educational project undertaken. Ultimately, to tackle both planned and unplanned changes in an innovative technology project, CL would be needed to realize PM efficiencies through control mechanisms spanning the project life cycle. Thus, overlaps among SDL, PM, CL, and PBL can be synergistic to a potentially robust, integrated, and accelerated A-PBL model (Figure 3).

RECOMMENDATIONS

Recommendations are offered for two pragmatic purposes: (a) To identify and propose actionable solutions to the research problem; and, (b) to guide future research. These recommendations draw from various aspects of the study, including the literature review, empirical research of Phase 1 and Phase 2, and, the researcher's reflections.

Actionable Solutions to the Research Problem

This study investigated the overarching research problem of how diffusion of technological innovations through innovative technology projects in a competitive higher education environment can be accomplished by employment of SDL, PM, and CL as key components of PBL. The following actions are recommended for competence in SDL, PM, CL, and PBL towards resolving the research problem.

1. Apply the Accelerated PBL (A-PBL) Model Diligently for the Projects

Most innovative technology programs seem to either use PBL with inadequate structure or employ it with lack of understanding of the constituents of self-directed learning (SDL), project management (PM), and change leadership (CL) as implicit or explicit ingredients for PBL competence. In the case of the ET program studied, there was a loose, working framework of PBL in place, with students and faculty advisors practicing PBL with various levels of understanding and competence. It is recommended that the Accelerated PBL (A-PBL) model be applied proactively, formally, and diligently by technology programs seeking to apply PBL for their capstone projects. Application of A-PBL requires strong commitment and support from the program leadership, along with adequate instruction, training, and written operational guidelines. Acceleration of PBL can be a distinct reality by building continually on individual and team competence, as well as fostering speed and focus in each of the three areas: SDL, PM, and CL.

2. Develop Strong SDL Skills Among Learners throughout the Academic Year

It was seen from the literature review and the SDLRS-A® Survey results that SDL skills are not optional in the 21st century educational environment: they are critical to self-management, self-efficacy, and a genuine desire for learning—especially life-long learning by the adult population. These attributes need to be consciously developed among students to enhance their prior preparation for the Senior Design undertaking. Indeed, this study has demonstrated that SDL skills are necessary PBL ingredients for self-motivation, personal competence, and self-management that will enable best practices as well as acceleration of the PBL experience. Based on the research findings, SDL skills can enhance altruistic service motives toward responsible and productive citizenship. Additionally, SDL skills can foster interdependence within teams, and a competitive spirit between learners and teams to further aid the acceleration of PBL.

3. Provide Essential PM Training for Students Early in the Curriculum

PM training would involve a keen understanding of how the Triple Constraints of time, cost, and quality are dynamically managed (Sohmen, 2007). This training needs to be provided prior to embarking on PBL, as front-end planning and control need to be in place in advance for best practices and results. This was underscored and concurred with by both faculty advisors and students during interviews in Phase 2 of this study. Scheduling using Gantt charts, costing and quality control techniques, and, the Work Breakdown Structure (WBS) are some of the basic tools of PM using Microsoft Project 2019.

Also, Massive Open Online Courses (MOOCs) in Project Management are freely available through open-source training sites such as EdX for self-study by the motivated learner.

4. Give Students Opportunities and Training to Sharpen their CL Effectiveness

The capstone project typically has shared leadership through referent power (French & Raven, 1959), as evidenced from the interview responses. It is important for student leaders to be apprised of how to factor for risk management as well as change management on the project. They need to be trained to develop their competencies to optimize changes and to combat unexpected changes vigorously through risk analysis tools. Clear communication, speedy conflict resolution, and collaborative leadership are some of the soft skills needed for effective CL contributing to best practices and acceleration of PBL.

5. Build Strong Stakeholder Networks

This study demonstrated the importance of sponsors, consultants, experts, advisors, and instructors as key stakeholders to train students through the capstone projects. It was confirmed during the one-on-one interviews by both student leaders and faculty advisors that time and cost can be saved, and quality enhanced, through the expertise of key stakeholders.

6. Avail of the Sponsor's Facilities, Funding, and other Resources

Sponsors enabled many student teams in the ET program to finish their prototypes early—even during the second term of their final year. This was accomplished at a fraction of the cost due to assistance from sponsors. For project success, it is therefore important to proactively maintain external communication with the sponsors, and to regularly seek their advice and practical assistance on the feasibility of the project and its economical resource requirements. This can be done even prior to start of the project, through to project completion.

Suggestions for Future Research

1. Conduct a Meta-Review of PBL Literature

The last meta-review of PBL literature was conducted around two decades back by Thomas (2000). Such a meta-review selects and analyzes available research on a topic conducted within a time period. The meta-review thus seeks to review several articles on a subject such as PBL, condense the available evidence into groups or subtopics, compare them, and provide a succinct overall review for the guidance of future researchers. In the case of PBL, no follow-up meta-reviews seem to have been undertaken since the cogent meta-review by Thomas (2000). It is therefore recommended that a thorough meta-review for the period from 2000 to 2020 be carried out. This will not only bring forward the research on PBL by a couple of decades but will also enable best practices in PBL to be extracted through greater depth and breadth of research. As a sequel to this meta-review, an edited volume on best practices in PBL could be produced for the benefit of educators, researchers, trainers, and students.

2. Recommend Update of the SDLRS-A® Instrument

The SDLRS-A® Survey was produced in 1978 by Lucy Guglielmino from her Ed. D. dissertation. It has proven to be reliable and valid across a range of educational and industrial environments globally (Guglielmino, 1997). In reviewing the items in the SDLRS-A® Survey, several of them seem to have nearly identical meanings, or are ambiguously worded (for example, "I love learning"/"Learning is fun" may be treated as identical by Millennials!). Also, subtle cultural changes and linguistic tweaks have occurred over the nearly 50 years since the instrument was launched. Global respondents may therefore find some of the language to be quaint. Further, having to reverse the scores of the 17 negative items is tedious. It is recommended that a thorough face, content, and construct validity analyses be carried out for the SDLRS-A® instrument. The 17 negatively worded items could also be made positive to minimize complexity for participants and researchers.

3. Promote Interdisciplinary Research Among SDL, PM, CL, and, PBL

Research on SDL, PM, CL, and, PBL is currently conducted individually with very little evidence of crossovers among these streams of literature. There is some evidence of PBL and SDL research being conducted together (Stewart, 2007), and of PM and PBL being conducted in the same study (Gratch, 2012), but CL does not seem to feature in any of the inquiry-based learning studies. More interdisciplinary research (Casey, 2009; Jones, Rasmussen, & Moffitt, 1997; Machi & McEvoy, 2012) will enable these four streams of literature to inform one another—and thereby derive viable synergies, frameworks, and testing instruments incorporating diverse perspectives.

4. Pilot-Test the Accelerated (A-PBL) Model

The Accelerated PBL (A-PBL) Model needs to be tested by developing a comprehensive, yet parsimonious PBL instrument (Booth et al., 2016) with up to 50 items incorporating the essence of SDL, PM, CL, and, PBL. The instrument will need to be expert-tested by 3-5 experts in the field; pre-tested by 5-10 typical respondents; and, pilot-tested by a random sample of 30-50 participants with a diversity of demographic features (Creswell, 2014). This will aid in fine-tuning the instrument for face validity, content validity, and construct validity of the PBL survey. Systematic validity-testing through focus groups, interviews, and surveys can be done before wider dissemination of the instrument to a larger population (Booth et al., 2016).

5. Follow-Up with Larger Study Samples Using Mixed Methods

As the sample in this study was small (30 students), employment of significantly larger samples with 100 to 1,000 participants would enable generalization. The samples could be drawn from a variety of universities, multiple ET programs, across STEM disciplines, and, transnationally across cultures. Comparisons can then be made of diverse sample groups for testing using MANOVA, Cluster Analyses, and Structural Equation Modeling (SEM). Generalizability would thus be significantly strengthened. Testing of reliability and validity can also be carried out employing both cross-sectional and longitudinal studies. Through these processes, the A-PBL Model proposed herein could be developed further, modified, or refined.

CONCLUSION

Innovative technology is being introduced and diffused widely and rapidly in 21st century higher education. For progress of learning in the prevailing competitive environment, change leadership (CL) consequent to changes attending this diffusion needs to be successfully executed for overcoming resistance and facilitating innovative output. Among inquiry-based learning methods considered to accomplish this diffusion of technology in higher education, PBL has been chosen for its hands-on, result-oriented, and transformational approach.

Though basic premises for introduction of PBL appear to be valid, this study sought to go a step further than existing frameworks of PBL in studying and seeking accelerated diffusion of innovative technology. This has been accomplished by employing a competency-based, accelerated project-based learning (A-PBL) model—infused by Self-directed Learning (SDL) skills, Project Management (PM) efficiencies, and Change Leadership (CL) effectiveness. In the process, the existing literature on adult learning has been extended by presenting the A-PBL Model with its emphasis on project management, self-directed learning, and change leadership toward formalizing the current, disjointed practice of project-based learning (PBL).

This study is also significant because in a competitive, resource-constrained, and technology-infused higher education environment, accelerated progress is critical. This would enable adaptation to the rapid turnover of technology, enhance employability, and foster successful life-long learning propensities.

After all, the most obvious indicator of quality for a higher education program is whether students transition successfully into jobs and careers (McCarthy, 2014). The unpalatable alternative could be severe and measurable attrition of students, underutilization of resources, and potential lack of employability of graduates (Harris, 2007; IWNC, 2012; Ryan, 2018; Sheets, Crawford, & Soares, 2012). This research therefore sought to build a robust, accelerated PBL (A-PBL) model as a synergistic synthesis of SDL, PM, and CL for best practices to accelerate learning.

This study had a few limitations born of necessity. The sample size for quantitative analysis was relatively small, though all 30 students in the sample pool participated enthusiastically in the study for a 100% result. Also, only one innovative technology program (ET) was considered among the diverse undergraduate programs at one STEM university in the USA. Future research could be undertaken using larger sample pools across diverse programs and disciplines—and even multi-nationally across geographical borders. Longitudinal studies may also be embarked upon towards further enrichment, validation, and consolidation of the new Accelerated Project-Based Learning (A-PBL) model.

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KEY TERMS AND DEFINITIONS

Capstone Project: A multifaceted, investigative project that culminates in a final product and presentation, typically during the final year of an academic program

Change Leadership (CL): Describes leadership that concerns driving forces, vision, and processes that fuel change and transformation in an organization (Kotter, 1995)

Diffusion of Innovation (DOI): Occurs when an innovative product spreads through an environment in successive, overlapping waves (Business Dictionary, 2014)

Ecosystem: Composed of several stakeholders including graduate students, undergraduates, faculty, staff, institutions, scientific societies, and funders, each with a role to play (Hagan, 2019)

Engineering Technology: Emphasizes the application of existing scientific and engineering skills and techniques to real-life issues and problems

Innovative Technology: New technology that can be incremental, radical, or disruptive

Project-Based Learning (PBL): Refers to any programmatic or instructional approach utilizing multifaceted projects as a central organizing strategy for educating students; an inquiry-based teaching method in which students execute a project to investigate a real-life, complex problem (Glossary of Educational Reform, 2019)

Project Management (PM): A methodical approach to execute a project within time, cost, and quality constraints through the phases of initiation, planning, design, execution, commissioning, and, closing (Turner & Müller, 2005)

Self-Directed Learning (SDL): Learning characterized by personal autonomy, management of self-learning, and, viewing problems as challenges; a self-disciplined approach with a high degree of curiosity, self-confidence, and diagnosis; and, a strong desire to learn, evaluate the learning, and make necessary changes (Candy, 1991; Guglielmino, 1978; Knowles, 1975)

APPENDIX

Discussion Activities

SCENARIO 1

Using the Accelerated Project-Based Learning Model (A-PBL Model), device an innovative, light-weight instrument borne by helium-filled balloon(s) to probe and classify concentrations of pollutants in the atmosphere that are vertically stratified at various altitudes for comparison of evidences of carbon, sulfur, dust, and acid levels at each earmarked altitude.
A-PBL Activities for Discussion and Action:

1. Perform necessary background research to determine air pollution sources.
2. Identify industry sponsor(s) with expertise in atmospheric sensor technology.
3. Carry out a technological and economic feasibility study for the prototype.
4. Create a schedule for the A-PBL execution, allowing for likely contingencies.
5. Produce a viable design for the prototype, factoring all project constraints.
6. Estimate the overall budget and itemized costs in executing the project.
7. Choose the suppliers of components for the pollution-testing prototype.
8. Identify the steps for procuring patents for the new pollution-testing device.
9. Formulate a strategic marketing plan to promote and market the device.
10. Prepare a persuasive presentation of the A-PBL project lessons and product.

SCENARIO 2

The Bahamas has recently been devastated by Hurricane Dorian. Using the Accelerated Project-Based Learning Model (A-PBL Model), build a prototype for an emergency power generation (EPG) plant for the community that can withstand future hurricanes and provide emergency power during such natural calamities.
A-PBL Activities for Discussion and Action:

1. Perform necessary community needs assessments to provide basic power.
2. Conduct technological, economic, sociological, and sustainability research.
3. Identify industry sponsor(s) with expertise in emergency power generation.
4. Carry out a technological and economic feasibility study for the prototype.
5. Determine local expertise for the EPG design, construction, and maintenance.
6. Estimate the overall budget and itemized costs in executing the EPG project.
7. Create a schedule for the A-PBL execution, allowing for likely contingencies.
8. Produce a viable design for the prototype, factoring all project constraints.
9. Choose suppliers of technology, equipment, and materials for the project.
10. Prepare a persuasive presentation of the A-PBL project lessons and product.

Chapter 6
Providing Adult Learners in Community Colleges With Education and Support

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ABSTRACT

This chapter provides an overview of the development and mission of community colleges to present the challenges that adult students who attend community colleges often face, and to explore ways that community colleges can help students overcome these challenges. Challenges are often related to other obligations adult students face, financial pressures, geographic location, academic ability, and feelings of not belonging. Community colleges are uniquely situated to address these challenges through programs and practices from beginning orientation, through coursework, and onto graduation. Postsecondary education can lead to employment that can give students the resources they need to improve the lives of their families and communities.

INTRODUCTION

Community colleges are uniquely situated to serve adult learners, especially those interested in preparing for high-wage employment opportunities in the areas in which they live. But, many of these adult learners struggle with barriers including work and family responsibilities, limited income, geographic location, academic ability, and feeling out of place at the community college. Community colleges can provide adult learners with ways to overcome these barriers and receive the education they need to succeed. Through adaptations such as flexible scheduling for orientation, advising, and classes; degrees targeted at good-paying, locally-available employment; credit for prior experiences; instructional methods appropriate for adult learners; stackable credentialing; articulation agreements; and social and academic support services for adults, community colleges are reaching out to meet the needs of adult learners. The objectives of this chapter are to examine the challenges that adult students attending com-

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munity colleges face and to explore solutions and recommendations that community colleges can use to address these challenges.

LITERATURE REVIEW

Community College Development

The community college has been defined as "any not-for-profit institution regionally accredited to award the associate in arts or the associate in science as its highest degree" (Cohen, Brawer, & Kisker, 2014, p. 5). In addition, a growing number of colleges are offering the community college baccalaureate degree (Bilsky, Neuhard, & Locke, 2012). These degrees are usually designed for working people who want to pursue higher education for employment advancement while still meeting other demands on their time (Bragg & Ruud, 2012). They are generally offered in fields where there are labor shortages (Bilsky et al., 2012), primarily in areas of business, education, healthcare, and information technology (McKinney, Scicchitano, & Johns, 2013). Many of the students enrolled in these programs are adults, and more colleges intend to offer the programs online to meet the needs of students (McKinney et al., 2013).

According to Cohen et al. (2014), the community colleges, or junior colleges as they were called, were first established in the early 1900's, and enrollment grew throughout most of the century as the number of high school graduates increased and more graduates sought postsecondary education. Salomon-Fernández (2019) stated, "Community colleges were born out of a need to innovate the then-existing higher education model when the first college was founded in 1901" (p. 99), and they have continued to adapt over the years. In addition, they serve a range of students, from those still enrolled in high school to adults returning to upgrade their skills or seeking leisure courses.

Not all students at community colleges began their postsecondary education at a community college; a number of them began at a university and transferred back to a community college for a variety of reasons. "A growing proportion of the population served by community colleges engages in reverse transfer: they begin their college careers in a four-year institution but transfer to a community college prior to earning a degree" (Kalogrides & Grodsky, 2011, p. 853). A national dataset revealed that of the 44% of students who began at a 4-year institution but did not earn a degree, 10% transferred to a community college. Of these transfers, 26% earned an associate degree or certificate, and an additional 18% eventually received a bachelor's degree or higher. Disadvantaged students were more likely to transfer down or drop out of postsecondary education. Reverse transfers earned more credits, which may have increased their job earnings, than did students who dropped out completely (Kalogrides & Grodsky, 2011).

Functions of the Community College

The curricular functions of the community college include developmental education, integrative or general education, liberal arts and transfer education, and occupational education as well as continuing education and community service (Cohen et al., 2014). Crisp and Delgado (2014) noted, "Developmental education has been cited as one of the most difficult issues facing community colleges" (p. 99) and found that participation in developmental education may actually decrease a community college student's chance of transferring. And, adults who participate in developmental education are not more likely to attain a degree (Hawley & Chiang, 2017). The liberal arts and academic transfer courses have always been a key function of the community college, and the transfer associate degree was developed to make sure community college transfer students got credit for their work at the community college through articulation agreements and policies (Cohen, 2012). Occupational education, including career and technical education and workforce development, have also played an important role for adult learners who are often looking for a direct link to employment opportunities. Career education and workforce development may include credit and non-credit courses and training to prepare students for middle-skills careers and may include certificate programs (Myran & Ivery, 2013). And, Clotfelter, Ladd, Muschkin, and Vigdor (2013) noted that the role of community colleges has expanded and includes, in part, "courses to enhance the skills of adults" (p. 806). The community education function includes a number of activities. Hicks and Jones (2019) describe "opportunities to interact with local citizens" (p. 35) as "touch points" and give the examples of "the library, food service athletics programs, campus events, and student organizations" (p. 35).

In addition, community colleges offer a number of student support services to adult learners, which can be especially important for adult learners with numerous obligations including work and family. These services can increase engagement and retention of adult learners. Some colleges are expanding services to include online support services. "Effective delivery of online student services can increase access, convenience, and timeliness of information distribution and improve student-staff interaction (Hornak, Akweks, & Jeffs, 2010, p. 85).

Community College Students

Postsecondary institutions are serving an increasingly diverse student population. And while this chapter focuses on adult students, it is important to note that traditional-aged students too are working while they are going to college. The traditional-aged student population and the non-traditional aged student population are beginning to be more alike in their characteristics, leading institutions to "become more mindful of the challenges that students face in balancing their personal, academic, and work lives (Jacobs & Hundley, 2010, p. 4). So, while the problems and solutions suggested here are focused on the adult learner, many will certainly also apply to younger learners as well. Erisman and Steele (2015) state,

Notably, many of the most significant challenges for returning adult students are rooted in policies and practices that are barriers for all students, which means that improvements in these areas may also improve postsecondary retention and completion more broadly and thus provide a substantial return on investment for colleges ad universities willing to undertake a process of change. (p. 1)

Further, Jacobs and Hundley (2010) note that there is a convergence of adult education and higher education and that the convergence has implications for managing and accommodating student expectations, programs offered and instructional choices, teaching and learning practices, faculty development, and other choices the institutions make to assist adult learners.

Community college students, whether adults or of a traditional student age, face various challenges. According to the American Association of Community Colleges (2019), community college students list the following as their greatest challenges to their success: work (34%), paying expenses (34%), family and friends (30%), online classes (21%), parking on campus (21%), developmental courses (17%), faculty (16%), health and disability (16%), doing college-level work (15%), and registering for courses (14%). Specifically related to these challenges:

Of students indicating work as a challenge, having work hours that do not leave time for study was most often cited (61 percent), followed by not being paid enough to cover expenses while in school (49 percent). A work schedule that hampered students' ability to use campus resources was also a challenge (36 percent), as was work schedules that conflicted with classes (35 percent). Among those who said paying expenses was a barrier, living expenses were most often cited (71 percent), followed by books, software and supplies (58 percent), and tuition and fees (55 percent). In regards to family and friends, difficulty balancing demands of family and friends (72 percent) was most often noted, followed by difficulty dealing with the health of family and friends (35 percent). (American Association of Community Colleges, 2019, p. 1)

Defining the Adult Student

According to the National Center for Educational Statistics (NCES, 2019), 21% of full-time students and 39% of part-time students in public 2-year colleges in Fall 2017 were 25 or older. While age is a common method to define an adult learner, there are other considerations making defining who adult learners are difficult (Jacobs & Hundley, 2010). Kasworm (2003), while studying varying institutional types including two community colleges, included factors related to the nontraditional roles and characteristics of adults including age and responsibility. While age often refers to someone 25 or older, maturity is developed through responsibilities students have, including financial independence. Responsibility may refer to adult roles that students play, including work and family responsibilities. Similarly, the Southern Regional Education Board (n.d.) states,

Adult learners are a diverse group – typically age 25 and older – with a wide range of educational and cultural backgrounds, adult responsibilities and job experiences. They typically do not follow the traditional pattern of enrolling in postsecondary education immediately after high school. They often return to school to stay competitive in the workplace or prepare for a career change. And they usually study on a part-time basis, taking one or two courses a term while maintaining work and family responsibilities. (para. 1-2)

Calcagno, Crosta, Bailey, and Jenkins (2007) found, in a statewide study of community college students comparing younger and older students, that older students were more likely to have a GED (instead of a high school diploma), more likely to receive federal financial aid, more likely to be part-time, and less likely to earn credits and graduate in a timely manner, and that they scored lower on mathematics placement exams but higher on tests of verbal skills. There was little difference in the length of the programs in which the students were enrolled, with older students being as likely to be enrolled in associate degree programs as were younger students.

Wax and Wertheim (2015) state that adults begin at or return to postsecondary education for a myriad of reasons. Often those reasons are related to work and may include stalled careers due to lack of a degree or technology knowledge; desire for a higher salary; interest in a new field of work, which requires training, due to boredom with the current job; and the desire to set a good example for children or grandchildren.

ADULT LEARNERS AT COMMUNITY COLLEGES AND THE STRUGGLES THEY FACE

Many students who attend community colleges are adults (NCES, 2019), and they often struggle to meet all of the demands on their time. Numerous studies have noted the challenges that adult students face. Wax and Wertheim (2015) stated,

The obvious challenges adult learners face related to time management and organizational skills can be compounded by anxiety about being in school, negative experiences in prior learning settings, lack of a support system at home and/or work, limited financial resources, or failure to link education goals with employer needs. (p. 40)

Sutton (2016), in describing an accelerated mining technology program primarily serving adults, stated that the program director indicated students often had "concerns in four interrelated areas: scheduling and time investment; money; college-readiness; and personal benefits of the program" (p. 458). Osam, Bergman, and Cumberland (2017) conducted a literature review to determine barriers adult learners face as they seek a college degree. They divided the barriers into three categories based on Ekstrom (1972): situational, such as work and family responsibilities, financial, transportation, and health; institutional, such as admissions, advisement, and scheduling; and dispositional, such as self-esteem, anxiety, and feeling excluded. This section of the chapter will focus on five areas in which adult students often struggle including other obligations that take adult students' time, financial issues, geographic location, academic ability, and feeling out of place.

Other Obligations that Take Adult Students' Time

Adult students often have numerous obligations that take up their time, with academic responsibilities added to an already-full schedule of work and family commitments. Wax and Wertheim (2015) note, "For the most part, these adult learners attend school part time while juggling the responsibilities of multiple roles such as full-time employee, spouse or partner, caregiver for children or parents, volunteer, friend, and coworker" (p. 40), and they may have to deal with resentment from friends and family and a lack of support from employers, who may fear the student will move to another job. Similarly, Erisman and Steele (2015) state that returning students "face serious barriers to both re-enrollment and degree completion. Many of these learners originally left college due to financial challenges and difficulties with balancing life, work, and school, and those challenges are still a part of their lives" (p. 2).

Philibert, Allen, and Elleven (2008) examined "three components of Donaldson and Graham's (1999) model of college outcomes for adults: (a) Prior Experience & Personal Biographies, (b) the Connecting Classroom, and (c) Life-World Environment" (p. 582). The Model also considers three other elements, including Psychosocial and Value Orientations, Adult's Cognition, and the Outcomes. Philibert et al. (2008) surveyed community college students in one district and found that the Life-World Environment construct contributed most to differences between traditional and non-traditional students. They state, "The Life-World Environment encompasses current work, family, and community situations and settings or the different roles and contexts in which adults work and live" (p. 586).

Peterson (2016) interviewed 15 community college students who are parents of young children and are attending college full time pursuing an associate degree while working part-time. These students faced challenges from obligations they had with home, child care, work, and academic responsibilities. "The student-parents described experiences that required prioritizing responsibilities, managing time effectively, securing needed support services, addressing stress, developing strategies for study and parenting, and maintaining a positive mindset" (p. 370). The students were determined to get the education that they felt would lead to a better life for themselves and for their families but faced struggles in doing so.

Patterson (2018) looked at a large-scale, national dataset to investigate why the least educated adults in the U.S. do not participate in additional education. In this dataset, 74% of the adults who were not pursuing additional education (non-participating adults) had completed high school, while the remaining participants had not. For adults who did not have a postsecondary degree but were pursuing additional education (participating adults), 89% had completed high school. The primary reasons given by adults who wanted to pursue nonformal education but had not was cost, work obligations, and family responsibilities.

Financial Issues

As noted above (Erisman & Steele, 2015; Patterson, 2018), many adult students struggle with financial issues in addition to concerns with meeting other demands on their time. Patterson (2018) investigated why adults with a high school diploma or less do not participate in additional education and found cost as a primary issue. For adults who do participate in postsecondary education, many pay their own expenses to attend college and want to know that they are on a clear path towards their goals so as not to waste time or money. Erisman and Steel (2015) state, "Returning adult students want to know how long it will take and how much it will cost to complete a degree program" (p. 3).

Rosenberg (2016) surveyed students in one community college system about their perceptions related to transfer. All students, traditional and non-traditional, indicated that the cost of attendance was a primary concern. When students were asked about the importance of cost of attendance at the institution to which they would transfer, there was a significant difference between traditional and non-traditional students, with more adult students indicating this factor as having greater importance.

According to Ma, Baum, Pender, and Libassi (2018), in 2018-19, the average in-district tuition and fees at public 2-year colleges was $3,660 as compared to the average in-state tuition and fees at 4-year institutions of $10,230 in 2018-19. But community college students still face financial obligations. "On average, full-time students at public two-year colleges receive more than enough grant aid and federal tax benefits in 2018-19 to cover tuition and fees. After this aid, they face an average of $8,270 in living expenses out of pocket" (Ma et al., 2018, p. 3). And, these figures include expenses for students who live with their parents, which many adults do not do, leading to higher living expenses out of pocket.

In situations where the adult students have lost their jobs and are at the community college for retraining, the financial situations in their households can be particularly bleak. Hodges (2013) interviewed 15 displaced female workers, as well as two college administrators, and found that many were struggling financially. The author noted, "Whether altering spending habits, eliminating expenditures, or seeking leisure activities that did not require additional finances, returning to school meant a lack of disposable income on top of an already tight budget" (p. 99). Some students were working multiple part-time jobs in order to be able to pay their bills.

Geographic Location

Adults may not live near a community college or other postsecondary institution and probably cannot relocate, so adults need flexibility in how they take their courses, with online options being particularly important. Jacobs and Hundley (2010) state that institutions must pay attention to "maintaining consistency in serving learners while being attuned to the necessary and reasonable flexibility that adult learners need in courses, options, and educational practices" (p. 18). Rosenberg (2016) found that adult students, when considering the importance of various factors when considering where to transfer, perceived the importance of flexibility of scheduling as well as distance from home as higher than did traditional students.

Academic Ability

Adult students may struggle with the academic demands of attending college, both from the amount of time that has passed since they have been in school and from the academic deficiencies that they had leaving high school. Calcagno et al. (2007) found, in a statewide study of community college students comparing younger and older students, that older students were more likely to score lower on mathematics placement exams but higher on tests of verbal skills and so more likely to be enrolled in developmental math courses but less likely to be enrolled in developmental reading and writing courses. Older students who had been enrolled in development coursework were less likely to pass their first college-level writing and math courses than were younger students.

Patterson (2018) investigated why adults with a high school diploma or less do not participate in additional education and found that these adults scored lower in assessments of math and literacy than those who were participating in additional education. And for students who are enrolled at the community college and considering transfer, Rosenberg (2016) found that all students, traditional and non-traditional, indicated that their academic preparedness was a primary concern.

McNair, Bensimon, Cooper, McDonald, and Major (2016) note that many college students struggle academically. While challenges related to preparation, along with problems of access and affordability, continue, there are now added challenges related to technology, demographics, and economics. McNair et al. (2016) argue that institutions do not support students sufficiently and should alter practices and culture to be able to meet the needs of current students.

Feeling out of Place

Many adult students feel out of place in the community college classroom with younger students who more closely match society's more traditional perceptions of who community college students are. Kasworm (2005) interviewed 28 adults at two community colleges about their experiences in intergenerational classrooms. She noted,

The student identity of an adult in an intergenerational classroom context represents coconstructed understandings and beliefs based in the day-to-day classroom engagements with faculty and between younger and older students, the adult students' goals and expectations for collegiate studies, their life roles and experiences, and their related beliefs and motivation for accessing the particular institution. (pp. 8-9)

Kasworm (2005) described positional and relational identities of adult community college students. For positional identities, students expressed concerns about age-appropriate social norms, feeling they were too old to be in college, although they knew there were benefits for them because they were advancing their educational level. Students also expressed concerns about their ability to perform academically since they were older and noted that they had to study more. Finally, students expressed views related to "standards representing an ideal college student image—of being serious and committed students, of college as a life-choice commitment, of past experiences enhancing college studies, and of their student actions more often reflecting successful (ideal student) behaviors and actions" (p. 12). For relational identities, relationships with faculty were seen as positive. Adults students initially expressed concern about going to class with younger students but formed positive relationships, sometimes even serving as mentors to younger students. But some adult students noted that the younger students did not like that adult students sometimes worked harder than the younger students did. Relationships with other adult students were seen as positive, with most students indicating an automatic friendship with other adults, but the students did not form friendships outside of class (Kasworm, 2005).

SOLUTIONS AND RECOMMENDATIONS

According to Erisman and Steele (2015), adults "need a higher education system that is more affordable, flexible, and student-centered than the one that currently exists" (p. 1). They go on to note that "higher education must promote innovative ways to deliver course content and assess student outcomes, develop more effective student support systems, and forge closer connections to workforce and industry" (p. 1). Community colleges have a history of serving underrepresented students. Cohen et al. (2014) stated the following.

The community colleges reached out to attract those who were not being served by traditional higher education: those who could not afford the tuition; who could not take the time to attend a college full time; whose racial or ethnic background had constrained them from participating; who had inadequate preparation in the lower schools; whose educational progress had been interrupted by some temporary condition; who had become obsolete in their jobs or had never been trained to work at any job; who needed a connection to obtain a job; who were confined in prisons, physically disabled, or otherwise unable to attend classes on a campus; or who were faced with a need to fill increased leisure time meaningfully. (p. 35)

Programs, services, and practices of the community college can help many adult students succeed there. Montero-Hernandez and Cerven (2013) "argue that it is at the community college where adult students may encounter the highest concentration of educational programs and student services that resonate with and support adult learners' agentic approach to postsecondary education" (p. 70).

In this section of the chapter, nine solutions and recommendations that can address the challenges many adult students face are suggested. While this chapter focuses specifically on community colleges, many of these are in place in other types of institutions or, if they are not, could be put in place to benefit adult students who attend those institutions. Likewise, while this chapter focuses on adult students, many of these solutions and recommendations would benefit traditional-aged students as well.

The suggested solutions and recommendations take into consideration the challenges that adult students face and provide examples of policies and practices that community colleges are using or that other researchers have recommended that they consider. The solutions and recommendations begin with recruitment and admissions and continue through graduation and job placement. First, orientation and advising are key, but these services must be available to students when and where they can access them. Second, as adult students consider furthering their education, many will look for degree programs that allow them to find employment in their local areas that pays a good wage or allows them to advance in their current jobs. Thus, the specific degree programs offered by the community colleges are vitally important. Third, as students begin to enroll in courses, considerations related to credit for prior work, course scheduling, and instructional methods are important. Fourth, as students finish programs and look to future endeavors, credentialing and articulation become increasingly important for colleges to consider. Finally, throughout the process, the support of family and the community college are essential for adult students.

Orientation and Advising

Orientation and advising services should be offered to adult students at times and locations that are convenient to them since numerous adult students have additional obligations, may be in a geographic location at some distance from the college campus, and may need services that are targeted at adult students and their feelings of being out of place. Adult learners value services that support students (Bragg & Ruud, 2012). Sutton (2016) states, "It is important to address the challenges of adult learners who have been out of college for several years with meaningful engagement through advising, the creation of cohorts, and mentoring" (p. 458). But, Erisman and Steele (2015) note,

Adult students may find it difficult to access student services if those services are only available on campus during regular business hours. Solutions to this problem include opening student services offices on a weekday evening or a weekend, providing as much information as possible online, creating adult-focused orientation sessions, student success class sections, short workshops on key topics, and centralizing services in an adult-focused office or student center. (p. 3)

Unfortunately, adult students may be less likely to meet with an academic advisor. Roessger, Eisentrout, and Hevel (2019) found in a study of community college students at one institution that students aged 18–22 were 25% likely to, aged 23-27 were 12.8% likely to, and aged 43-47 were only 4.6% likely to attend these sessions. This was more pronounced for women. Recommendations Roessger et al. (2019) make include for colleges to offer planning resources such as worksheets and mobile software applications to help student choose courses and build their class schedules; advising at times convenient for working students, such as at night, online, and on the phone; and orientation for new students with "online options and/or modular orientations" since many students "cannot logistically spend hours in one place as they balance their multiple roles" (p. 1069).

Adult students need a clear plan for their postsecondary education. In a qualitative study of 27 community college employees who worked with older adult learners involved in workforce training, Cummins (2015) found that effective strategies "include outreach programs for older students, providing advice for specific programs of study, support during the program to ensure completion, job placement services, and continuing education for skill upgrading" (p. 265). Rosenberg (2016) suggests that colleges provide students

with, at a minimum, a rough term-by-term plan of how a student progresses from initial enrollment through a designated transition point (preferably involving completion of an associate degree). Offering such guidelines is crucial, especially for part-time or online students. These pathways allow a student balancing multiple roles to plan for various life circumstances, work obligations, and/or family responsibilities. (p. 1069)

Degree Programs

Adults often look to community colleges to provide training needed for career advancement, and this may be related to financial struggles they face. In addition, many adult students are unable or unwilling to relocate from their current geographic location and require degree programs that lead to employment in the local area. According to Erisman and Steele (2015),

Career advancement is a primary motivation for many adults returning to college, making it crucial for institutions to ensure that degree programs aimed at adults with some college credit will provide them with the appropriate skills and credentials to achieve their goals. (p. 2)

Community colleges are a clear solution to meeting this need. Community colleges strive to provide a highly educated workforce ready to meet the needs of regional employers while also leading activities to provide social equity, thus closing "employability and wealth gaps" (Myran & Ivery, 2013, p. 45). They provide programs to students that meet their specific needs in the industry in which they work or hope to work (Nickoli, 2013). Adult learners value programs linked to employment demands of local economy (Alvarez, 2017). Sutton (2016) stated that as community colleges compete for adult learners and develop new programs to meet their needs, "Choice of programs will likely be predicated on opportunities in high-growth local and regional industries" (p. 458).

Allen and Zhang (2016) interviewed 18 adult students who had transferred from a community college to a university to pursue an engineering degree. They found that the participants were pursuing engineering degrees because they felt it held prestige and because they were curious about understanding how things work and interested in problem solving. They also found that the adult students value programs that are "hands-on." In addition, the authors noted that the students were selective in the opportunities and relationships they participated in, choosing those that would help them academically and professionally. The students accepted responsibility for their success, including making sure they were on track to transfer.

Community colleges also support entrepreneurship efforts, for example with business incubators (Nickoli, 2013). According to Mars and Ginter (2012), "community college entrepreneurship education is argued to be a market-oriented trend that has been largely overlooked as a curricular alternative to workforce development models" (p. 75).

Credit for Prior Work

Considering the time and financial constraints that adult students often face, as they begin degree programs, many will seek credit for prior classroom experiences as well as work experiences. Adults value credits based on competency demonstrated through exams and portfolios (Alvarez, 2017) as well as credit for life and work experience (Bragg & Ruud, 2012). Students see receiving credit for prior work as an important part of achieving their goals (Erisman & Steele, 2015).

Prior learning assessments (PLA) are one way to be able to offer students credit for their work. Klein-Collins and Wertheim (2013) define PLA as

the process by which an individual's learning is assessed and evaluated for purposes of granting college credit, certification, or advanced standing toward further education or training. That learning may have been acquired through on-the-job experiences, corporate training, military training or experience, volunteer work, or self-guided study. (p. 51)

Methods for PLA may include exams, portfolios, or reviews of training programs or courses, and interest in PLA is growing as there is a national push to increase degree completion rates. PLA can save the student money and time and encourage the student to keep going towards completing a degree (Klein-Collins & Wertheim, 2013). But, according to Erisman and Steele (2015), policies on PLA "vary from one campus to another, and implementing PLA at the institutional, state, or system level requires an investment of time and resources in building faculty engagement, developing effective PLA policies, and ensuring students are aware" of them (p. 4).

Hayward and Williams (2015) studied adult student graduation rates at four community colleges based on students' PLA status and methods. More adult PLA learners graduated (28.4%) than non-PLA learners (11.8%), and the benefits were particularly high for PLA learners who identified as Hispanic. There were also differences in the method for earning PLA and graduation, with varying graduation rates for adults who earned credit through College Level Examination Program (52.3%,), American Council on Education (24.0%), Portfolio (12.3%), and a Combination of methods (29.9%). Hayward and Williams (2015) suggest that colleges do more to identify and support these adults who have prior college-level learning and to make the PLA's more accessible to them.

Other programs that provide students with credit for prior experiences include competency-based education (CBE) and career pathways. According to Erisman and Steele (2015), CBE programs "are growing and are likely here to stay. These programs emphasize advancement based on skills mastery, self-pacing, and customized instruction and are well-suited to many returning adult students, but questions remain about the quality and cost" (p. 4). Likewise, another program designed to help students complete their programs of study are career pathways (Bragg & Krismer, 2016), which include "career-focused curriculum and instruction" (p. 64), "competency-based core curriculum" (p. 64), "stackable credentials" (p. 64), "intensive support services" (p. 65), "accelerated credit attainment, including credit for prior learning" (p. 65), and "contextualized developmental education" (p. 65).

Hullinger (2015) states that the college experience is changing and that institutions will likely close in the process. He predicts that colleges in the future will focus on the skills a person has rather than the amount of time that person spent in a classroom. Employers complain that college graduates do not have the skills they need, such as communication and problem-solving skills. They are looking for employees with the competencies to meet their needs rather than those who have simply completed a certain number of courses in college. Students at Southern New Hampshire University, for example, complete programs by proving they have mastered certain competencies instead of completed certain courses. These students are only admitted through their employers, with partnerships existing between the college and those employers to ensure the work is relative. Hullinger (2015) notes that other institutions are exploring using similar competency-based models.

Course Scheduling

Many adult students face challenges related to time and geographic location, making flexible course scheduling essential. As far back as 1975, Malcolm Knowles stated, "Since most adults are part-time learners, learning opportunities must be made available to them at times and places that are convenient to them and that provide easy entry and exit" (Knowles, 1975, p. 85). More recently, Erisman and Steele (2015) stated, "Flexible learning opportunities such as online courses, night and weekend courses, and accelerated or modular course formats where students can enroll, stop and re-enroll can help adults overcome the challenges of balancing college with work and other responsibilities" (p. 4). Options may include classes offered throughout the day as well as at night and on weekends (Alvarez, 2017; Bragg & Ruud, 2012); during shorter terms (Alvarez, 2017), such as 8-week courses; and online (Bragg & Ruud, 2012).

Community colleges provide flexible course scheduling, including training at times convenient for adult learners (Nickoli, 2013) and a majority attending part-time (NCES, 2019). And, an increasing number of colleges are offering courses online, with more students taking courses online. Older students may be more willing to consider online degrees. Rosenberg (2016) surveyed students in one community college system about their perceptions related to transfer. When students were asked about their willingness to consider completing a degree online, 65% of adult students said they would as compared to 40% of the traditional-aged students. And, the percentage of adult students who would consider an online degree increased as the students got older until the age group of 45-54, with 72% indicating they would consider completing a degree online. The outcomes of courses offered online or in other formats outside of the traditional weekday class may be questioned, but Underwood and Hernandez-Gantes (2017), in a single-institution study, found no difference in student outcomes including national certification score and grade point average (GPA) when comparing young, middle aged, and older adult opticianry students regardless of whether they took courses online, face-to-face, or in a hybrid format.

Instruction

Adult students may struggle with lower academic ability than younger students, and they may feel out of place in a classroom with younger students. Instructional techniques that are designed with the adult learner in mind are important for their success. Knowles (1975) states,

The core concepts of andragogical theory are that adults have a psychological need to be self-directing, that their richest resource for learning is the analysis of their own experience, that they become ready to learn as they experience the need to learn in order to confront developmental tasks, and that their orientation toward learning is one of concern for immediate application. (p. 87)

Similarly, Erisman and Steel (2015) note, "Adult learners strongly prefer active learning, self-directed learning, and classroom learning relevant to real-world settings" (p. 4).

Adult students' contact with the college is primarily through the classroom, and the classroom is the focal point for defining their experience there (Kasworm, 2003). Alvarez (2017) states that adult students value relationships with instructors, and Peterson (2016) found that student-parents benefitted from faculty who showed interest in them beyond the classroom, including interest in their career plans; made good use of classroom time; and provided clear expectations for the course. The community college is uniquely situated to meet the needs of adult students in the classroom. "Students and learning are the focus of community colleges; their number one priority is to be relevant to their students, both current and potential students" (Hicks & Jones, 2019, p. 34).

Purcell (2010) surveyed community college students about their perceptions regarding learning and grades. She found that adult students, as compared to traditional-aged students, had higher learning-orientations (i.e., focus on acquiring knowledge and personal enlightenment) and lower grade-orientations (i.e., focus on getting good grades) as the main reason for being in college. Most students, young and adult, indicated they enjoy classes that go beyond just learning facts but are related to issues outside the classroom, appreciate feedback from the instructor, attend class, and think it is unfair to be tested on material in reading assignments but not discussed in class. Adult students were more likely to take part in activities related to a learning-orientation such as staying after class to discuss materials with the instructor, attending out-of-class activities, and studying and reading more. And although most students indicated they would not be tempted to cheat, there was a difference between adult and younger students, with adult students being less tempted to cheat. Most adult students indicated that they found learning new material to be fun. Based on these findings, the author suggests these strategies to increase adult student learning: faculty can help students understand how course material relates to real life, provide feedback on assignments and tests, explain the importance of reading and understanding information, and help students learn how to learn.

Lengacher and Wiles (2014), community college developmental literacy instructors, note that, "Enhancing motivation in adult learners is often a difficult task in today's college classroom" (p. 1057). In order to move learners from passive recipients to active learners, they have developed and implemented a number of classroom techniques such as graphic organizers, clickers, and social networking. They have found that, "Instructional methods designed to cultivate active learning and critical thinking through more contextualized, hands-on teaching activities produced initial evidence of improved reading achievement" (p. 1057).

Griffin (2019), a community college faculty member in psychology, developed psychosocial techniques to enhance student learning and improve academic outcomes based on strategies used in a large system that includes seven community colleges along with other types of postsecondary institutions and a significant number of non-traditional students. She coined the model the Cultural Empowerment Teaching Andragogy. "Techniques used included cognitive empowerment, collaborative learning exercises, and testing of the student limits to guide mastery of material" (p. 1). Conventional strategies of the model include strategies such as positive affirmations, purposeful mentoring, and giving real life examples. Unconventional strategies include changing the physical arrangement of the classroom to create a community atmosphere, oral exams and discussion questions, having students work in groups and write on the board, using YouTube video segments, encouraging creativity (such as the development of a rap song), and using the Montessori Method whereby a student who has mastered the material is paired with a student who needs help. Griffin (2019) suggests that faculty should help students become independent thinkers in addition to mastering the material of the course; consider the needs of students with various learning styles; and reflect on his or her own personality style, ideologies, and academic experiences. Preliminary results from use of this method indicate that students have increased self-esteem, self-actualization, oral communication skills, class engagement, and grades.

Credentialing

Adult students often attend postsecondary programs with specific plans to enter or advance in a career field; these plans may be related to financial struggles they face. According to Alvarez (2017), adult learners value industry credentials that are part of the program and that are stackable. Similarly, Erisman and Steele (2015) state, "Academic programs that can be of particular value for returning adult students include targeted and accelerated degree-completion programs and career pathways programs that offer stackable and latticed credentials, including industry-recognized credentials" (p. 4).

Community colleges may provide adult learners with programs that allow for stackable credentials (D'Amico, 2017). According to Audant (2016), "Stackable credentials have become a best practice for community colleges across the United States as they struggle to advance the college completion agenda and ensure that students graduate with the skills needed to find gainful employment" (p. 299). These credentials allow students to enter and exit educational programs as they are able, while obtaining certificates and degrees that can help them advance in their careers.

Sutton (2016), in describing an accelerated mining technology program, notes that "students who earn a degree in this program have an industry-recognized credential that provides career-enhancing knowledge and a competitive edge when pursuing positions of increased responsibility" (p. 456). The courses are scheduled to accommodate the needs of students who currently work in the field of mining, generally working 12-hour shifts. Courses are offered online, face-to-face, and as hybrids of these two options. Courses are offered in a compressed schedule, and students only attend once per week. It takes students three years to complete the degree, but they earn a stackable credential each year. The program works closely with the mining industry so students know that the credentials they are earning will lead to employment opportunities.

Articulation

Adult students often face struggles related to academic ability and financial resources, and according to Cohen et al. (2014), many students who are not qualified to enter a university enroll at the community college, with many of them being minorities or low income. If those students decide to transfer to a university, articulation agreements to allow for the movement of their credits from the community college to the university are vital. According to Alvarez (2017), adult learners value community colleges that will work with universities to ensure that their community college courses count towards the university major, not only as electives.

Community college students may be enrolled in terminal applied associate degree programs and thus have courses that will not transfer (Bragg & Ruud, 2011). In a national study of applied baccalaureate degrees, Bragg and Ruud (2011) noted that the U.S. is looking "for innovative ways to increase college access and completion" (p. iv) and that the applied baccalaureate may be one way to meet that need by providing adults with education beyond the associate degree for those occupations requiring it. They noted, "Historically, applied associate degrees have been considered terminal degrees for those planning to enter the workforce; they have been considered a separate and distinct path that is incompatible with transfer" (p. v). This may leave adult students with courses that cannot transfer and degrees that do not meet their needs. The applied baccalaureate degree "is designed to incorporate applied associate course work and degrees once considered terminal or at a non-baccalaureate level into a transfer program leading to a baccalaureate degree" (Townsend, Bragg, & Ruud, 2009, p. 686). These degrees are offered in institutions whose highest degree awarded is usually the associate degree as well as in those whose most commonly awarded degree is the baccalaureate degree. Influences on the development of these degrees included workforce demands, desire to increase baccalaureate degree attainment, student demand, and institutional support (Townsend et al., 2009).

The number of applied baccalaureate programs is increasing, according to Bragg and Ruud (2011), based on their multicase study conducted in six states. State and institutional administrators who participated in their study agreed that working adults benefit from these programs. Models for offering these applied baccalaureate degrees vary and include a focus on advanced technical education (career pathway or ladder model), on general education requirements (inverse or upside-down model), on supervisory or managerial coursework (management model), or, most commonly, as a hybrid of these models, according to Bragg and Ruud (2011). And, programs are predominantly in fields related to science, engineering, technology, and math (STEM), public service, and business; and students are usually adult learners.

Support from Family

Since adult students often struggle with work, family, and financial obligations as well as academic challenges and feeling out of place at the postsecondary institution, the support of family is very important. Family can help provide the support that adult learners need to be successful. In a qualitative study of five female community college students, Cox and Ebbers (2010) found that students persist because of the support of family and friends as well as faculty and other adult students despite challenges from balancing multiple roles and responsibilities, emotional challenges, and a lack of diversity on campus (including age).

Peterson (2016) studied students who were parents of young children. Student-parents' responses led the author to develop themes of study strategies and parenting, including discussing with the children what she or he is learning at college and asking family members for help with the children as well as self-awareness, including keeping a positive mindset. Students also used strategies such as studying at work during slow time (with permission) and always having class materials available in case there was some time available.

Support from the College

With all of the struggles and challenges that adult students face, support from the community college is key to their success. In general, community college students have other priorities in their lives, including work and family, and colleges must connect with and engage them during the few hours they are on campus taking courses each week. According to Cohen et al. (2014), community college "student services now include recruitment and retention; counseling; orientation; student activities; student health; financial aid; academic support; career centers; transfer centers; and supplemental services such as transportation, child care and services tailored for specific populations of students" (p. 209).

Support from the college may be related to financial need. Erisman and Steele (2015) note, "Adult students need more sources of financial aid, particularly at the state level. Partnerships with workforce and public benefits agencies can help institutions develop more sources of financial support for their adult students" (p. 3). Peterson (2016), in a study of students who were parents of young children, found that student-parents needed support, including financial support such as from grants and scholarships, and noted that these students can benefit from clear but succinct information from the college about tasks such as registration and obtaining financial aid. He also noted the importance of affordable on-site child care. In addition, adult learners value open access books and materials (Alvarez, 2017). There is growing interest in open educational resources (OER). According to Blick and Marcus (2017), OER

are increasingly becoming more popular on college campuses. The astronomical increase in the cost of textbooks has provided strong motivation for an 'Open Access' revolution. Collaborative materials made available online across the curriculum have offered richly rewarding alternatives to the use of traditional materials. (p. 29)

Offering students access to inexpensive course material is valuable to them, especially to students who struggle with having financial resources.

Sorey and Duggan (2008) studied predictors of persistence at the community college between traditional and adult students at one community college and found differences between traditional and adult students. The key predictors for adult students were "social integration, institutional commitment, degree utility, encouragement and support, finances, an expressed intent to leave, and academic integration" (p. 75). Social integration was the strongest predictor for adults, and elements that contributed to this feeling of integration included friendships with other students, interactions with faculty outside of the classroom, and other interpersonal relationships. Academic integration was the weakest predictor for adults. Both traditional and adult students who were enrolled in occupational/technical programs were more likely to persist than were students who were enrolled in transfer programs. Encouragement and support from significant others were important for both groups of students. Sorey and Duggan (2008) encourage community college administrators to analyze data related to the different groups of students enrolled in their colleges, including adult students, to better understand the needs of these students and to develop programs and services to support these students where most needed. They also note the important role of faculty and encourage them to build relationships with adult students and to encourage the students to build relationships with other students as well as to use diverse teaching strategies and to hold high expectations for students.

Wax and Wertheim (2015) suggest that adult students may benefit from working with a coach who can help him or her with a variety of issues including time management, linking school work to tasks performed in his or her daily life, recommendations for counseling services, adding to the student's support system, and helping the student see the advantages of maturity and experience. They note that in coaching, in contrast to seeing an advisor, that the "student is much more self-reliant, with the coach acting as a guide along the way. The coach will often ask questions of the client in order to help the client think through a situation, rather than offering specific advice" (p. 41). They describe the relationship as a partnership. Community colleges may be able to provide students the chance to work with a coach.

Palazesi and Bower (2006) used a qualitative grounded theory approach to study the value importance of 17 baby boomers attending two community colleges. They found that most of these older students were primarily using the community college to reinvent their self-view; many participants were seeking to adjust their self-identify. The authors found that reinvention was a central theme in the study, and they developed a self-identity modification model. The model "is a simple self-change model that describes how participants reinvent how they see themselves (their self-identity), utilizing the community college as the modifying agent" (p. 51). The change does not have to be profound or permanent, and process can occur again and again. The process can be used for simply tweaking or for creating a new master status of self-identity and can be a continuing process. The students placed cognitive value of the community college based on utility for careers or other interests, cost, quality of faculty and facilities, ease of access and exit from programs, and the buyer/seller exchange between the student and the community college as more of a short-term relationship. The students placed affective value of the community college based on connection with the community college experience, social risk, quality of the experience and relationship with the college, ease of access back into the college, and the buyer/seller exchange between the student and the community college as more of a long-term relationship. In the end, the students evaluated the usefulness of the college to help them achieve a new self-view using the cognitive and affective factors and based decisions to return to the college on the value they assigned. Palazesi and Bower (2006) conclude

Participants who perceived a high degree of modification and described the value more affectively expressed the highest intent to return. They recognized and placed importance on how well the community college made them feel about themselves. Equally important were relational exchanges with community colleges, that is, relationships built on trust, loyalty, and commitment to the institution. (p. 63)

Since many students are not college-ready, McNair et al. (2016) argue that colleges must be student-ready. McNair (2018) states,

The term "student ready" comes from a belief that if significant progress is to be made in the student success agenda, there must be a paradigm shift in how educators design and lead student success efforts. Instead of focusing solely on students being college ready and on students' perceived deficits, educators must focus on what they can do to create educational environments that meet students where they are and eliminate barriers that hinder their success. (p. 20)

McNair et al. (2016) offer that postsecondary institutions should share the responsibility of helping students succeed and should become student-ready colleges as opposed to only accepting college-ready students; they state that institutions do not support students sufficiently and should alter practices and culture to be able to meet the needs of current students. McNair (2018) provides suggestions for colleges looking to become student ready as opposed to focusing on seeking students who are college ready. She notes that each person who works at the college has the capacity to be an effective educator, including not just the faculty but also those in support roles such as custodial services. She also notes the importance of showing empathy to students, especially those who might feel isolated or excluded, and to show care for the students.

Jacobs and Hundley (2010) suggest that colleges engage in a 4-step process to analyze and improve the environment at their colleges for adult learners: prepare, research, plan, and implement. Prepare by determining the needs of adult learners, establishing goals, clarifying the context, securing sponsorship, and forming a task force or committee. Research by ensuring understanding of the issues, inventorying practices currently in place, collecting additional data, and analyzing findings. Plan by conducting a situational analysis, identifying and prioritizing actions, outlining performance indicators, developing an implementation plan, communicating with stakeholders, and providing training and other resources. Finally, implement by pilot testing the intervention, implementing it, evaluating it, and disseminating lessons learned.

FUTURE RESEARCH DIRECTION

A future research direction might include further study related to the solutions and recommendations offered above. As the use of various forms of technology increases and advances in technology offer more options for interacting from different geographic locations, research should be designed to determine how college functions such as orientation and advising might be revised as well as ways to improve the delivery of online classes. In addition, research related to the best methods to offer credit for prior experiences, stackable credentials, and articulation is warranted. Finally, research related to ways of determining the needs of local employers and the training required for future employees is needed.

CONCLUSION

Adult learners often struggle to complete postsecondary education due to work and family responsibilities, limited income, geographic location, academic ability, and feeling out of place. Community colleges are uniquely situated to provide the support they may need from the time of recruitment until a job is secured. Effective and accessible orientation and advising, credit for prior experiences, convenient course scheduling, appropriate instructional methods, attention to credentialing and articulation, and both college and family support are vital to adult student success. In addition, community colleges, through their career and technical programs as well as their workforce development programs, provide students with access to high-quality training for employment in local companies. This employment can give students the financial resources often needed to change the lives of their families and communities for the better.

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KEY TERMS AND DEFINITIONS

Academic Ability: The capacity of the student to successfully complete required coursework.

Community College: Colleges that typically offer the associate degree as the highest degree but also offer certificates and other credentials.

Family Responsibilities: Responsibilities that many adult students have related to a spouse, children, parents, and/or other family members.

Financial Struggles: Struggles that many adult students face related to supporting themselves and their families financially; often the reason they are pursuing postsecondary education.

Geographic Location: The place where the student lives, often with his or her family; often the student is unwilling or unable to leave this location.

Sense of Belonging: The feeling of fitting in with other students in the college as well as not feeling out of place there based on societal expectations or expectation of college personnel.

Work Responsibilities: Responsibilities that many adult students have related to traveling to work and performing their duties there; often necessary for financial sustainability of the family.

APPENDIX

APPLICATION ACTIVITIES

Discussion Question 1: You are a community college administrator and you have been asked to speak to a group of adult students who are enrolled at your community college. Outline a presentation that you might give to these students that discusses the ways your college can help them meet the challenges they face as adult students.

Discussion Question 2: There are several adult students enrolled at the community college at which you work who are having difficulty attending the required new-student orientation session. Discuss how you will address the students' problems with attending an orientation session to ensure they have the information they need.

Discussion Question 3: You are the director of workforce development at your community college. Develop a policy for how your college will respond to students who request credit for prior work experience.

Discussion Question 4: Several faculty members at the community college where you serve as academic dean have approached you about issues they are having with adult students who are enrolled in their classes. Draft a memo to send to faculty about best practices for working with adult students.

Discussion Question 5: The community college where you work as a coordinator for adult services is hosting a luncheon for families of adult students who are enrolled on your campus. Design a brochure to give out to families who attend the luncheon offering tips for ways they can support their family members who are students.

Chapter 7
Afrocentric Thought in Adult Education

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ABSTRACT

The failure of the American education system to teach African American students has been well chronicled. This chapter draws attention to the history of Eurocentric pedagogy and its ineffectiveness to educate African American students. The principles of Afrocentricity are presented as a plausible way to counter ineffective, hegemonic, and ethnocentric curriculum planning for all students, with particular emphasis on students of color. Differentiated instruction offers adult educators a way to vary instruction and integrate an Afrocentric paradigm and content into student-centered curricula. This chapter concludes with two Afrocentric application activities.

INTRODUCTION

The social, educational, economic, and health status for African Americans have been historically poor. The explanations for the poor outcomes are varied. However, structural and institutional inequality, discrimination and racism remain constant explanatory variables. In 1968 the National Advisory Commission on Civil Disorders, referred to as the Kerner Commission Report of 1968 offered this summary race of relations in America:

Our nation is moving toward two societies, one black, one white-separate and unequal. Reaction to last summer's disorders has quickened the movement and deepened the division. Discrimination and segregation have long permeated much of American life; they now threaten the future of every American. This deepening racial division is not inevitable. The movement apart can be reversed. Choice is still possible. Our principal task is to define that choice and to press for a national resolution. To pursue our present course will involve the continuing polarization of the American community and, ultimately, the destruction of basic democratic values. The alternative is not blind repression or capitulation to lawlessness.

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The Kerner Commission's presented a well-defined and cautiously optimistic summary. All Americans must recognize racial relations throughout the nation must change. Moreover, the nation must alter its perception of a binary nation; one black and one white; separate and unequal. Critical Race Theorists posited that to create meaningful change in education and legal structures educators and judicial representatives must move beyond the black-white binary perception and multicultural education methodologies (Crenshaw, 1988; Ladson-Billings & Tate, 1995; West, 1999). To ignore or reject this urgent message is to continue in the trajectory of national destruction vis-à-vis the issues of race and racism in America.

In America race has become, metaphorically and politically, the elephant (or donkey) in the room. Most Americans readily respond to matters of race with muted observation or spurious rationalizations. Polarized by partisan politics, the aggrieved are acutely aware of the aggressive attempts to mute or muffle necessary local and national race-related discussions by the dominant classes (DiAngelo, 2018; West, 1993). These polarized divisions are predictably contentious and conflicted; further complicated by futile attempts to conflate important factors. However, no matter how it's reported, race remains America's cultural accelerant that threats to incinerate the nation.

Now, slightly more than 50 years later, as the United States steams forward, accelerating with hypersonic speed into the first quarter of the twenty-first century, it appears our nation remains weighted by the friction of race. The status of African Americans has improved in some areas and remain stagnate or have worsened in others. According to the Economic Policy Review (2018), African Americans still have worse outcomes than their white counterparts in health, home ownership, household income, family wealth, infant mortality and incarceration. Nevertheless, African Americans are graduating from high school and attending college at significantly higher rates.

However, African American students remain less likely to attend and graduate from college compared to their white cohorts. In 1968 college graduation rates improved for African Americans 25-29 years; from 9.1 percent to 22.8 percent. Comparatively, college graduation rates increased from 16.2 percent to 42.1 percent for White students, 25-29 years (Economic Policy Review, 2018).

Clearly over a fifty year interval the educational outcomes for African American students have improved. Confounding to demographers however, were the extant and persistent negative correlations among education and employment, health, home ownership and household income for African Americans. To better understand and interpret these outcomes African and African American scholars began to critique the content and challenge the utility of employing European designed education systems. This epistemological inquiry, led by Carter G, Woodson, was instrumental to the birth of an Afrocentric paradigm.

Woodson (1990) believed African Americans were inculcated and indoctrinated to accept a Eurocentric version of U.S. history. This version of history venerated the contributions of white Americans while denigrating the accomplishments of Africans and African Americans. Moreover, Woodson argues that authors of American education must restate the history of slavery, oppression and exclusion of Africans and African Americans contributions in world and U.S. history. Theoharis (2018) asserts, "we need fuller histories – uncomfortable, sobering histories – that hold a mirror to the nation's past and offer far-reaching lessons for seeing the injustices of our current movement and the task of justice today" (p. xvii). The inclusion of the untold extraordinary achievements *by* African and African Americans, presented through an Afrocentric paradigm, corrects the skewed perception *of* Africans and African Americans for all people.

Uncomfortable Sobering Histories

The Afrocentric paradigm emerged due to the efforts of African and African American diasporic scholars who sought a prospective for grasping and interpreting the African experience in world histories. Pioneered by WEB DuBois, Carter G. Woodson, Cheikh Diop, and Molefi Asante Afrocentricity reflect a worldview distinct from and opposed to Eurocentric philosophies. Moreover, it is an acknowledgment that African people had been systematically omitted from all literatures or presented in a distorted and denigrated manner as to demean an entire people (Akbar, 1984; Asante 1998). Freire (1972) affirms a hegemonic education system can only exist when the voices of other histories are withheld or presented inaccurately.

Race remains a deadly, destructive and divisive force in America. Inexplicably, Americans ardently resist race-related discussions. West (1999) asserts that white Americans avoid discussions about race because the debates raise important underlying questions about what it means to be an American. The idea of being an American obligates one to recognize that whiteness and Christianity, democratic composites, are inextricably linked. Whiteness is an integral construct and guiding principle in the construction of American democracy and Christianity (Cone, 2004; West, 1993). West (1999) maintains the difficulty of defending America as a democratic nation is to acknowledge that the historic construct of whiteness must include the subordination of Black people and the near genocide of American Indians.

It has been suggested that America's desire to silence race-related discussions is based on white fragility – the avoidance or refusal by white people to engage in discomforting and complicated discussions about race and racism (DiAngelo, 2018). This assumption is based on the misconception that the United States has become a post-racial society (Theoharis, 2018). Obviously, the United States is not presently a post-racial society. A partial explanation of the white fragility is found in the race exhaustion discourse (Hutchison, 2009). Race exhaustion is the perception that America has become a color-blind society. Proponents of this view believe constructing tougher civil rights legislation is pointless and current inequalities are associated with non-racial exogenous factors.

Much of the disparity and inequities experienced by African Americans and other people of color was legislated by the United States judicial system; enforced by an emboldened law enforcement department and tacitly or overtly supported by a majority of white Christian citizenry (Fletcher, 2017). Real discussions within judicial, correction, and religious communities that promote dialogue concentrated on change seldom happen. Hence, the extant legal, economic, education, and religious social structures that subordinate black people remain in operation.

To engage in critical dialogue on race would require white Americans to courageously and attentively listen to the narratives of Black Americans. Dialogue as a democratic process represents a cooperative and collaborative interaction between and among people (Darder, 2002). Freire (1972) believed that through dialogical relationships students could confront their individual and collective differences. According to Freire (1972), these repeated confrontations emancipate students, transforming their oppressed consciousness from self-perceptions of being marginalized, pathological members of society to views of self as full membership with access to all rights of citizenship.

Emancipated students learn to examine one-sided, narrow historical perceptions of their people group. Students become confident to voice their opinions of extant world histories. Because these confrontations do not happen in isolation, both students and teachers learn to navigate conflict and opposition in classroom communities which prepare them for life and liberation in the real world (Shor & Freire, 1985). This expressed liberation can create opposition by members of hegemonic groups who ostensibly resist change.

One recent example of ostensible resistance was realized with the Black Lives Matter (BLM) Movement. Collaborative dialogue is purposed to bring people together to focus and share similarities, differences and points of conflict (Darder 2002). During this collaborative engagement clarity and understanding is the essential goal of the dialogue. This goal was not achieved during the ensuing and combative dialogue between black and white Americans.

From the onset White Americans attempted to redefine Black Lives Matter by refusing to alter its ideological position on democracy and patriotism. Black Lives Matter, founded by Patrisse Cullors, Alicia Garza, and Opal Tomeli, was initially created to express black love (Taylor, 2016). In an effort to bring national attention to the brutal treatment of African Americans; Colin Kaepernick, former quarterback of the San Francisco 49ers, refused to stand for the playing of the National Anthem. His silent gesture of kneeling during the anthem was designed to help Americans engage in national discussions devoted to honest evaluation of race relations. Instead, this gesture was recast and redefined as un-American, inappropriate and unpatriotic (Rickford, 2015). Regardless of your location on the ideological continuum, Kaepernick's protest, designed to move America into that dialogue, revealed that America is still divided on the issue of race.

The Black Lives Matter Movement, like the Civil Rights Movement, forced Americans to face the uncomfortable sobering histories of African Americans in American history. Sixty four years ago, on August 28, 1955 Emmett Till, 14 years, was murdered in Money, MS by Roy Bryant and J. W. Milam, who, protected by double jeopardy laws, both admitted to the murder and were paid $4000 for describing the story for Look Magazine. Many believe it was Till's death and the pictures of his mutilated body that acted as a catalyst for the commencement of the Civil Rights Movement. More likely though, it is a nation of angered African Americans who were tired of being victimized; in the view and by the hands of White Americans.

Recently, media outlets flooded America with pictures of mutilated, dead black bodies into the homes of America. Once again, our nation was confronted with the legacy of racism and white supremacy. The death of Trayvon Martin, 17 years and the acquittal of George Zimmerman, who fatally shot him in 2012, was all too familiar to African Americans. Many believe it was the death of Michael Brown, an 18 year old African American who was fatally shot in 2014 by a white Ferguson, Missouri police officer that marked a movement. There is a long historic narrative of public executions at the hands of white men that has contaminated the consciousness of America (see Table 1.) Black Lives Matter framed an easily articulated social narrative regarding America's racial history; three words, simple and yet, profound (Bailey & Leonard, 2015). That this simple message was perceived as pernicious and hostile by white Americans underscores the necessity for infusing an Afrocentric model in the American education system.

Eurocentric Pedagogy: Democracy and Christianity

The inability, resistance, or failure of the American education system to teach Black students has been well chronicled. Molefi Asante (1998) asserted that teaching Black children was never the primary goal of America's education system. Educating African American children was perceived as unnecessary. The interest of the dominant classes was to design an education structure that would systematically reproduce their ideology (Asante, 1991; Freire, 1985; Grollios, 2009).

Table 1. Historic Examples of public police brutality and lawlessness by white men

• *1902 – Henry Wilson -* Convicted of murder in a trial that lasted 2 hours 40 minutes. Despite a law prohibiting public execution, Wilson received a public hanging.
• *1931 – Scottsboro Boys -* 9 African American males charged with raping two white women in Alabama. An all-white; all male jury sentenced all to death.
• *1963 – Johnny Robinson -* While protesting the 16th Street Baptist Church bombing in Birmingham, AL., was fatally shot by a white officer, Jack Parker.
• *1991 – Rodney King*- Videoed receiving an inhumane beating by LA police officers. The officers were acquitted of all charges.
• *2016 – Alton Sterling* -Killed by 2 officers at close range in Baton Rouge, LA.
• *2016 – Philando Castile* -Fatally shot in front of his girlfriend and 4 year old daughter by a white officer during a routine traffic stop.

The pedagogy of the nineteenth-century American education system was intended to inculcate democratic virtues, values, and morality for future U.S. citizens (Tyack, 2003). The design and operation of public school education was informed by racism, classism, religious bigotry, and ethnocentrism (Asante, 1998; Tyack, 2003). The history of Blacks, Native Americans, Hispanics, and immigrants from southeastern Europe were excluded from textbooks, curriculum design, and forbidden in classrooms. The lived experiences and the interpretations of American history by African Americans and other people of color were intentionally omitted, invalidated or minimized in historic and education literature (Asante, 1998; 2003; Cone, 1997; West 1993).

This inculcation began with the passage of The Old Deluder Satan Law of 1647 (Hazlett, 2011). The Old Deluder Satan Law was passed to ensure that White children could read a Christian bible. By 1930, compulsory public education was established in all states in the Union. The purpose of education was to prepare students to become good citizens; guided by Christian values. White children were educated to assume, as adults, various roles in a democratic society (Emerson & Smith, 2000). Consequently, most White children learned the systems of subordination of Black people (Asante, 1991). This approach to establishing a democratic society was intentional, believed to be sanctioned by God, and was supported by the U.S. Constitution.

Christianity cemented the racial caste in U.S. democracy. The United States used democracy as a framework for the construction of hegemonic education, economic, religious, and political institutions. Catholic and Protestant leaders alike were concerned about the hermeneutic interpretation of the scriptures regarding slavery. Due to the enormous economic value in maintaining a system of slavery, both Catholic and Protestant institutions invented nomenclature and principles justifying the protraction of slavery. These religious institutions assembled communities to teach rules and rituals that normalized the practice of slavery (Emerson & Smith, 2000).

To offer some insight to the normalization of racism in America Wang (2006) draws on the analogy between computer software programs and discrimination. Just as Times New Roman font was once the default setting for most computer word processing programs Wang states, “And, as often happens when most of us accept the default setting on a computer, discrimination *by* default creates a situation in which racial discrimination becomes the default; the expected, the accepted, the standard” (p. 8). This reflexive, automatic, unquestioned, and normative reception of racial discrimination as default causes a vast number of white Americans not to see systematic and institutional racism.

Moreover, if the default setting in America is primed on discrimination then white superiority is also the default in America. The dominant group or white America concurrently establishes one cultural standard and appropriates corresponding attitudes, values, and behaviors that reinforce that standard. Once established the cultural standard of whiteness is socialized through various education structures. White superiority becomes the norm or default; hence there is no need to discuss the status quo or reasons to change (Cone, 2004).

The normalization of slavery did pose some salient questions to government and religious institutions regarding the legal and spiritual status of African Americans (Hutchison, 2009; Hollenbach, 2003). Major constitutional legislation established legal parameters on black people's freedoms. The *Scott v. Sanford 60, U.S. 393 (1857)* Supreme Court decision ruled that Dred Scott, a black man, was not entitled to his freedom under constitutional law. Moreover, the majority opinion rendered by Justice Roger Taney held that African Americans could never experience democracy as American citizens. Moreover, because slaves were property under the Fifth Amendment, any law that deprived a slave owner of that property was unconstitutional (Anderson, 2016).

The emancipation of Blacks did not alter America's ideological positon on race. After the Civil War, America continued in hotly debated deliberations vis-à-vis the meaning of freedom for blacks. The 13^{th} Amendment (ratified in 1866) constitutionally prohibited slavery. However, the idea of blacks freely and equally participating with whites in *life, liberty, and the pursuit of happiness* was unthinkable for white Americans (Hutchison, 2009).

In *Plessy v. Ferguson 163 U.S 537 (1896)* the Louisiana Supreme Court ruling sanctioned and instituted the constitutional position of racial discrimination regarding the utilization of public facilities and services with the "separate but equal doctrine." This separate but equal doctrine was reversed with the ratification of *Brown v. Board of Education Topeka 347 U. S. 483 (1954)*. The US Supreme Court unanimously ruled that racially segregated schools were in violation of the Fourteenth Amendment and had no place in public education. Despite the Constitutional amendments Black people understood they wouldn't be afforded legal protection of the law and they would remain unwelcomed in White America (West, 1999).

The *Brown* Supreme Court decision (1954) determined that separate educational facilities are inherently unequal. The strength of the *Brown* decision was tested with the attempted integration of Central High School, Little Rock, AK in 1957. Nine African American students (who were referred to as the Little Rock Nine) were forbade entrance of the all-White education institution. President Dwight D. Eisenhower ordered federal troops to escort the children into the school. The White citizenry of Little Rock, Arkansas; like most of America, was forced by judicial intervention into involuntary compliance. Once again the equitable applications of American democracy escaped African Americans (Emerson & Smith, 2000).

In April 1983 The National Commission on Excellence in Education reported our educational systems were failing *all students* due to "a rising tide of mediocrity that threatens our very future as a nation and a people" (p.3). Both the No Child Left Behind Act of 2002 and the Every Student Succeeds Act of 2015 were designed to close the achievement gaps between white students and students of color. However, even with innovative educational policies the narrative remains the same; educational disparities and inequities persist for students of color.

When applied, African Centered pedagogy connects the heritage and historic practices of African Americans with other histories (Durden, 2007). Afrocentric narratives move historical events beyond the degradation, exploitation, and humiliation found in traditional American histories (Murrell, 2002, p. 9-10). This becomes important because most students taught in the American education system are presented historic events from a European-American worldview. The assumptions of Afrocentric thought are antithetical to Eurocentric thought (see Table 2).

Asante (1991) presents one example, citing, "for instance, most classroom discussions of the European slave trade concentrate on the activities of Whites rather than on the resistance efforts of Africans (p. 171)." The challenge for educators is to acquire an Afrocentric paradigm that centralizes black interests, education, methods of knowing and believing, and moves African Americans from the margins to the mainstream of curricula planning (Mazama, 2001).

Prior to the mid-twentieth century curriculum design and implementation of lesson plans for children and adult educators were very similar (Holmes & Abington-Cooper, 2000). The major drawback of using pedagogic methods and materials to teach adults in the twenty-first century is what Alfred North Whitehead referred to as material relevance (Knowles, 1980).

Education is the transmittal process of information and experiences. Information remained relevant because the time span of cultural change was greater the life span of the student.

Today, because the composites of culture changes rapidly, news and information are not yesterday's news stories. Issues and information are present in the here and now. Students, primarily through technology, are presented more pressing existential and epistemological questions. However, their personal and private introspection, particularly in the areas of race, gender and sexual orientation; is a search for the right answers; never to confront head-on the status quo of America Freire (1972).

The student's search to find the right answer is a product of the banking concept of education (Darder, 2002; Freire, 1972; 1985). The banking concept of education finds the teacher as depositor and students depositories. In this education model students are reduced to passive receptacles, which receive, retain, and regurgitate information deposited by the teacher. This form of education is oppressive; reproducing in students the repressive ideology of democracy and Christianity to justify racism (Darder, 2002). Classrooms and therefore teachers must become liberators; sites of contestation, conflict, and struggle.

Classrooms: Sites of Conflict and Struggle

Freire (2009) maintains classrooms must become a space where students are offered hope and experience the values of freedom and equality. Education should reflect the contemporary struggles in society; grounded in belief that people can freely discuss the difficulties of the day (Freire, 1972). Freire adamantly affirms that any curricula that represents, reinforces or expresses the hegemony of dominant social classes must be rejected.

For Freire and other educators like him; there is a clear recognition that democracy is not a gift or entitlement (Darder, 2002). Change will only occur through the dedicated and disciplined experiences of struggle among students and teachers within the praxis of liberation. Democracy must become a way of

Table 2. Four Afrocentric assumptions – Jerome Schiele (1994, 1997)

1. Individual identity is conceived as a collective and spiritual identity. Individual differences are less important; commonalities among people are the focal points.
2. The spiritual aspects of humans are just as valid as the physical, quantifiable component.
3. Conception of humans placing emphasis on harmony and collectivity.
4. Affective acquisition of knowing is valid.

life that celebrates liberty, provides hope, and advocates for justice. Democracy is transformed from its original purpose of oppression, restriction or control of some people into an idea that inspires students to individual and collective action. This action can help people redress inaccurate histories and confront the encompassing press of culture (Darder, 2002; Freire, 1972)

The central focus of the educator is concentrated on how to adapt the environment to foster learning. Equally important is the educator's recognition that their personal paradigm must become concentric with the paradigm of the learner (Fonagy & Allison, 2011). Educators who are committed to students become student-centered teachers. Student-centered teachers discover ways to integrate the interests of their students into the curriculum. Academic disciplines are not, nor should they be, isolated from social life. The ability or inability of the teacher to integrate relevant issues into the curriculum reflects the competence or resistance of the teacher to change their paradigm (Darder, 2002; Freire, 1970).

LITERATURE REVIEW / THEORETICAL FRAMEWORK/ PARADIGMS/BACKGROUND

The importance of centrality and Afrocentricity are reflected in the recent box office hits, Hidden Figures and Black Panther. Hidden Figures (released in 2016) and Black Panther (released in 2018) challenged the extant paradigms of race, gender and social class. In each film the central characters were Black protagonist in uncommon, unconventional statuses. The roles presented Black people with human agency; mathematicians, engineers, and rulers of a kingdom with advanced technologies. The themes of each film moved beyond black pain, poverty, and suffering. Additionally, the narration of the films was told from a Black perspective. The section of the chapter will concentrate on the concepts of centrality and student-centeredness and how these concepts can help educators integrate Afrocentricity in their curriculum design for adult learners.

Centrality and Student-Centered Instruction

The ideology of centrality; that is the extent to which the subject or construct is and remains the focus has found its way in education, psychology, and business literature. Terms such as "student-centered, client centered, or customer centered is now part of the lexicon of those disciplines. Centricity in education refers to the process of locating the student as center or "hub" of curriculum planning (Asante, 1991). Student-centered instruction is an educational approach where the designs of the curricula, content selection and activities are all specifically designed to facilitate the requisites, interests, and capabilities of the student (Brown, 2008).

A centrist or student-centered paradigm can be used with any student and incorporate any culture. Asante (1998, 2003) articulates it is possible for anyone to master the discipline of seeking the centrality of Africans in a given phenomenon. Effective educators of African American students possess an elevated sense of efficacy and for their students. These educators enter teaching-learning environments empowered with the belief that all students can learn and they can teach and engage all students (Toldson & Lewis, 2012). The empowerment of students increases the probability of academic success.

Afrocentricity is not an anti-white ideology. The ideological foundation of Afrocentrism is pro-human (Asante, 1991). The objective of Afrocentric thought is not to divide American classrooms or the nation. Paradoxically, it is the privation of Afrocentric thought in American antiquity and contemporary history that has contributed to the chasm in our collective conceptions and sensibilities of African and African Americans (Asante, 2003). As the racial divide deepens, there is, for various reasons, growing outrage on both sides of the racial chasm.

This outrage, articulated in barbershops and barrooms, on CNN and Fox News, and in the halls of Congress, fills our atmosphere with agitated and generally opposed opinions. Race so permeates our society, that when questioned whether coping with AIDS was the heaviest burden he had to carry Arthur Ashe, professional tennis player and the first African American male to win singles titles in The Championships, Wimbledon, the US Open, and the Australian Open responded, “You’re not going to believe this,…but being black is the greatest burden I’ve had to bear” (Ashe & Ramperstad, 1993, p. 126). Arthur Ashe was articulating an Afrocentric perspective to understand his position as Black man in America.

Afrocentricity

Asante (1998) defines Afrocentricity as a worldview in which the centrality of African interests, values, and perspectives predominate. Early work with Afrocentric thought focused on the development of a philosophical framework for an African paradigm (Akbar, 1988; Asante, 1991; Woodson, 1990). It is an ideological paradigm that places Africa at the center of any analysis of African American phenomena (p.2). Moreover, Afrocentricity attempts to appropriately legitimate the centrality of the African and African American person.

Afrocentricity offers a reference where the observer can view or review historic events and experiences from the perspective of the African person. The Afrocentric worldview (see Table 3.) is distinct from and incongruent with western worldviews (Asante, 1988)

Afrocentricity is not a Black version of Eurocentric history of notions of White supremacy. The goal of Afrocentricity is to transform the ideological malaise (general feeling of physical discomfort) and nihilism (the sense of hopelessness, insignificance, and despair) experienced by African and African Americans when discussing issues of race, nationalism, and racism. Afrocentricity empowers and encourages African American individuals, groups, and communities to move toward action and liberation. Asante (1998) asserts the establishment of human agency is the key concept to the acquisition of freedom. It provides a bilateral shuttle to negotiate the persistence of white privilege and white supremacy. Without this philosophical conduit there is no real understanding of African agency.

Table 3. Afrocentric and western worldview comparisons (Ginwright, 2004)

Opposing Paradigms
Afrocentric Worldview Western Worldview
Self-knowledge – basis of all knowledge External-knowledge – basis of all knowledge
Both/And mode of reasoning Either/Or mode of reasoning
Spirituality – goal achievement Technology – goal achievement
Faith, belief is primary Control is primary
Choosing, acting, creating is power Money, persuasion, politics is power
Happiness, peace define purpose Owning, possessing define purpose
Loves change and growth Fears change

It is extremely important to African Americans that they are heard and believed. Historical narratives must accurately reflect their lived experiences; past and present, and report the racial, economic, social, and judicial injustices that are regularly consigned to these groups. Moreover, the stories of African Americans regarding their personal experiences with acute and chronic racism must be heard, validated, and most importantly believed by white people (Oluo, 2018). Without hearing the narratives of Black people and without confronting white supremacy truthfully; repairing the damage created in our shared history may be impossible. Until Black people and other people of color engage White Americans in honest dialogue about race they will never truly experience the equality, equity and justice of the U.S. legal system and guaranteed by the U.S. Constitution (West, 1999).

Americans are entrenched in heated conversations, guided by ideologies that generally never find common ground. From the White House to football arenas across the nation; Americans, positioned on either side of the racial abyss, present both cogent *and* unconvincing arguments to solving the conundrum of race in America. Lost in the explosive noise of racial rantings is the necessity of our nation's chosen to champion for our common good and to identify our interracial interdependence (West, 1993).

Andragogy

Much of the development of adult education and the concept of andragogy occurred initially in Germany. Although our practical understanding of andragogy in America is credited to Malcolm Knowles most researchers point to the published work of Alexander Kapp (1833) as the first to employ the term andragogy (Cooper & Henschke, 2001; Loeng, 2013). After WWI, Eugen Rosenstock-Hussey (1926) heightened our understanding of working with adults by suggesting that adult education curricula include the realities of adult learners within adult education ecologies. Rosenstock-Hussey emphasized that authentic adult education needed new methodologies that "moved beyond "student memorization, the transmission of information and teacher-centeredness (Loeng, 2013, p. 243)."

Eduard Lindeman and Malcolm Knowles were instrumental in bringing the ideas of adult education and the concept of andragogy to America. Although Lindeman, who was influenced by the work of Rosenstock-Hussey, is referred to as the *spiritual father of andragogy* (Davenport, 1987), Knowles is credited as the predominant figure in the promulgation of adult education (Loeng, 2013). Conventional pedagogy – the art and science of teaching children, was an inappropriate approach to teaching adult learners. Instead, Knowles promoted andragogy – the art and science of teaching adult learners, to accommodate the differences in learning styles and motivations (Knowles, 1980).

Knowles (1984) believed two important characteristics about the adult learner. First, adults approach learning differently than children. Second, if the assumption that adults approach to learning is different than children is true, then the ecological frameworks for teaching adults must accommodate those differences. Beyond moderating effects of race and social class, Knowles (1980) asserts adult learners differ from child and adolescent learners in five particular principled areas: (1) self-concept, (3) the role of experience, (4) student's readiness to learn, (5) the student's orientation to learning, and (6) student motivation. A brief comparison of pedagogical and andragogical approaches to learning is contained in Table 4.

The Integration of Afrocentricity and Andragogy

The literature is scant regarding the integration of Afrocentricity and andragogy. Much of what is understood about the application of Afrocentric principles comes from review of pedagogy and observational research conducted in public school settings. What distinguish andragogic from pedagogic approaches are the assumptions regarding the adult learner. The adult educator must conduct a thorough assessment of the student's level of knowledge regarding the content. Once the base of knowledge is determined, then the adult educator can begin to challenge the student to perceive the content from an Afrocentric paradigm. This will require the instructor to be familiar with both content and contributions of African and African Americans to the field of study.

Given the shortage of African American teachers within the U.S. education system, the question of who will teach an Afrocentric curriculum is as important as what is going to be taught. There are many proponents of an Afrocentric approach who fundamentally believe the instructors *must be* African or African American (Durden, 2007; Murrell, 2002; Toldson & Lewis, 2012). Both Asante (1998, 2003) and Freire (1970) affirm that competent teachers of any racial background, who are committed to creating classrooms that confront oppressive ideologies and collaboratively struggle with their students to obtain liberation and consciousness awakening will experience little difficulty with Afrocentrism. Competent and compassionate teachers recognize the diversity in their students and the need to differentiate instruction (Tomlinson 2014).

Table 4. Approaches to learning – assumptions of pedagogy and andragogy

Concept of the Student
Pedagogy - Student is dependent on the teacher. Teacher has complete responsibility for constructing the learning experience.
Andragogy – Student is self-directed. Role of the facilitator of learning (teacher); to encourage, to nurture process. Responsibility of learning is shared among the facilitator and the students.
Role of Learner's Experience
Pedagogy – Experiences are created by the teacher. The student's personal experiences aid little to the design of curricula. Chief method of teaching – information transmittal.
Andragogy – Life experiences of each student is shared and integrated into the design of the curricula. Chief method of teaching – experiential learning.
Readiness to Learn
Pedagogy – Standardized curriculums, conformity promoted – developmental progression to education.
Andragogy – Facilitator of learning responsible for providing necessary tools; constructs conditions conducive to stimulate the learner. Help learners discover their *needs to know* life application.
Orientation to Learning
***Pedagogy* -** Education perceived as the acquisition of subject matter. Progression moves from the simple to the complex; from ancient to modern history. People are subject-centered in their orientation to learning.
Andragogy – Education perceived as a process of the development of competence. Facilitator of learning is focused on the achievement of the learner's full potential. People are performance-centered in their orientation to learning.
Motivation to Learn
Pedagogy – students are extrinsically motivated; Perception of the teacher; believe they must use coercive methods, rewards and punishment, must be modified.
Andragogy – students are intrinsically motivated. Perception of facilitator; students want to learn and willing participate in the design and implementation of learning activities.

DIFFERENTIATED INSTRUCTION

In an effort to meet the needs of a distinct and diverse student population teachers have incorporated a technique called differentiated instruction. Differentiated instruction allows teachers to tailor instruction and curriculum design to maximize student potential and enhance their learning experience (Tomlinson, 2014). This approach provides multiple pathways for educators to present content materials and learners to access those materials. Moreover, differentiated instruction allows the teacher to adapt instructional and presentation of content to the students. According to Tomlinson (1999) teachers can differentiate instruction in four domains in the curriculum and classroom: content, process, products, and learning environment.

Differentiated Domains

1. Content – this domain addresses specific what the student needs to learn or know.
2. Process – student activities are designed to move student learning toward content mastery.
3. Products – assignments are designed to integrate prior learning. Students participate in class demonstration projects.
4. Learning Environment – design the overall appearance of the classroom to enhance and contribute to student learning.

In order for differentiated instruction to be effective Tomlinson (1999) asserts the importance of a well-designed curriculum and carefully communicated instruction. Teacher deportment during the delivery of classroom must demonstrate the instructor's concern and passion for the curriculum content. Competent teachers display command of course content and the ability to tailor instruction to different learning needs.

Differential Learning Approaches: Scaffolding, Fading and Co-teaching

Developed by Wood, Bruner, and Ross (1976), the educational technique called scaffolding positions the educators to guide the student toward incremental concept mastery; that is increased and greater independence for the adult learner. Scaffolding is often used by educators to bridge learning gaps. Learning gaps is the distance between what a student presently knows about a concept and the expected outcome identified in the student's lesson plan.

This approach requires the teacher to create a student-centered environment, where power is shared with the student. This is not as simple as it appears. From the development of the syllabus, the type and amount of content and the meeting times, much of what occurs in the classroom is directed by the faculty (Wright, 2011). Inviting students to actively contribute to the design of the curriculum is challenging. Students will want to hold on to the banking concept of education (Freire, 1972); requiring teachers to be responsible for what is taught. To better ensure that power is shared the following is recommended:

1. Establish that both students and teachers teach and both students and teachers are to learn. There is a shared responsibility for what happens in the classroom.
2. The appearance of the classroom, the cultural symbols and pictures are chosen by the students and the teacher.

3. Unconventional thinking; particularly when students challenge existing oppressive paradigms, is rewarded. Rewards are decided by the students.
4. Affective learning activities require both the students and the teacher to participate. Reflections, both oral and written are shared in the classroom.

Fading is the gradual removal the scaffolding (educational aids) so that, ideally, the student becomes an independent, self-motivated learner. As fading increases more responsibility for the learning process is assumed by adult learner. The adult educator becomes more of a tutor, educational monitor, and a broker of information.

Co-Teaching

Co-teaching is another way adult educators can integrate Afrocentricity into student curriculums. The advantage of co-teaching is that education instruction is provided by two qualified teachers who have different knowledge, skills, and abilities that have joint responsibility and accountability for the design, implementation and evaluation of education goals and objectives.

Co-teaching allows the teachers to divide the class into two groups. Group pairings are based assessment of student diversity, interest and current knowledge of a specific concept. The co-teaching approach requires that both instructors share equally in the preparation and presentation of various parts of the lesson. The expertise of each teacher is integrated into the instruction. This approach of integrating Afrocentric thought into the curriculum is valuable because it does not present Afrocentricity as an alternative composite or marginalized asterisk to mainstream education

This approach allows one teacher to instruct a larger group of students while the other teacher is providing the same instruction to a smaller group of students. An advantage of differentiated learning can be illustrated with the following example:

Adult Educator: Given the extreme racism found in U.S. history, specifically in education, what were the significant contributions of African Americans in the fields of education, math, science, medicine, engineering and other technologies? Students would work collaboratively with the teacher to research specific disciplines. Teacher one can provide instruction on the specific subject (math or science). Teacher two can provide instruction to a smaller group of students who may have difficult with African American history, language or with the nuances of culture. Teachers can also link other andragogical activities to the creation of prose, poetry, musical production that help students with personal express. Other activities might address the need for community and political empowerment. Each of these activities can be grounded in African and African American histories.

SOLUTIONS AND RECOMMENDATIONS

Teachable Moments

Major events such as the 2008 presidential election, the release of Hidden Figures and Black Panther, and the Black Lives Matter Movement present teachable moment. Teachable moments, as an educational construct (Havighurst, 1952) is the optimal opportunity for the teacher to increase the likelihood of successful student achievement. For African American students the student-teacher relationship is a determining factor in the prediction of successful academic outcomes. The student-teacher relationship, both within the education milieu and the personal environment of the student, is one of the most important for the learner. In education this means that teachers must create a milieu that provides *all* students the opportunity to study the world, its people, concepts, and history from an African and African American worldview or from the cultural group each student self-identifies.

Effective educators of African American students possess an elevated sense of efficacy and for their students. These educators enter teaching-learning environments empowered with the belief that all students can learn and they can teach all students (Irvine, 2000). America is resented is a tremendous opportunity to bridge the ever widening perceptual gap. This gap is exacerbated by the refusal or resistance of White America to capitulate; to listen. From Ferguson, MS to the future of America, African Americans are reclaiming a feeling of pride and sense of justice; similar to civil rights movement of 1960s. Application of Afrocentric principles can guide Americans from protest to praxis and gain solidarity among the oppressed and the oppressor.

Challenges to an Afrocentric Curriculum

The challenges for educators and administrators of adult education, related to the infusion of an Afrocentric curriculum are daunting. However, the option of doing nothing and allowing the status quo to persist is negligent and irresponsible. To meet the future challenges facing African American students and develop African-centered curricula that improve the academic performance of African American students; K-12, post-secondary, and adult learners, school personnel will have to address the following:

1. Recruit, retain, and train a faculty dedicated and committed to an African-centered education. Committed to curriculum redesign by the majority of faculty is necessary to reduce fragmentation (Asante 1991); Durden 2007).
2. Infuse African history and culture throughout K-12 curricula and college/university syllabi. Creating or redesigning a new curriculum will be time-consuming and labor intensive (Durden, 2007).
3. Promote Afrocentric thought among students, colleagues, and administrators by applying Afrocentricity in scholarly and professional activities (Schiele, 1994, p. 160).
4. Challenge adult learners to revisit extant historic periods in American history using an Afrocentric perspective. This will require investing in technologies that give voice and construct the narratives of African Americans.

FUTURE RESEARCH DIRECTION

Afrocentricity is atheoretical worldview that places the centrality of the African person at the center of analysis. There are many research questions regarding Afrocentricity that demand serious scientific investigation. Future research must provide a framework for:

1. the construction of Afrocentric curriculum; methodologies/procedures that direct school personnel in appropriate ways to integrate Afrocentric thought into existing curricula.
2. the design and preparation of classroom environments
3. the education and training of all teachers.

Longitudinal studies, both qualitative and quantitative, must be conducted to determine the short and long-term goals of utilizing Afrocentricity. Determining what successfully outcomes will be critical. Finally, identifying significant exogenous variables that contribute to the success or failure of Afrocentric educational models must be empirically tested.

CONCLUSION

This chapter examined the history of Eurocentric pedagogy, its ineffectiveness to educate African American students, and ways of integrating Afrocentric thought in curriculum design and planning. The principles of Afrocentricity and andragogy, along with differentiated instruction methods were presented to offer teachers strategies to construct student-centered classrooms. Two Afrocentric application activities were included at the end of the chapter.

In U.S. history two variables, whiteness and religion have been influential in the development of American democracy. The Pew Research Center (2018) projects a decline in both categories by 2055. Although whites will remain the largest racial group in America they will not be the majority. The racial profile will be 48% White, 24% Hispanic, 14% Asian, and 13% Black. Moreover, people who identify as religious unaffiliated or "nones" currently make up nearly 23% of U.S. population.

Although the number of Whites and Christians are decreasing in the United States, white supremacy has experienced a rebirth in the nation. Hostility and violence fueled by racism, sexism, anti-Semitism, and homophobia is on the rise. The racist, nihilistic proclivity is to point to antiquity and the recent past and question our progress. Blacks and other people of color, historically, have been treated inhumanely and unjustly, deprived of civil rights; prohibited from participation in America democracy, and killed capriciously without regard for the law. America will experience greater racial, religious and class diversity as we move into the second quarter of the 21st century. Dismantling oppressive structures by preparing adult students and educators to learn, to question, and most important, not to passive acquiesce to existing powerful individuals or institutions is critical. Guided by Afrocentric thought adult students and educators will learn innovative ways to make a difference in the classroom, the community, and across the nation. Dr. Martin Luther King, Jr. (1964), one of our most beloved champions of justice warned America, "We must learn to live together as brothers or we will all perish together as fools."

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KEY TERMS AND DEFINITIONS

Adult Learner: a person, 25 years and older, who uses personal experiences and their need to know to guide learning.

Afrocentricity: a frame of reference where the observer can view historic events and experiences from the perspective of the African person.

Andragogy: the art and science of teaching adults.

Banking Concept of Education: this model of education finds the teacher as depositor and students depositories. Students are reduced to passive receptacles, which receive, retain, and regurgitate information deposited by the teacher.

Democracy: a form of government in which the people freely govern themselves; where the executive branch and law-making power is given to persons chosen by the population, the free people.

Differentiated Instruction: instruction allows teachers to tailor instruction and curriculum design to maximize student potential and enhance their learning experience.

Empowerment: the process of discovering individual, collective, and political power to create change.

Nihilism: the sense of hopelessness, insignificance, and despair.

Pedagogy: the art and science of teaching children.

Privilege: Unearned advantage(s), life chances, or benefit(s) based on group membership.

Race Exhaustion: the perception that the race issue has been eradicated; tougher civil rights laws are unnecessary and futile, continued discussion about race is unfair to innocent whites and provides unfair advantages to blacks, and inequalities are the results of nonracial factors.

Racism: the denial or prohibition of access to social and economic opportunities, equal rights, and justice based on the attribute of race.

White Fragility: the avoidance or refusal by white people to engage in discomforting and complicated discussions about race and racism.

Whiteness: the social construction of racial superiority of white people in order to justify discrimination and dominance of non-whites.

White Supremacy: belief, attitudes and behaviors that demonstrate white people are superior to all of racial groups.

APPENDIX

Application Activities

The two application activities were designed for adult educators and health and human service workers to practice integrating Afrocentric thought in curriculum design.

LESSON ONE: Privilege Simulation – White Privilege. Time: 80 minutes

OBJECTIVES

Upon completion of this lesson the student will be able to:

1. Define privilege.
2. Explain White privilege
3. Define privilege utilizing an Afrocentric paradigm
4. Describe their personal experience of privilege
5. Express the attributions or characteristics (cognition, affect, and behavior) of members of the group who did not experience privilege.

Paradigm: Afrocentricity

Afrocentricity is a frame of reference wherein phenomena are viewed from the perspective of the African person. Afrocentricity is an ideological paradigm that places Africa at the center of the African American identity (Akbar, 1984; Asante, 1988; Schiele, 2000). It is not a Black version of Eurocentric notions of White supremacy. The Afrocentric approach seeks in every situation to appropriate centrality of the African/African American person (Asante, 1988). In education, this means that teachers must create a milieu and provide students the opportunity to study the world and its people, concepts, and history from an African worldview. One benefit of an Afrocentric approach is that it requires the user to intentionally questions Eurocentric education and research methodologies.

PRACTICE ASSIGNMENT

What is privilege?

Unearned advantage(s), life chances, or benefit(s) based on group membership.

Group Simulation

Students are instructed to identify in the room, based on their perception alone, the physically strongest person, who, in the opinion of the student, also possesses enormous determination and tenacity. Two students must be selected – First and second choices.

Step One

Two students have been selected by their peers is instructed to come to the center of the classroom and perform the following task:

1. Hold a single piece of paper at a 90 degree angle for 15 minutes. The student is given the option to decline to participate in the simulation. If they decline another student is selected.
2. While the student is holding the paper at a 90 degree angle the group facilitator informs the group members the failure by the student to hold the paper for 15 consecutive minutes will result in a group consequence. The consequence is never identified.

3. The facilitator instructs members of the group to observe the student holding the paper and speculate how the student is thinking, feeling, and behaving.
4. At the end of the 15 minute period two important questions are posed:
   a. To the student who held the paper – How did you feel when you were holding the paper and how do you feel now?
   b. To the members of the group who did not have to hold the paper – How did you feel when you witness your peer were holding the paper and how do you feel now?

Individuals and Groups who Experience Privilege Identify the Following:

a. Emotional, Psychological, and Physical Freedoms
b. More Energy Available
c. Less or Reduced Struggle
d. Less or Reduced Stress
e. More Choices
f. Emotional Stability
g. Physical Stability
h. Greater Concentration
   5. Then the teacher questions the entire group – *Which of you experienced privilege and how did you acquire that privilege?*
   6. **Answer:** the student selected to hold the paper represents individuals and groups who historically have been systematically chosen and required to "hold" issues or statues because of skin color or some other attribute. Students who did not have to hold the paper, *experienced privilege,* by definition, an unearned privilege.
   7. The facilitator then directs the discussion to historical periods in the US where African Americans and other groups of color were placed in painful positions and the impact of remaining in those positions for long periods of time. Focus may address contemporary issues such as *Black Lives Matter*.
   8. Students are required to submit reflection papers of their experiences.

1. DISCUSSION QUESTION:

Discuss how you would record this exercise historically. Compare and contrast your historical record with other students; particular those students who held the paper.

2. DISCUSSION QUESTION:

Explain why the perspective of the person who held the paper must be heard and communicated from their personal experience. How does listening validate the affective narrative of the person who held the paper?

3. DISCUSSION QUESTION:

Based on your understanding of the chapter explain how this application activity could be redesigned or restructured, applying Afrocentric principles. Include the Afrocentric principles used to guide your redesign or restructure efforts.

4. DISCUSSION QUESTION:

Based on your understanding of the chapter explain how children might participate and experience this exercise.

5. DISCUSSION QUESTION:

Based on your understanding of the chapter discuss some real life applications of Afrocentricity.

LESSON TWO: The Cat Teacher Story – Ethnocentric Monoculturalism. Time: 80 minutes

OBJECTIVES

Upon completion of this lesson the student will be able to:

1. Define Ethnocentric Monoculturalism.
2. Identify sources of motivation; extrinsic and intrinsic
3. Describe their personal worldview
4. Identify the five assumptions of ethnocentric monoculturalism
    a. belief in superiority
    b. belief in the inferiority of others
    c. power to impose standards or distribute rewards and punishment
    d. superiority manifested in institutions
    e. erroneous assumption that everyone share's the same worldview

Paradigm: Afrocentricity

Afrocentricity is a frame of reference wherein phenomena are viewed from the perspective of the African person. Afrocentricity is an ideological paradigm that places Africa at the center of the African American identity (Akbar, 1984; Asante, 1988; Schiele, 2000). It is not a Black version of Eurocentric notions of White supremacy. The Afrocentric approach seeks in every situation to appropriate centrality of the African/African American person (Asante, 1988). In education, this means that teachers must create a milieu and provide students the opportunity to study the world and its people, concepts, and history from an African worldview. One benefit of an Afrocentric approach is that it requires the user to intentionally questions Eurocentric education and research methodologies.

PRACTICE ASSIGNMENT

Have the students the following story about a frustrated cat teacher:

A cat teacher was talking about her students with some other cat teachers in the staff lounge.

"I don't know what is wrong with those two rabbits in my class, she complained. They don't have any motivation. Yesterday I gave a wonderful lecture on how to catch mice and neither of them paid any attention."

Briefly discuss or write your observations, assessments, thoughts and opinions of this story that might help explain the behavior(s) of:

1. The cat teacher
2. Her colleagues
3. The two rabbit students in her class.

1. DISCUSSION ITEM:

Describe the breed of the cat teacher and her colleagues.

2. DISCUSSION ITEM:

Utilizing principles of Afrocentricity discuss your recommendations for the cat teacher.

3. DISCUSSION ITEM:

Utilizing principles of Afrocentricity discuss your recommendations for the cat teacher's colleagues.

4. DISCUSSION ITEM:

Utilizing principles of Afrocentricity discuss your educational interventions for the two rabbits.

5. DISCUSSION ITEM:

Discuss how various aspects of the environment may have contributed to the attitudes and behaviors illustrated in the cat teacher story.

Chapter 8
Issues of Health-Related Physical Fitness of the Adult Learner

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ABSTRACT

This chapter discussed the importance of physical fitness concerning adult learners' readiness to participate meaningfully in academia. Despite the importance of health-related physical fitness, not many adults seem to have given the issue (physical fitness) the needed attention. The chapter focused on the issues associated with a reduced level of physical activity participation, and the changing modes of transportation, and how the issues could interfere with learning if not addressed — suggestions on how to improve physical fitness while learning constitutes parts of the discussion.

INTRODUCTION

Concerns of physical fitness are very critical in every sphere of life all over the world. This is because of the paramount importance of physical fitness of the individual. Mana Medical Associates (2019) identified improved health, staying active, improved quality of life reduced risk of injury and increase in life expectancy as some of the advantages of physical fitness. Excelling in any area of life requires optimum physical fitness. That is why fitness of the adult learner is crucial when it comes to adult learning. Being physically fit is associated with mental fitness because less uneasiness could help reduce stress (Checkrout, 2018). Mental fitness of the learner is a prerequisite for effective adult learning. Mental fitness helps one to be cognitively alert for serious academic activity which is demanded in higher education. The question is: What is physical fitness?

Physical fitness has been defined differently by various authors. According to Kent (2006), physical fitness is the ability to function efficiently and effectively, to enjoy leisure, to be healthy, to resist disease and to cope with emergency situations. Farnsword (2019) views physical fitness as being made up of cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition.

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Physical fitness has been defined also as the ability to carry out daily activities with vigor and alertness without undue fatigue and with ample energy to enjoy leisure pursuit and meet emergencies (Caspersen, Powell and Christenson,1985). The authors categorized physical fitness into two- the health-related and skill related. The health-related such as cardiorespiratory endurance, muscular strength, muscular endurance, flexibility and body composition are components of physical fitness important to public health as they concern every individual. Aniodo (2011) in his classification recognized heart rate and blood pressure as health-related fitness. The skill related physical fitness is made up of agility, balance, coordination, speed power and reaction time (Aniodo, 2011). This chapter however is concern with the health-related components which are of great importance to the adult learner.

The health-related components of the individual have a lot of issues surrounding them. One of the issues is the reduced level of physical activity participation. There are evidences to show that there is decline in level of physical activity participation in different parts of the world. According to Paudel, Owen, Owusu-Addo, and Smith (2018), the number of times people now involve themselves in physical activities has declined despite global evidences that it reduces the risk of having chronic diseases. This is consistent with the findings of Dai, Wang and Morrison, (2014) who found marriage, overweight, regular smoking and constant body pain as predictors of decline in physical activity participation among adult men and women. Another issue that is of concern in this chapter is the changing mode of transportation in the contemporary society. Mode of transport affects to a great extent the physical fitness of the individual. The assumption is that those who rely on automobile or other types of transportation without participation in any type of physical exercise may become be less fit than those who walk or use bicycle for mobility. Before now, people do a lot of journey using active transport modes when distances are within walkable range.

Many students who enroll in higher education in Africa are besieged with a lot of issues which affect health and fitness. However, unless attention is given to the health-related fitness of adult learners in higher education, achieving adult education objectives may be difficult. Therefore, the focus of this chapter is to address the issues that may impact the fitness of the adult learner. The general assumption is that students who are fit perform better in academics than the unfit students (California Dept. of Education, 2012).

THEORETICAL FRAMEWORK

This chapter is anchored on adult learning theory of andragogy. The andragogy theory was popularized by Knowles (1980). The theory has five assumptions. It describes adult learner as having a self-concept. It points out that as a person matures in life, he or she ceases to depend on others but assumes the state of independence. This is relevant because the adult learner is expected to define his or her self-concept regarding physical activities and how to achieve physical fitness. The second assumption deals with experiences acquired over the years by the adult learner. This accumulated experience is relevant in dealing with the issues of health-related fitness. The third assumption points out that the adult learner acquires readiness to deal with the developmental task related to his or her social role. This assumption is about the readiness of the adult learner to deal with fitness issues related to his/her well-being. The 4th assumption focuses on the orientation to learning. It is concerned with the maturity of a person, i.e. the tendency to postpone action or to carry out action immediately. It deals with the issue of health-related fitness which may require immediate actions. The 5th assumption of the adult learning theory or andragogy explains that as a person matures, motivation becomes more intrinsic than extrinsic. It is related to the issues of the fitness of a person because fitness is better handled when the individual is intrinsically motivated.

ADULT LEARNING THEORY APPLIED IN HEALTH-RELATED PHYSICAL FITNESS TRAINING

Physical fitness training involves series of movement performed by the individual with or without the guidance of the instructor. The adult learning theory or andragogy by Knowles (Pappas, 2013) was used to develop physical fitness training in this chapter. The health-related physical fitness components among other issues include heart rate, blood pressure, cardiorespiratory endurance, muscle strength, muscle endurance, flexibility and body composition.

The first assumption of the adult learning theory is that the adult has self-concept, so the activities are explained here. Walking is a simple, easy and a low impact activity which has the potential for enhancing physical fitness such as cardiorespiratory endurance. Walking can also enhance the strength, endurance, flexibility and body composition when other activities are incorporated into it. Walking also reduces heart rate and blood pressure to healthy level.

Instructions are given and they are made clear enough to the learner. Here demonstration is cardinal to knowing how walking should be done to be able to develop cardiorespiratory endurance. Since all learners are not the same experiences of the different learners will be useful at this stage. The distance of walk and intensity of walking will vary from one learner to the other. Learners are free to decide how they go about performing the exercise as they are self-directed as consistent with the assumption of the adult learning theory.

As walking continues, muscle strength can be enhanced with hand-held dumbbell. This will help strengthen the muscles of the arms as well increased walking heart rate. There should be a firm grip of the dumbbell while walking. The walking works on the heart rate and brings about cardiorespiratory endurance over time while the hand-held dumbbells will strengthen the arm muscles. The action is demonstrated for the learners to follow. Dumbbells of different sizes are used to reflect varying physical strength among the adult learners. Therefore, learners should be at liberty to choose the size of the dumbbell that suits him or her. Some of the learners may have past experiences while the activity may be new to some of the adult learners. The learner should be free to adopt other strength building exercise that is more convenient to him or her.

To develop muscle endurance, the learner should walk with the arms raised-up. The arm so raised should be slightly flexed and sustained in that position for 20-30 seconds before dropping to the sides of the body. The exercise should be repeated several times during the period of walking. The learner should determine a convenient walking pace as well as the number and duration of walking, arms raised and the interval between one arm raise and another. This is because of individual fitness and other personal preferences coupled with the fact that the adult learner is self- directed. Walking as an exercise helps to improve cerebral blood flow and sharpens the brain to sustain learning. The arm raises and leg lift help to improve muscle strength and endurance. These in turn help to increase muscle tone and eliminates early fatigue during learning activity.

Flexibility is another health-related physical fitness component which can be enhanced during walking. The adult learner can perform some stretching exercises during walking. Learner could swing the arms in different directions, to the front, toward the back, sideways and of course upwards and downwards. The learner will need to be cautious and determine how he or she can stretch any part of the body as the adult is naturally limited to the extent to which he or she can stretch body parts. Flexibility exercise such as ‘sit and reach’ can help enhance the strength of the hip and sustain correct posture and comfortable sitting in a classroom situation. This in turn will enhance assimilation ideas by the adult learner during a teaching and learning process.

Body composition is a component of health-related fitness. It deals with the percentage of lean and fats which make up the total body weight. Exercise that can burn more fats and develop muscle mass is appropriate for moderating body composition. The adult learner could still choose to walk and undertake activities with dumbbells and light barbells. The walking is good for maintaining cardiorespiratory fitness while the exercises with dumbbells and barbells will reduce fat mass and increase lean mass. This could improve general health of the adult learner and improve concentration during the process of learning.

COMPONENTS OF PHYSICAL FITNESS AND THE ADULT LEARNER

The following health related indices or components of physical fitness by Loprrinzi and Veigl (2017) and Aniodo (2011) were analyzed in relation to the adult learner in this chapter.

- Heart Rate
- Blood Pressure
- Cardiorespiratory endurance
- Muscle strength.
- Muscle endurance.
- Flexibility.
- Body composition.

Heart Rate

The heart beats continuously for a lifetime. This is what results to a heart rate. Life Science (2018) defined heart rate as the number of times the heart beats per minute. Heart rate is usually two folds, heart rate at work and resting heart rate. Going by the above definition heart rate during work is the number of times the heart beats in one minute during work (whether sub-maximal or maximal work). While resting heart rate is the number of times the heart beats in one minute when the individual is at rest doing no visible work.

There is linear increase in heart rate with increase in work load or V02 in both trained and untrained subjects a slow heart rate coupled with a relatively large stroke volume. It is a characteristic of athletes and indicates an efficient circulatory system (Kay, Ashar, Bubien and Daily, 1995). Heart rate in this chapter is simply the number of heart beats in one minute.

Measurement of Heart Rate

According to Scientific American, (2019) heart rate can be determined by counting how frequently the heart contracts during a given period and converting this number to the standard measure in beat per minute. One should make sure that he presses just firmly enough to feel the pulse. If the pressing is too hard it may interfere with the rhythm. In determining resting heart rate Scientific American, (2019) recommended that the subject should sit down quietly for at least 5 minutes before measuring it. At rest heart rate should not change rapidly as is the case during work so the counts can be taken for either 10 seconds and multiplied by 6 or 30 seconds and multiplied by 2. Amusa and Igbanugo (1985) described the following procedure for measuring heart rate; wipe off the earpiece of the stethoscope. Then place the stethoscope' earpieces in the ear so that the angle of the earpiece is pointed forward (in the same direction of the nose). This positioning directs the sound into the canals; if the earpieces are inverted in the opposite direction, the sound is directed into the mastoid bone and hearting is difficult.

Place the diaphragm or bell of the stethoscope over the point where heart sounds can be easily picked up. The sound can be difficult to hear during rest but there should be no difficulty in hearing them during exercise. Be cautious in interpreting the sounds. The heart will generally transmit two perceptible sounds with each beat especially during strenuous activity. There is a definite, characteristic "LUB-dub" sound. In some subjects, the second sound may be so loud that the neophyte experimenter will count one complete heart sound as two sounds. You count 30 consecutive heart beats. Start the stop-watch with a beat, Count that beat as "O" (Zero). Then 30 consecutive beat and stop the stopwatch with the 30th beat. The purpose is to time exactly 30 complete cycles. The heart rate is computed using the formula HR = 1800t30 Where HR is heart rate and t30 is time taken for the 30 complete cycles (Amusa and Igbanugo1985).

Normal heart rate range is between 70 beats/minute-74 beats/minute. Adult learner needs to maintain this range of heart rate as a component to be able to sustain health required for effective learning, she or she pursues higher education. To maintain healthy heart rate and be physically fit for learning the adult learner needs to be involved in regular aerobic exercises such as brisk walking, jogging, swimming and many more. These exercises will help strength the heart and increase efficiency of the heart of the adult learner and slow down the onset of dementia in adults(McEwen, Siddarth, Abede, lsater, Kim, Mui, Wu, Emerson, Lee, Greenberg, Shelton, Kaiser, Small, Merrill, 2018).When onset of dementia is slowed down in an adult learning is enhanced and academic performance improved and learning process becomes more tolerable also because of improved exercise induced fitness

Blood Pressure

Blood pressure is the driving force which tends to move blood through the circulatory system. It flows from the area of high pressure to one of low pressure, like blood flow from left ventricle of the heart to the aorta (the main artery of the systemic circuit) because as the ventricle contracts it exerts a pressure that is higher than that at the aorta (Aniodo, 2011). As is the case with heart rate, blood pressure is measured both at rest and during exercise. According to Pediatr (2012) training generally does not affect the resting blood pressure of adolescents, except where aerobic training reduces body weight. The author further stated that if their fitness level is average their blood pressure is expected to be normal at the start of training. He also opined that the resting blood pressure will be significantly reduced, however, in middle-aged or older trainees (male and female) who stand out with a below average fitness level and higher "than normal blood pressure.

Blood pressure has the upper and lower values. The upper value is called the systolic blood pressure while the lower one is referred to as the diastolic blood pressure. When blood is injected into the arteries during ventricular systole the pressure increases to a maximum and when it drains the arteries during ventricular diastole the pressure is decreased to a minimum. These pressure levels are what experts call systolic and diastolic blood pressure respectively (Aniodo, 2011). In the context of this chapter, blood pressure is the force exerted by the blood against the walls of its containing vessel. The adult learner requires normal blood pressure to have an optimum health required for effective learning. Healthy blood pressure will help control or reduce the risk of having degenerative diseases common to adults. Unhealthy blood pressure constitutes a health risk among adult learners; it may adversely impact negative on academic performance.

Measurement of Blood Pressure

Blood pressure is measured using a variety of instrument. Some electronic devises are used to determine blood pressure others use different designs of sphygmomanometer and stethoscope to measure blood pressure. Aniodo (2011) described the procedure for measuring blood pressure as follow: An air tight cuff is wrapped around the arm just above the elbow the cuff is connected to a glass tube filled with mercury. Air is pumped into the cuff by squeezing a bulb. As the cuff becomes tighter, it compresses a large artery in the arm the brachial artery. This temporarily cuts off the flow of blood to the forearm and no heart sounds can be heard when a stethoscope is placed on the compressed artery just below the cuff. As the air pressure in the cuff is released the mercury level begins to drop. Eventually a point will be reached at which the blood pressure in the artery is just greater than the air pressure in the cuff. Blood will now begin to flow through the artery and heart sound may be heard through the stethoscope. This is the systolic or upper pressure; it is the maximum pressure that can be produced by the heart. As air continues to be let out of the cuff, the sound herd through the stethoscope will become louder as more blood flows through the artery.

Finally, a point will be reached at which the distinct heart sound disappears as the blood flow steadily through the artery. At this point the height of the mercury shows the diastole or lower pressure representing the least amount of pressure in the artery. Blood pressure is recorded as systolic blood pressure/diastolic blood pressure (SBP)/(DBP).

Normal blood pressure is 120/80mmHg. The adult learner requires normal blood pressure to enable him or her maintain optimum health for effective learning. Many adult learners experience one form of anxiety and stress or the other as a result of learning activities. These anxiety and stress could lead to high blood pressure, a notable risk factor for so many chronic diseases like heart diseases, arteriosclerosis, stroke and others which some adults suffer as they grow older in age. Just like the case of heart rate, normal blood pressure range could be maintained through regular aerobic exercises. Mild intensity exercises such as walking, jogging, treadmill work, bicycle ergometer ride and a lot more are good for reducing high blood pressure and bringing it to normal range. High blood pressure could cause frequent head ache, anxiety and discomfort which could lead to weak academic performance as a result of mental defocus. Anxiety for instance could make the adult learner not complete his or her group or personal task and may be unable to seek for help in class (Dobson, 2012). Normal blood pressure will improve the health of the adult learner and a healthy adult is a potential effective learner. Health is required to be able to develop effective study habit which all things being equal should lead to achieving the goals of adult learning.

Cardiorespiratory Endurance

Cardiorespiratory endurance is a health-related index of physical fitness. This is so because every human being including the adult learner requires cardiorespiratory endurance for normal daily life processes. The concept has been defined severally by different authors, according to Kent (2006) cardiorespiratory endurance is the capacity to continue in prolong physical activity and still withstand fatigue. Kent explained that much depends on the ability of the lungs and heart to take in and transport adequate amount of oxygen to the working tissues as well as the ability of the tissues to extract and utilize efficiently the oxygen and nutrients so supplied by the lungs and heart. Health Link (2017) defined cardiorespiratory endurance as the level at which your heart, lungs, and muscles work together when you are exercising for an extended period of time. In this chapter cardiorespiratory endurance is the ability of a person to undergo his or her prolonged activities without general fatigue. The cardiorespiratory endurance as an index of fitness is as important to the adult learner as is the case with other persons. The adult learner needs cardiorespiratory endurance to be able to cope with the learning activities. This is because the activities could take a long time. He or she requires cardiorespiratory endurance to be able to accommodate various spheres of activities directly as well as indirectly related to learning. Cardiorespiratory endurance or higher aerobic fitness enhances cognitive functions related to attention and memory and facilitates learning (National Academy of Science, 2013). Where the adult learner lacks cardiorespiratory endurance, it becomes difficult to undertake learning activities. That is why cardiorespiratory endurance training for the adult learners is become inevitable in helping to achieve the goals of adult learning.

Muscle Endurance

Muscle endurance is another health component of physical fitness related to cardiorespiratory endurance. This type of endurance as the name implies is related to muscles. Muscle endurance, according to Kent (2006) is the ability of a muscle to avoid fatigue. This is shown evidently when we observe the duration a muscle can sustain an activity before it gets fatigued. It also shows the number of times a muscle or group of muscles can sustain an activity. Brown (2018) sees muscle endurance as the ability of muscles to consistently exact force against a resistance. That means for instance that for the arm to lift a barbell and hold it in the lifted position for a minute or two shows that the arm muscles have muscle endurance, otherwise it will be impossible to sustain the lift for the duration of two minutes.

The adult learner is involved in a lot of muscular activities as he or she undertakes the day to day activities. The much the learner is able to sustain the muscular activities will go a long way in helping to achieve daily goals of life. The learner requires healthy muscles to be able to sustain the learning activities of each day. He or she must be able to walk up to places of learning within the immediate environment. This learner must also be able sit or stand for the duration of the activity. For this to happen, the learner must have some level of muscle endurance. Muscle endurance is important to the learner in that it increases your ability to do activities like opening doors, lifting boxes or chopping wood without getting tired, reduce the risk of injury, help you keep a healthy body weight, lead to healthier, stronger muscles and bones, improve confidence and how you feel about yourself, give you a sense of accomplishment, allow you to add new and different activities to your exercise program (Health Link, British Columbia 2016). General body muscle endurance is needed by the adult learner to be able to cope with prolonged lecture period and avoid local fatigue. When there is lack of this endurance in the muscle the adult learner is uncomfortable sitting at class sessions, experiences muscle weakness general unease.

This could lead to discontinuation of learning activities or loss of concentration during classes because of lack of fitness. Experts and researcher have come up with a number of tests for muscle endurance. The tests presented here are from McGill test for core endurance as adapted from (Hockey, 1993).

Burpee (Squat Thrust) Test

This is used in measuring general body endurance. Here the subject starts from a standing position, then assumes a squatting position. He or she places the hand forward and the palm on the floor. He makes a backward thrust of the legs. The subject returns to squatting, and then standing position. This is counted as one and the process is repeated as many times as possible.

Muscle Strength

Muscle strength is another very important component of physical fitness which is health related. It is health related because it is indispensable to one's life. Every human being requires muscle strength for the day to day activities and body processes. But what is muscle strength? There are many definitions of muscle strength as there are many experts in the field of physical fitness. Kent (2006) defined muscle strength as the force exacted by a muscle or muscle group against a resistance in one maximum effort. This strength depends on the action, the velocity of the action producing the strength as well as the length of the muscle itself (Kent, 2006).Healthy Philosophy Wellness Services Inc (2019) on their part referred to muscle strength as the amount of force a muscle can produce and is usually measured by the maximum amount of force a muscle can produce in a single effort (maximal effort). They further opined that the amount of muscle strength which can be achieved depends on gender, age, and inherited physical attributes, while strong muscles are essential for any athletic Endeavor, strong muscles can benefit everyone in some way.

Strong muscles can have direct and indirect benefits on health and some of the benefits are; ease of movement, good posture, easier performance of work such as day to day activities and exercise, easier performance of recreational activities, stronger tendons, ligaments, and bones, decreased risk of injury and also decreased risk of falls. Muscle strength is important to the adult learner as is the case with every other person. Muscle strength is needed to carry out the activities of learning. Adequate muscle strength will help the adult learner minimize the stress associated with learning and the adult age and remain in health.

Factors that Influence Muscle Strength

There are many factors which influences muscle strength in one way or the other. These factors include age, sex, cross sectional area of the muscle, weight and height

Age

It was reported that a decrease in strength, both isomeric and dynamic occurs with increasing age at least in the quadriceps femoris muscle group. Individuals gain muscle strength from birth through adolescence peaking at the age of 20 to 30 years and gradually declining in advancing age and human muscle efficiency gradually lessens with age (Cathe, 2019)..

Sex

The muscle strength of young boys is claimed to be approximately the same as that of young girls up to the age of puberty after which males exhibit a significantly greater strength than females with greater difference occurring during middle age. According to Cathe (2019) males have 50% more muscle strength in the upper body and 30% more muscle strength in the lower body than the females. However, it was reported long ago that muscle strength per cross sectional area of muscle appears to be similar in males and females (Kanehisa, Ikegawa and Fukunaga1994)

Cross Sectional Area

The larger the physiological cross section of muscle in man the more tension it can produce, even though this is not quite as direct, as exercised muscles are generally stronger. Large muscles also have greater number of cross bridges that can be activated to produce muscle force during contraction

Weight and Height

It has been reported that in a population of normal subjects of various ages, maximum voluntary contraction especially of the quadriceps is closely related to the body weight. In a study conducted by Mebes, Amstutz, Luder, Ziswiler, Stettler, Villiger and Radlinger (2008) it was found that the hypermobile subjects showed a significantly higher value for rate of force development (15.2% higher; $P = 0.038$, $P = 0.453$, $\epsilon = 0.693$) and rate of force development related to body weight (16.4% higher; $P = 0.018$, $P = 0.601$, $\epsilon = 0.834$) than the controls. The groups did not differ significantly in MVC ($P = 0.767$, $P = 0.136$, $\epsilon = 0.065$), and MVC related to body weight varied randomly between the groups ($P = 0.921$, $P = 0.050$, $\epsilon = 0.000$). In balance testing, the mediolateral sway of the hypermobile subjects showed significantly higher values (11.6% higher; $P = 0.034$, $P = 0.050$, $\epsilon = 0.000$) than that of controls, but there was no significant difference (4.9% difference; $P = 0.953$, $P = 0.050$, $\epsilon = 0.000$) in anteroposterior sway between the 2 groups.

Muscle strength also depends on height of the subjects when testing for strength. Fox and Mathews (1981) opined that length of muscle also affect the amount of tension developed. According to them, an isolated muscle can exert its maximal as the muscle shortens less tension can be exerted. For instance, at about 60 percent of its resting length, the amount of tension that the muscle can exert approaches zero (Fox and Mathews, 1981).

Strength Testing Methods

As previously stated, there are basically two types of strength-static and dynamic strength and there are separate measuring instruments for each. However some instruments that may be classified under one could be used to measure the other. The universal gym machine, which is usually employed to move weights through a range of motion, is categorized under dynamic strength, if the subject holds a 25-pound weight in a curl position at an elbow angle of 90 degrees for a minute the universal machine may be classified as a static strength measuring instrument (Verducci, 1980).

There are many static strength test instruments. Baumgartner and Jackson (1995) identified the dynamometers and tensiometers as some of the static strength measuring instruments. The handgrip dynamometer estimates the force the handgrip exerts on the dynamometer. It is usually meant to measure the arm strength: As Verducci (1980) described the test. The dynamometer is placed in the subject's dry hand with the dial facing away from the palm. The subject stands erect and looking straight forward with the arm at the side slightly away from the body. The dynamometer is squeezed once sharply and as hard as possible without moving the arm. The score is read from the scale on the dynamometer to the nearest kilogram.

The cable tensiometer also described by Verducci (1980) estimate the maximum force that can be exerted by muscle groups on a cable. The force is measured by the use of a tensiometer. Although the measuring instruments have been used for estimating maximum force of short duration, they may also be applied to measure sub-maximal static contractions for extended durations. The equipment includes tensiometer, testing table, wall hooks, straps, cables and goniometer. The tensiometer is an instrument generally designed to test the tension of aircraft control cables. The manufacturer modified the instrument so that it may be used in strength testing.

Some common procedures are involved in administering the cable tensiometer measuring instruments. The body position for each subject is important in that every effort must be made to eliminate compensatory action of muscles not being tested. In measuring the static strength of elbow flexion, every effort must be made to eliminate any shoulder flexion that may influence the elbow flexion score, In the testing positions the cable is always arranged at right angle to the body part serving as the pulling lever. The goniometer is used for measuring the joint angle specified in some of the muscle ground. The joint angle should be adjusted in such a way that it reaches at the maximum force of the pull. The cable should be at the beginning of each muscle contraction. The subject should not be allowed to have alack in the cable prior to applying the muscular force. According to Verducci (1980), the following are body sites that could be measured with cable tensiometer measuring instruments: elbow flexion, elbow extension, should flexion, shoulder extension, neck flexion, neck extension, trunk flexion, trunk extension, hip flexion, hip extension, knee flexion and knee extension.

Despite the popularity and longtime use of the dynamometers and tensiometer, Baumgartner and Jackson (1995) found them inadequate because they are subject to error and difficulty to calibrate. They stated that electronic hand-held devise are now replacing these mechanical devices. It is recommended by National Institute for Occupational Safety and Health (NIOSH, 2018) in America, that cylindrical handle dynamometer should be used for improved grip strength measurement. According to Baumgertner and Jackson (1995) though isometric and isokinetic strength testing equipment can be used to measure leg strength the availability of weight training equipment makes 1 - RM leg strength tests a realistic option. Isometric lei; strength is a recommended pre-employment test; some of the tests according to Baumgartner and Jackson (1995) are leg press and leg extension.

Leg Press

The subject gets down in the provided chair, fully extends the legs and executed a maximum repetition. The seat should be adjusted to standardize the knee angle at approximately 1200

Leg Extension

The subject is in a sitting position and the test is to extend the knee from 900 to 1800●

Flexibility

Flexibility is another health related component of physical fitness and it has been defined by different authors. American Council on Exercise in Scott (2018) defined flexibility as the range of motion of a particular joint or group of joints or the level of tissue extensibility that a muscle group possesses. On his part Kent (2006) had earlier defined flexibility as the ability to move a joint smoothly through its complete range of motion. That is to say that each joint and each group of muscles in the human body have different ranges of motion or a different level of flexibility. Some areas of your body may be very tight, meaning that the muscles feel short and restricted. Some areas of your body may feel very loose and you may be able to lengthen and move those muscles freely. Flexibility as a health-related fitness contributes immensely to the comfort enjoyed by any adult learner during the process of learning both in the classroom and in other environments of learning.

Factors Limiting Flexibility

Many factors reduce the range of flexibility. According to Kent (2006) the limiting factors are structural in nature such as (1) bones (2) muscles (3) ligaments and other structures as associated with the joint capsule 4) tendons and other connective tissues and (5) skin. Limitations by bony structures are confined to certain joints for example the hinge-type joint such as the elbow. Plowman and Smith (2008) also stated that the degree of flexibility of a specific joint tends to be related to factors such as Ligaments, tendons, muscles and bones of the joint, and that limited flexibility is usually the result of restricted elasticity of the muscles and tendons. He also talked of motion of a specific joint.

Methods of Testing Flexibility

Amusa and Igbanugo (1985) described some test methods which could be used to determine flexibility. The equipment for the tests is goniometer, wall tape, clock, timer or stopwatch; Broad blade anthropometer, meter stick and toe touch board. The procedure for the tests is presented as described by Amusa and Igbanugo (1985) for each of the tests.

Toe touch test- Let your partner stand on the toe-touch and reach box with his knees fully extended and feet kept together. The subject bends forward to touch the furthest point on the board. Allowed three trials and record the average of the trials.

Trunk twist and reach test- Subject stands laterally at arm length to a well. The feet are kept together, subject twists at the trunk with the other arm extended measure the point the subject touches on the wall. Repeat the demonstration three times.

Trunk hyper-extension test- subject assumes prone lying position with hands clasped around the neck. The lower limbs are stabilized, and the trunk is hyper extended. Record the distance between the chin and the floor using a board blade anthropometer or ruler

Shoulder hyper-extension test- Subject assumes prone lying position. He stretches his hands forward while holding a meter stick with both hands. He then raises the trunk as far as possible. Record the distance between the floor and the meter stick, sitting position and the furthest point reached. Allow three trials

The results are usually shown as below:

Static and Dynamic Flexibility Tests

Toe touch test ………………………cm
Trunk twist and reach best …………cm
Trunk hyper-extension test …………cm
Shoulder hyper-extension test ……...cm
Sitting to touch test ………………...cm

Body Composition

Body composition describes the make ups of the human body in terms of proportion of body mass that is lean weight and fat weight. Kent (2006) defined body composition as the relative amount of different components of body. He explained that it is made up of fat free mass and fat mass. Fat free mass include muscles, tendons, bones and other body tissues excluding fats. Fat mass encompasses all the total body weight that is made up of fats.

Assessment of Body Composition

There are several methods of assessing body composition. The surest of them is the direct cadaver method which measures directly the fat mass of the body. Where that is not possible other proximal methods are employed in assessing body composition. The simplest and commonest of them is the body mass index. There is also the skinfold measurement, hydrostatic weighing method and bioelectrical impedance.

Body Mass Index (BMI)

The body mass index is a very simple method of determining body composition. Body mass index is the ratio of an individual's total body weight to height (Kent, 2006). Body weight is in kilogram (kg) while height is in meters (m^2). This method is widely used today in determining body composition. Where the population is fairly large to determine the Body Mass Index of an individual the weight and height of the person should be taken. The formula $BM1=w/h^2$ should be used to find out the value of the individuals BMI. Table may be used for categorization. Normal BMI for a person with a very low health risk is 18.5-24.9kg/m (Wadsworth, 2011).The adult learner requires BMI within this range to enhance to achieve effective learning.

Hydrostatic Weighing

The hydrostatic weighing technique also known as underwater weighing principles provides one of the best methods of assessing body composition. The principle states that "an object partially or fully submerged will experience an upward buoyant force equal to the weight or the volume of the fluid displaced by the object.

In hydrostatic weighing body composition is determined through the calculation of body density (densitometry). Densitometry is the measurement of mass per a unit volume measurement of mass per a unit volume (Plowman and Smith, 2008). This technique divides the body into two compartments of fat weight and fat free weight. The weight of the individual is taken in the air either by weighing the body why naked or by weighing the individual dressed up and subtracting the weight of the cloth from the weight of the individuals wearing the cloth. Thereafter the individual is submerged in the water while in a weighing scale. The individual will be asked to relax as much as possible as the weight is being taken several trial results are obtained.

Bioelectrical Impedance

Bioelectrical impedance analysis is one method of determining body composition that has gained much ground in fitness and exercise performance centers outside Africa. In Africa and indeed in Nigeria it is still highly unknown as the facilities are not available in most fitness and performance centers.

Importance of Physical Fitness to the Adult Learner

Various components of health-related physical fitness such as heart rate, blood pressure, cardiorespiratory endurance, muscle endurance, muscle endurance, flexibility and body composition have been discussed in previous sections of this chapter. The importance of physical fitness to the adult learner cannot be overemphasized. Physical fitness is highly needed by the adult learner at least as much as every other person. There is hardly any form of learning that the adult can undergo without reasonable level of physical fitness. Bhardwaj (2018) in precautions for staying fit presented the following as benefits of being physically fit which could enhance adult learning:

- Prevention of Chronic diseases – Being Physically fit helps lower blood sugar levels and checks blood pressure. It also keeps a check on your health, and you are less likely to suffer strokes or heart diseases.
- Control of Weight – The current generation is prone to diseases owing to extra body weight and increased cholesterol levels. Being fit allows you to get rid of fat which in turn supports a healthy lifestyle.
- Ensuring of strong bones, muscles and joints development – Adolescence is the ideal time when you can invest in your body and the results will last forever. Physical wellness and exercise ensure the adult learner has strong bones, muscles and joints.
- Reduction of stress – Stress is one of the most dominating health hazards in the younger generation. Being unfit makes one lose confidence and it is one of the most prominent factors of our time that causes stress. Being fit makes you physically smart and helps better your inter-personal relationships. Thus, making you stress free.
- Increase in energy levels and confidence – Laziness is an associate of an unfit body. Being fit makes you active, spirited and energetic all the time. Thus, making you more competent and prompt in your work and results. This ultimately reflects in your confidence level which gets boosted.

The adult learner who is physically fit can have his or her performance in learning greatly enhanced. Participation in physical activity which leads to physical fitness improves brain health. Improved brain health enhances cognitive and mental processes (National Academy of Sciences, 2013). Because the brain of the physically fit adult is improved his or her learning ability is improved, so is the academic performance. This is because the benefits of being physically fit would help position the individual for better learning. Adult learners should take to physical activity to be able to improve their physical fitness and achieve the goals of adult learning.

DISCUSSIONS

Physical Activity Participation and Physical Fitness

One issue which is of concern to health-related fitness is participation in physical activity. Literature shows that physical activity participation promotes physical fitness of the individual. To help us understand better it is important we define physical activity and physical fitness World Health Organization (2018) define physical activity as any bodily movement produced by skeletal muscles that require energy expenditure on the other hand physical fitness is seen as the ability of an individual to carry on his or her day to day activity with vigor and alertness, without undue fatigue, take part in recreation and still have energy for emergences (Udoh, 1982).

There is a positive co-relation between physical activity and physical fitness. Increase in physical activity participation leads to increase in physical fitness status of the individual. The issue, however, is that there appear to be decline in the level of participation in physical activity among the world population. Anderson et al (2009) reported a decline in physical activity participation in school age children in Norway. Since physical activity co-relates positively with physical fitness, it therefore follows that decline in physical activity participation will equal result to decline in physical fitness. It follows that the challenge here is dealing with decline in physical activity participation which obviously would affect physical fitness which also in turn would affect adult hearing. That is because physical fitness correlates positively with cognitive learning.

Changing Mode of Transportation as it Affects Health-Related Fitness

The world is advancing in technological development and the transport sector is not left out. Technological advancement has brought in different modes of transport. In the ancient time people travelled to different locations majorly by walking and later through the use of bicycles. In the last century however motorized modes of transport has become increasingly more popular than walking and bicycling. Many now use mass transit, private cars, train, ship, while others go by aircraft. Although distance is a major factor in determining the mode of transport to adopt it has become clear that the average person is unwilling to walk even distances that are walkable (Rodrigue, Slack and Comtois, 2019). This dislike for walking and road infrastructure favor motorized transport as against non-motorized or active transport.

It is now a common experience that many journeys are now been done by motorized modes at transport than the active made (human energy driven modes of transport such as walking and cycling). This is not minding the fact that active transport has been proven to enhance physical fitness of the individual. Ostergared, Kolle, Steene-Johannessen, Anderseen and Andersen (2013) in an investigation of association between selected health-related fitness components and travel mode found that active transport especially cycling is associated with favorable body composition, better cardiorespiratory and muscular fitness. It follows that using walking and cycling as modes of transport enhances physical fitness of the learner. That is why the learner is encouraged to adopt walking and cycling as transport modes to and from school where the distance is within coverage.

Physical Fitness Status and Academic Achievement

The physical fitness has been defined earlier in this chapter as the ability of an individual to perform his or her day to day activities with vigor and alertness without undue fatigue, while at the same time still have energy for recreation and unforeseen circumstances. The more physically fit a person is the more he or she is able to undertake daily task with greater ease. One major part of daily task are academic activities which requires physical fitness to be able to take part activities for purpose of fitness may lead to more academic activities which could result to increased academic achievement.

Academic achievement is one of the outcomes of diligent academic activities by a physically fit individual studies show that the more physically fit a person is the more likely is academic achievement. Han (2018) found that students with higher levels of physical fitness tend to have higher academic performance in a study my Colcombe (2006), it was found that six-month aerobic training program increased the volume of gray and whites matter region of the brain by analyzing 69 people between the age of 60 and 79 years old.

Screen Time vs Physical Activities: How does screen time impact on adult learner?

Screen time has become another issue of concern as it relates to physical activity participation. Sequels to the technological advancement people now pay a lot of attention to viewing various screens. It is a common experience that many times people are either doing one thing or the other with their cell phone, working with the computer or viewing programs on the television. In a study conducted by Brien, Issartel and Belton (2018) on the relationship between physical activity, screen time and weight status of some adolescents found that overweight and obese participants accumulated more screen time than normal persons. Motamed-Gorjietal (2019) on their part found that where there is high participation in physical activity involvement in screen time was low as participants busy themselves in physical activity rather than screen time activity. Physical activity participation and involvement in screen time, therefore, have an inverse correlation. That means that when screen time participation is high, physical activity participation will be low. Low level of participation of the individual in physical activity means low level of physical fitness. Reducing time spent on the screen is essential for promoting physical activity participation and physical fitness status of the adult learner. Reducing screen time and improving health-related fitness help provide more time for learning activities that are not screen related. This is necessary because from experience many adult learners spend a lot of their screen time on social media such as Facebook and WhatsApp meeting with friends discussing issues that are of interest to them which may not be related to their study.

SOLUTION AND RECOMMENDATIONS

The following solutions and recommendations were made for the chapter:

1. More campaigns on the participation in physical activity by adult and children alike should be encouraged by government and corporate bodies. This may help reverse the trend on level of participation in physical exercises;

2. Governments all over the world should embark on massive development of active transport infrastructure. This may make the entire people to take to active transport as a way of life thereby promoting their health;
3. Institutional authorities should make the environment active transport friendly. This could make students or adult learners take to active transport to and from the classrooms; thereby helping them meet their daily need for physical activity.
4. Educational institutions, experts and practitioners in fitness and health should organize seminars to enlighten adult learners on the academic benefits of being physically fit. If they know that physical activity participation could improve academic performance it may motivate them to participate in physical activity and
5. There should be aggressive campaign against excessive involvement in screen time. The teachers and parents and family members should discourage their loved ones from spending too much of their time viewing programs that are not directed at meeting their academic needs. If this is achieved, then they will have more time to devote into physical activity for health promotion.

FUTURE RESEARCH DIRECTION

Researches in the area of physical fitness and health and various issues related to them are ongoing. However, the following are suggested future research directions:

1. Future research direction should focus more on factors that motivate participation in physical activity leading to physical fitness. If there are enough information on motivational factors it will be a lot easier to get adults to exercise;
2. More studies are needed to really find out the direct academic benefits of participating in physical activity;
3. Active transportation research would be looking at more convenient active transport modes that people would embrace without much persuasion;
4. Future research will be focusing on reducing the side-effect of exercises and different active transport modes. Reduction in the side-effect of exercise will encourage more to take part in it and
5. Future research should focus on direct application of physical exercise in enhancing adult learning.

CONCLUSION

The chapter discussed key issues concerned with health-related components of physical fitness. It discussed low level participation in physical activity, changing trend in the mode of transport and screen time as issues that are of concern in dealing with health-related components of physical fitness. It became obvious that there is reduction in level of physical activity participation globally and that this reduction in participation has led to reduction in level of health-related physical fitness status.

Some of the health-related physical fitness components related to the issues as discussed in this chapter are heart rate, blood pressure, body composition, strength, endurance, flexibility, and cardiorespiratory endurance. The issue of change in the trend of transportation is become another concern to the world. The change of mode of transport from active to passive in recent years is a threat to health-related physical

Table 1. Online-offline e-Learning schedule

	Synchronous E-Learning	Asynchronous E-learning
When	• Discussing the meaning of physical fitness • Students are exposed to health- related components of physical fitness • The plan for the training for different health related components of physical fitness is drawn.	• Students have the opportunity to reflect on the meaning of physical fitness • Students visualize what the health-related components are when they unable to attend face to face classes.
Why	In the synchronous e-learning students are more committed because they get to understand meaning of physical fitness better as they get quick and direct response from the leacher.	Here students spend more time trying to understand the concept of physical fitness as the feedback may be delayed.
How	Apart from face to face class other media such as video conference, instant message and chats	A synchronous means that could be used include e-mail, blogs and discussion boards
Online	Synchronous means: • Virtual classes where physical fitness components are explained and activities leading to each is component is demonstrated. • Video conferencing, where the teacher interacts with students and administrator training leading to acquisition of health-related components of fitness.	A synchronous means: • Web-based teaching of walking, arm raise, dumbbell, raise and arm swing in different director • Recorded physical fitness training could also be used in teaching the students and also help them acquire physical fitness if the follow the demonstrations.
Offline	Synchronous mean: • Demonstration of different exercises in the exercise physiology laboratory • Field trip to fitness centers	A synchronous means: • Textbooks on physical fitness • Videos
Examples	Group demonstrations are held where group members learn from one another. They plan their task and execute them together	• Students reflect on the various activities • Students are expected to share the ideas regarding various activities as well as assess the performances of their peers.

fitness. Change in the mode of transport affects adversely the physical fitness status of the individual. Adopting active transport mode will help the individual meet up with the day to day need of physical activity. This can happen by walking or riding bicycle to school or walking and riding bicycle to work-place. Active transport is a means of keeping the adult learner physically fit.

The chapter also discussed the various activities that develop the components of physical fitness. Among the activities discussed are walking which could help improve cardiorespiratory endurance, reduce heart rate, blood pressure and even strength and endurance when dumbbells are held in the hand during walking. Lifting the barbell also can be used to build strength and endurance as well as moderate body composition. The use of these various activities could help develop health–related physical components of the adult learner if properly and adequately utilized.

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KEY TERMS AND DEFINITIONS

Active Transport: This is defined as modes of transport that are driven by physical exerted energy such as is the case with walking and bicycling.

Blood Pressure: This is the pressure exerted by the blood against the walls of its containing vessel.

Body Composition: This refers to the ratio of leans and fats that make up the human body.

Cardiorespiratory Endurance: This refers to the ability of the cardiovascular and respiratory systems to sufficiently support a prolonged activity with excessive fatigue.

Flexibility: This is the ability of the joint to move freely around its axis without causing any crack in the joint.

Health Related Physical Fitness: This refers to the components of physical fitness that are required by all human beings irrespective of the field of endeavor.

Heart Rate: This is the number of heart beats per minute.

Isometric: It means the same length. It stands for the strength generated when muscles contract without a change in muscle length.

Muscle Endurance: This refers to the ability of a muscle or muscle group to resist fatigue or the ability of a muscle group to perform an activity repeatedly without much fatigue in a set time.

Muscle Strength: This is a force exerted by a muscle against resistance in one maximum effort.

Passive Transport: This mode of transport that is powered by motorized engines such as in a car, train ship aircraft.

Physical Activity: This refers to any form of activity anywhere that requires physical exertion of energy.

Screen Time: It refers to the time spent on viewing programs on a television, cell phone, computer and any other use of electronic screen for non-educational purposes.

APPENDIX

APPLICATION ACTIVITIES (Discussion Questions)

The following questions should be discussed and demonstrated where applicable.

1. What makes up health related physical fitness?
2. Discuss active transport as it concerns the health-related physical fitness of the adult learner?
3. Discuss how participation in screen time activity affect participation in physical activity
4. What is the normal heart rate?
5. Discuss normal blood pressure in relation to the health of the adult learner

Chapter 9

A Practitioner Guide on Backward Design Application for Online Aviation Training in Higher Education

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ABSTRACT

The aviation industry experienced a significant growth over the years. Such growth was supported by a highly knowledgeable workforce, which presented various skills, including problem-solving and decision-making. The need for a highly skilled workforce led an aviation-focused university located in southeast USA to provide students with learning opportunities to hone those skills to succeed in the industry. This chapter explains the process through which those learning opportunities are created. It presents a practitioner's guide on how that university is designing online courses for the aviation industry. The entire design and development process and the theories supporting it, such as Backward Design and authentic learning, are thoroughly discussed. The chapter also presents several challenges negatively impacting the successful design of those courses and how those challenges can be mitigated so instructionally-sound online courses are created.

INTRODUCTION

The purpose of this chapter is to describe the design and development of online courses supporting the academic mission of an aviation-oriented university in order to inform the online learning community of the process and challenges of designing online courses for a specific industry. Such university has received several accolades for the quality of the design and delivery of their online undergraduate and

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graduate courses over the years. The success of the instructional pursuits of the institution is largely credited to the online course development process and structure established by the institution's instructional design team in collaboration with the colleges and supporting departments.

The online course development process conducted by the instructional design team was built upon teaching and learning theories, practices, and frameworks targeting the design of instruction that benefits the non-traditional, adult learner. Those theories include Backward Design, Gagné's Nine Events of Instruction, Keller's ARCS Model, and authentic learning. They were selected because of their nature and foundation, which are focused on how adult learners develop new knowledge from existing knowledge and from their engagement with learning activities built upon real-world issues (Bofill, 2013; Brandon & All, 2010; Lombardi, 2017; Mbati, 2012; Tucker, YoungGonzaga, & Krause, 2014). The characteristics, demands, and limitations presented by the adult learner working in the aviation industry shaped the online course development process, as it geared the process to become more aligned with andragogical principles, such as prior experience of the learner as well as readiness and motivation to learn (Knowles, Holton III, & Swanson, 2012). By designing and developing learning activities based on those theories, practices, and frameworks, the instructional design team created a learning environment that provides adult learners with the knowledge and skills they need in order to succeed in their careers in the aviation industry.

The chapter will further explain the theoretical foundation underpinning the university's online course development process. The process spans several months and involves several stakeholders, such as instructional designers, senior instructional designers, instructional design and development directors, course developers, academic chairs, instructional technologists, and media producers. It starts with an initial course development project kickoff meeting, in which the director explains the entire online course development process to the course developer. Subsequently, the instructional designer and the course developer start collaborating on the design and development of the online course in a course template site within the institution's learning management system (LMS). Throughout its development process, the course undergoes a number of quality assurance reviews by content editors, senior instructional designers, and academic chairs. Once the course is entirely built in the course template site and the project is finalized, the course is transferred into a master template from which the sections are created.

Additionally, this chapter also provides a description of the resources available to course developers and instructional designers as they engage in the development process. Lastly, it will explain the common challenges associated with the design and development of undergraduate and graduate online courses; and the actions to mitigate those challenges while creating an effective learning environment for the adult learner in the aviation industry.

LITERATURE REVIEW

This section of the chapter explores the theoretical foundation upon which the online course development in question is centered. It covers the evolution of the aviation and aerospace industry and the role training played in such evolution. Additionally, this section of the chapter explains how the needs of the industry defined the workforce skills underpinning the industry evolution and how the university developed training focused on those skills. Lastly, this section explains the theories and practices adopted in the design of the university training – including Backward Design, Gagné's Nine Events of Instruction, Keller's ARCS Model, and authentic learning – and describes how those theories and practices provide foundation and structure to the instructional design process of aviation training.

The Growth of the Aviation Industry and the Need for Education

The aviation and aerospace industry experienced consistent growth for many years since its inception. The early days of the industry witnessed the development of hot air balloons and the achievement of the first powered and controlled flight by Orville and Wilbur Wright (Curley, 2012). From those early days, the industry evolved with the establishment of airmail routes, airlines, and with the development of wide-bodied commercial jets and the construction of world-class airport systems (Wensveen, 2018). With those achievements, the aviation industry became more complex in scope and in nature. Such growth occurred despite financial, governmental, socio-economical, as well as safety- and security-related challenges imposed by society over the years (Kane, 2012). The history of aviation is punctuated by milestones that resulted from cognitive efforts made by its professionals. Therefore, in order to grow and successfully overcome those challenges, the aviation industry relied heavily on instructionally- and pedagogically-sound training to ensure that its professionals are equipped with appropriate knowledge, skills, and aptitudes (Telfer, 2018).

The relationship between aviation and training has substantially evolved over the years. Since its inception, the aviation industry has benefited from different training approaches, which have been able to promote the growth of the industry while prioritizing security and safety. According to Kearns (2010), the evolution of training interventions in the industry can be generally segmented into four main phases: apprenticeship, simulation, safety, and customized training. With their accomplishment of operating the first powered and controlled flight, the Wright brothers established the basis upon which aviation training found its inception by using the apprenticeship model to teach other individuals the components and steps required to operate powered flights. With the growth of the industry, aviation training evolved and focused its attention on the mastery of flight performance standards. The efforts supporting aviation training at that point were centralized on simulation, which helped aviation training professionals to improve aircraft systems and components (Kearns, 2010) by authentically mimicking real-world flight operations (Jentsch, Curtis, & Salas, 2011). As those components gained universal adoption, the focus of aviation training shifted to safety as a major cornerstone in the industry, while training was still very much based on apprenticeship aided by simulation instruments. Consequently, elements of crew resource management (CRM) safety training were added to all aspects of aviation training (Kearns, 2010). The aviation industry presently thrives on customized training experiences that provide its professionals with opportunities to hone relevant skills, such as critical thinking, problem-solving, decision-making, and communication in order to solve complex problems. Therein lies an opportunity to enhance the design of learning experiences based on authenticity and direct application of skills.

Given the nature of the aviation and aerospace industry, the principles supporting adult learning gained relevance in the design and development of training for adult learners. According to Knowles et al. (2012), the principles underpinning adult learning efforts included the need of the learners to know, the learner's self-concept, the learner's orientation to learning, as well as the learner's prior experience, readiness to learn, and motivation to learn. Those principles guided the university in its attempt to provide education to those adult learners who are seeking career advancement or are attempting to join the aviation and aerospace industry.

The Role of the University Within the Aviation and Aerospace Industry

Given its nature and focus, the university described in this chapter has grown with the expansion of the aviation and aerospace industry. With such expansion and with the technological and managerial advancements made by the industry, the university has aimed its efforts at promoting excellence in aviation and aerospace training. Over the years, the university established academic programs that encompassed specialties supporting the industry, including aeronautics, aerospace engineering, aviation management, airport management, aviation safety, aviation security, human factors, project management in aviation, and, most recently, unmanned aerial systems operations. The intent has always been to ensure that aviation professionals pursuing academic and non-academic degrees with the university experienced learning that was designed and developed in accordance with the challenges presented by the aviation and aerospace industry.

The university's distance learning campus is focused on non-traditional, adult-oriented, online learning. The campus established a robust process to support the design and development of undergraduate, graduate, doctoral and continuing education courses that are aligned with the needs and demands of the aviation and aerospace industry. In the 2018-2019 academic year, the university had approximately 22,956 students, who registered for courses in different modalities, including online (asynchronously), through web-conferencing, and face-to-face. The university recorded 76,558 registrations for asynchronous online courses, 6,479 for courses delivered through web-conference, and 2,846 for face-to-face courses. The number student of registrations for asynchronous online courses illustrates the relevance of that particular delivery mode relative to the other delivery modes.

To execute that process, the university assembled a team of instructional designers, instructional technologists, videographers, photographers, graphic designers and audio specialists, who have extensive understanding of the design and development of instruction for the online learning environment. The department is titled Instructional Design and Development (IDD), which is composed of three teams of instructional designers and a team of media producers titled Media Production and Instructional Technology team. Those education professionals collaborate with faculty members that serve as subject matter experts, known as course developers, on the design and development of the institution's online courses. The online courses are delivered to the students through Canvas™, the university's learning management system (LMS).

Instructional Design Theories, Models, and Practices

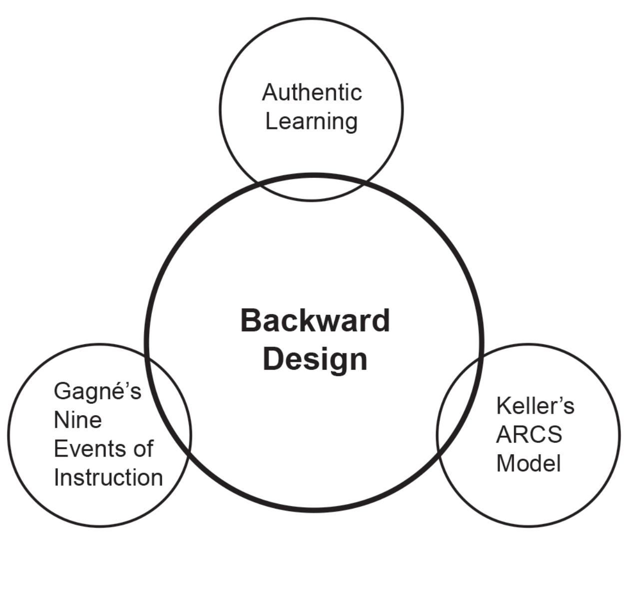
Backward Design

The IDD team follows Backward Design as the instructional design approach in collaboration with course developers in the design and development of the university's online courses. The Backward Design approach is a framework applied to plan and design curriculum by focusing on what the learner will be able to do upon the successful completion of the learning experience (Wiggins & McTighe, 2006). This approach is used in several types of educational levels including K-12 (Reynolds & Kerns, 2017), university undergraduate through doctoral programs (Neal & Hampton, 2016), and professional development (Graff, 2011). Backward Design is modality agnostic and is used in face-to-face courses, blended courses (Florian & Zimmerman, 2015), and asynchronous online courses (Neal & Hampton, 2016). Another aspect of the Backward Design approach is the creation of curriculum that emphasizes the learners' understanding and transference of knowledge through authentic assessment (Jozwik, Lin, & Cuenca-Carlino, 2017). Six facets serve as a guide to create appropriate assessments that measure the degree of understanding the students gain (Jozwik, Lin, & Cuenca-Calino, 2017). These facets include capacity to explain, interpret, apply, shift perspective, empathize, and self-assess (McTighe & Wiggins, 2012). Wiggins and McTighe state "The ability to transfer our knowledge and skill effectively involves the capacity to take what we know and use it creatively, flexibly, fluently, in different settings or problems, on our own" (2006, p. 40). One of the purposes of Backward Design is to intentionally create instruction and experiences that elicits the transfer of knowledge (Florian & Zimmerman, 2015). While the Backward Design approach serves as a framework for planning curriculum, it is versatile to allow the curriculum developer to incorporate other learning theories and instructional design models into the course development. Three common models for instructional design that the university has incorporated with the Backward Design approach are Gagné's Nine Events of Instruction, Keller's ARCS Model, and authentic learning (see Figure 1).

Gagné's Nine Events of Instruction

According the Gagné, Briggs, and Wager, "The events of instruction are designed to make it possible for learners to proceed from ''where they are" to the achievement of the capability identified as the target objective" (1992, p. 189). The nine instructional events focus on enriching the learners' performance and the model "is compatible with web-based courses" (Hannon, Umble, Alexander, Francisco, Steckler, Tudor, and Upshaw, 2002, p.1). Gagné et al. defined nine events of instruction along with the different internal processes of learning in which each event relates. Table 1, adapted from Gagne (1992), shows the nine events and their relation to learning processes:

Figure 1. Graphic representation of the theoretical framework supporting the university's online course development process. Backward design is used as the main theoretical approach and is supported by Gagné's Nine Events of Instruction, Keller's ARCS Model, and authentic learning.
Source: Authors.



The general structure of the online courses offered by the university is composed of weekly modules. These modules include overviews and objectives, instructional materials, assessment activities, and wrap-ups. These module activities and assessments are designed and created with guidance from the aforementioned nine instructional events. Creating learning materials and assessments that include clear instructions and rubrics help provide guidance, elicit performance, and create an opportunity for feedback. While the courses are broken down into weekly module units, they build upon each other to help the student retain and transfer the knowledge throughout the course and ultimately, retain and transfer the knowledge after the course is complete. Transference of knowledge and skills from the class to the workplace is a practice utilized by the instructional design team by incorporating real-world examples and authentic assessments.

Keller's ARCS Model

According to Park and Yun, "Motivation is essential for online learners because it helps them grow as self-regulated learners and further engage them into online learning activities" (2017, p. 44). Keller's ARCS Model is based on the concept that there are four requirements that need to be met for a person to obtain motivation to learn (Keller, 1987). These four requirements are the categories that outline the ARCS model: attention, relevance, confidence, and satisfaction (Keller, 2008). According to Keller, the categories can be defined as follows:

- Attention: Capturing the interest of the learners; stimulation the curiosity to learn
- Relevance: Meeting the personal needs/goals of the learner to effect of positive attitude
- Confidence: Helping learners believe/feel that they will succeed and control their success
- Satisfaction: Reinforcing accomplishment with rewards (internal and external) (1987, p. 2)

Promoting student motivation and engagement is another priority taken into consideration when creating instructional materials and assessments for the online courses. While the instructional content and assessments may vary from course to course, aligning the assessments to the goals of the course

Table 1. The Nine Events of Instruction and their relations to learning processes (Gagné et al., 1992, p. 190).

Instructional Event	Relation to Learning Process
1. Gain attention	Reception of patterns of neural impulses
2. Inform learner of the objective	Activating a process of executive control
3. Stimulate recall of prerequisite learning	Retrieval of prior learning to working memory
4. Present the stimulus material	Emphasizing features for selective perception
5. Provide learning guidance	Semantic encoding; cues for retrieval
6. Elicit the performance	Activating response organization
7. Provide feedback about performance correctness	Establishing reinforcement
8. Assess the performance	Activating retrieval; making reinforcement possible
9. Enhance retention and transfer	Providing cues and strategies for retrieval

helps ensure relevance. Going one step further by creating content and assessments that are relatable to real-world experiences, creating and organizing the content into manageable units, providing guidance, and several opportunities for feedback are some ways the courses help instill confidence and satisfaction for the learner.

Authentic Learning

In addition to Gagné's Nine Events of Instruction and Keller's ARCS model, authentic learning plays an instrumental role in the design and development of the university's online courses. Authentic learning is commonly known as a pedagogical approach focused on developing and situating learning activities and tasks in the context of future use by learners (Herrington, Reeves, & Oliver, 2014). According to Mims (2003), as a pedagogical approach to course designing, teaching, and learning, authentic learning provides learners with opportunities to explore, discuss, and construct concepts and relationships within contexts based on real-world problems, challenges, projects, and tasks that are important to them. The essence of authentic learning resides in the ability to actively engage students and tap into their intrinsic motivation (Mims, 2003). Hence the need to design, develop, and deliver online courses that allow the learners to actively participate in learning experiences that are authentic to the aviation and aerospace industry as a means to hone relevance and directly applicable knowledge and skills.

One of the reasons why the university's online course development process follows the authentic learning approach is the fact that the approach finds its roots in the situated learning theory. The situated learning theory is based on the notion that knowledge and skills are effectively gained in contexts that genuinely portray the ways that knowledge and skills will be valuable and useful in real life (Herrington & Oliver, 2000). When learning is genuine to real world contexts, learners are successfully and actively engaged in authentic learning problems and challenges that allow the learners to connect the knowledge that is being gained with their prior knowledge (Mims, 2003). The adoption of authentic learning as a pedagogical approach to course design and development at the university is just an example of the paradigm shift that Herrington and Oliver (2000) call a philosophical change from a behaviorist to a constructivist approach that addresses the conflicts between formal school learning and real-life learning. As the university's online courses target primarily, yet not exclusively, working adults who have existing knowledge on certain topics, authentic learning lends itself extremely appropriate for the design and development of those courses.

The aspects upon which authentic learning is based are intrinsically married with the need to create learning experiences that truly mirror the intricacies of the aviation and aerospace industry. Those aspects move away from superficial approaches to learning while prioritizing deep approaches to learning, which include learner-centered learning, problem-based learning, and computer-supported collaboration (Herrington, Reeves, & Oliver, 2006). With that in mind, the university's online courses are designed and developed according to aspects indicated by Meyers and Nulty (2009), who stated that learning experiences are real-world based and relevant, are interlinked and build upon each other in sequence, lead learners to engage in higher order cognitive processes gradually, are aligned with the learning goals, and provide learners with motivation to learn by solving problems and overcoming challenges. Those experiences include problem-based activities, case studies, and role-playing exercises, among others (Lombardi, 2007), which provide the university learners with the skills they need to succeed in their work environment.

Delving deeper into the concepts supporting authentic learning, the university's online course development process focuses on certain factors to ensure the product of the process is intrinsically aligned with the challenges and demands of the aviation and aerospace industry. Those factors include real-world relevance of learning, sustained investigation by the learner, collaboration among learners, and reflection. Either being designed and developed following a combination of all those aspects or with some of them, the university's online courses are intrinsically aimed at providing learners with opportunities to hone knowledge and skills that play an instrumental role in the success of the aviation and aerospace industry.

Real-world relevance is the cornerstone of the university's online courses. Herrington et al. (2006) indicate that authentic activities are focused on matching as nearly as possible the activities related to real-world tasks of work environments. Learning comes to fruition as learners engage in authentic learning activities by working actively with concepts, facts, and challenges that mimic the practices of the discipline or discipline covered in the online course (Lombardi, 2007). An example of how the university's online courses bring real-world relevance to the learning environment is the graduate course on aircraft accident analysis and investigation. The course goal is to prepare the learner to all aspects of the aircraft accident investigation process starting with preparation for investigation through report writing. The course uses simulation as a major learning tool by asking the students to navigate through a virtual aircraft crash site, which was built based on a real aircraft crash. In that course, learners are asked to engage in activities that are authentic to the tasks executed by aircraft accident investigators in real-world environments, including visiting the crash site to collect evidence and interviewing crash survivors. At the end of the term, learners should leave the course not only with a deep and meaningful understanding of the challenges related to the investigation of aircraft accidents, but also with a set of skills required to conduct an aircraft accident investigation.

The university's online courses also promote a sustained investigation by the student. Sustained investigation is one of the tenets of authentic learning. It is based on the notion that authentic learning activities cannot be solved in minutes or hours (Lombardi, 2007). Instead, authentic learning requires the learner to engage in an activity over a sustained period of time by immersing themselves in the problem or challenge to be overcome (Herrington et al., 2006). An example of this approach is the term project adopted in the undergraduate course on unmanned maritime vehicles. The course introduces the student to fundamental concepts and applications of unmanned maritime vehicles. The course project asks the student to plan and develop an expedition to be conducted with the deployment of an unmanned maritime vehicle. The students are expected to engage in sustained investigation to successfully plan the expedition by establishing the scope and mission of the expedition, selecting the unmanned maritime vehicle, and making determinations regarding the launch, recovery, and operations of the vehicle. Additionally, the students are expected to review and critique the expedition plan of their fellow students, which promotes collaboration and critical thinking.

The adoption of collaboration-based activities is one of the recurrent practices in the design of the university's online courses. Such practice is based on the notion that activities that promote collaboration among learners is one of the many pillars sustaining authentic learning environments. Promoting collaboration-based learning activities allow learners to develop skills that are relevant to learning environments and, subsequently, to work environments (Herrington et al., 2006). According to Lombardi (2007), authentic activities make collaboration an essential component of learning simply because success is not achievable by a learner when he or she works alone. An example of this approach is the graduate course on advanced meteorology. The course is focused on providing the students with the skills to carry out responsibilities in aviation-related endeavors by applying meteorological concepts, tools, and technologies in order to determine and mitigate the impacts of weather on aviation operations. One of the assessments asks the students to work collaboratively on the creation of a flight weather forecast and briefing. The assessment spans a number of module weeks, in which the students are expected to collect real time information and develop weather forecast-related deliverables. By participating in this activity, students should be able to leave the course have a solid understanding of the process one must follow to work with weather forecast professionals to mitigate the impacts of weather on aviation operations.

The act of reflecting also plays an instrumental role in the success of authentic learning environments. According to Herrington et al. (2006), authentic learning activities provide learners with opportunities to engage in the act of reflecting. Such reflection primarily targets the topics explored in the course. But, most importantly, reflection allows learners to think about how much the learned topics changed them as well as their behavior and the way they work. Learners engage in the act of reflection either individually or in groups as learners become part of a community (Lombardi, 2007). An example of this approach in the undergraduate course related to risk reduction for fire and emergency services. The course provides the students with a framework to understand the ethical, sociological, organizational, political, and legal components of risk reduction. It also presents the students with a methodology for the development of a comprehensive risk reduction plan. At the end of the second weekly module, students are asked to engage in reflection to develop their understanding of what it means to successfully conduct risk reduction. By engaging in this activity, students develop an understanding of the knowledge and skills one must develop to conduct a risk reduction plan.

In addition to the aspects explained above, authentic learning environments thrive on the mindful, purposeful, and strategic adoption of technology and learning technologies. Authentic learning activities can use learning technologies as tools that promote high level cognition aimed to prepare learners to excel in overcoming the challenges of the workplace (Parker, Maor, & Herrington, 2013). Such practice is based on the notion that the adoption of technologies, when used as cognitive tools, promote mental effort by the learner (Herrington & Parker, 2013). Additionally, when created and adopted in a pedagogically-sound fashion, learning technologies are able to promote characteristics of authentic learning, including collaboration across distance, construction of knowledge by the learner either individually or in groups, individual or group articulation, and sharing of learning results (Bozalek, Gachago, Alexander, Watters, Wood, Ivala & Herrington, 2013). Consequently, the nature of authentic learning guides the design and development of the university's courses in the online learning environment.

THE DESIGN AND DEVELOPMENT OF THE UNIVERSITY'S ONLINE COURSES

Overview

This section of the chapter is aimed at thoroughly explaining the process through which the university's online courses are designed and developed. While the previous section of this chapter explained the theoretical approached followed by the university to create learning experiences for the adult learner in the aviation industry, this section focuses on the steps, stakeholders, roles and responsibilities, and timeline pertaining to the instructional design process and practices followed by the university.

The university utilizes a templated model for the design and development of its online courses. The course developer and the instructional designer collaborate to create the course in a working shell titled production template. The template is located inside Canvas. At the end of the development process, the content of the production template is copied into a master template, from which the sections are created. The master template serves as a secure place in which the course is kept intact, especially while the course is undergoing an update or a redevelopment in the production template. Designing and developing courses through a template model supports the university's distributed learning strategy by ensuring that all students taking a course will have the same learning materials and assessments regardless of the course section in which they are enrolled.

Before the online course development process begins, the Master Course Outline, which contains the course description, course goals, and course learning outcomes has already been created and approved by the college. Therefore, the analysis regarding the need for the course has been completed prior to the development process described below.

The online course development process is a major project with several enabling processes and moving pieces. It takes on average four months from beginning to end. The major steps of the process that occur within this timeframe are:

Step 1: Course Development Kickoff Meeting
Step 2: Design Meeting
Step 3: Course Design Worksheet (CDW) Completion
Step 4: Content creation – Completion of first few modules
Step 5: Submission of required course materials to the bookstore
Step 6: First round of reviews (Design and Academic)
Step 7: Content creation – Completion of remaining modules
Step 8: Completion of multimedia learning asset adopted in the course
Step 9: Final round of reviews (Quality, Design, and Academic)
Step 10: Production template copied into master template and sections released

Step 1: Course Development Kickoff Meeting

The online course development process begins with the Kickoff Meeting. The directors of the IDD department host this town hall format webinar with new course developers or with those developers who have not gone through the development process in the last year. The purpose of the Kickoff Meeting is to explain the entire development process from a big-picture perspective. Important information such as the timeline, mandatory due dates, the adoption of required course materials, copyright compliance, accessibility compliance, the review process, a quick overview of the Backward Design process, and how to fill out the CDW are explained. At the conclusion of the webinar, there is a question and answer session. Several resources available for the course developer, such as an internally created tutorial about Backward Design, an objectives builder tool, a module workload estimator, and the Quality Matters Higher Ed Rubric are also introduced and explained in the Kickoff Meeting.

Step 2: Design Meeting

Purpose

The next step in the process is the Design Meeting. The instructional designer assigned to work on the particular course development project meets with the course developer, program/discipline chair, and senior instructional designer. The purpose of this meeting is to discuss the logistics of course development process in more detail. The other important item discussed in the Design Meeting is the vision of the course developer regarding the learning goals and the learning experience provided to the students in the course. Further explanation of the Backward Design approach, along with more detailed instructions for completing the CDW, is also provided by the instructional designer.

Project Management and Logistics

To help keep the project on task, the instructional designer and the course developer use a project management tool called Wrike™. That tool helps the entire instructional design team keep track of all course development, redevelopment, and update projects. It also promotes transparency and accountability regarding the status of the projects, as reports are generated and shared with the chairs and college deans. Wrike™ also serves as another communication channel via the comments, tasks, and subtasks features. Since Wrike™ integrates with the university email system, it is easy to convert email communications, including file attachments, into tasks or comments directly into the Wrike™ project. During the Design Meeting, the instructional designer introduces the tool to the course developer and chair and demonstrates how the tool will be used during the development process.

One of the challenges the department faces is that while the Instructional Design Department is located at the campus headquarters, most of the course developers are located in different states or different countries. Consequently, sometimes time zone differences make it difficult for synchronous meetings between the course developer and the instructional designer. Logistics for communication between the course developer and instructional designer are determined during the Design Meeting. Email is often the primary form of communication. If possible, and when needed, weekly synchronous meetings are held using Skype for Business™.

One of the most crucial aspects of the online course development process is the timeline. A proposed development schedule is presented and discussed in the Design Meeting. Any scheduling conflicts, such as traveling for conferences, holidays, and scheduled time off are reviewed and any adjustments are made as needed. In general, the timeline calls for one module of content due each week from the course developer, time allotted for any media production that may be needed, and a few weeks at the end of the project for the several rounds of quality assurance reviews. Those dates, which are agreed upon in the Design Meeting, are added to the tasks and subtasks within the Wrike™ project.

Course Vision

The most important aspect of the Design Meeting is to discuss what the course developer envisions for the course. The course developer, department/program chair, and instructional designer examine the pre-determined course learning outcomes (LOs) and brainstorm ideas for the learning experience for the students based on those LOs. For example, when examining the LOs, application may be a consistent theme and goal of the course, so ideas of real-world projects being integrated into the course are discussed. For courses that are being redeveloped, the course developer has experience teaching the course and has identified the areas of the course that need major improvement and areas of the course that work really well. Based on this knowledge and experience, the course developer describes their vision of how to improve the course. The chair will also interject ideas about the direction of the course regarding how the course fits within the degree program and expectations or particular requirements that the college dean wants in the courses (e.g. more project-based activities instead of multiple-choice exams).

Based on those brainstorming conversations, the instructional designer explains the CDW in more detail to help the course developer transform those ideas and vision of the course into a written outline. This goal of the conversation in the Design Meeting is to prepare the course developer to fill out the CDW (Step 3 of the course development process), which is due the following week. Details of the CDW based on the Backward Design approach is explained in the CDW section of this chapter. The instructional designer informs the developer and chair of the importance of creating original content for the course instead of textbook-centric courses. The instructional designer also encourages the course developer to consider the importance of authentic assessments, problem-based assessments, and activities that foster student engagement as the course developer works on the CDW.

Workflow for Content Delivery

The workflow for content delivery is a straight forward process. The course developer develops the content and submits it to the instructional designer on a regular and pre-determined basis. Within the production template, there is a module titled Development, which is a dedicated work space for the course developer. During the Design Meeting, the instructional designer introduces the Development module to the course developer by describing its components and the role it plays in the course development process. The Development module contains several documents related to the course development process, including the CDW, the Module Guide, and Module Template content pages for each module of the course.

The CDW is the seminal document in which the course developer will map out the course following the Backward Design approach. The Module Guide is a reference for the developer regarding the components of a module. Within the Module Guide, directions and guidance are provided to the course developer regarding best practices of instructional models, such as Gagné's Nine Events, Keller's ARCS Model, and authentic learning. For instance, the Module Guide page provides an explanation for creating engaging module overviews to gain the learners attention; reminds the course developer about the importance of creating authentic assessments; and provides guidance for creating module wrap-ups that not only summarizes the module concepts, they should also connect those concepts to the following module. Lastly, the Module Templates are the documents in which the course developer will use to develop the course. Examples of these documents, along with more detailed descriptions, are provided later in this chapter.

Learning Assets and Copyright

The course developers are expected to create their own, original content and materials for the course they are developing. During the Design Meeting, the course developer and the instructional designer take the opportunity to brainstorm ideas about the creation of original multimedia content for the course, such as interactive learning objects, videos, or other media for the course. A major component that is discussed regarding multimedia content creation is that it should benefit the learner and support the learning goals. In other words, an animation should not be created and added to the course just for the sake of adding animation. If there is a valid need for multimedia materials in the course, these projects will be executed by the Media Production and Instructional Technology team. However, several course design elements are emphasized regarding the course content and media during the Design Meeting. For instance, the importance of complying with copyright policies and creating course materials that are accessible to all learners regardless of their physical limitations.

Course Materials and Technology

Another topic of discussion in the Design Meeting is the required materials that the student will need for the course. The due dates for the information to get to the bookstore is imperative. Because the university offers courses to many students deployed in military locations across the globe, the bookstore needs time to send those students their materials in time for the course to start. The instructional designer also encourages the course developer to utilize materials from the university's online library, given the large number of aviation-related resources within the library databases available to the students. There is a liaison from the library who is dedicated to the instructional design team and assists the course developers to locate and curate resources for the online courses.

In addition to the required reading materials, the instructional designer and the course developer discuss the possible use of technologies and external tools in the course. During the Design Meeting, if the course developer determines that the course will require the use of specific technology tools by the students, the course developer and instructional designer will need to submit the tool through an internal review process by filling out the Canvas™ Tool Review form, which is submitted to the Academic Technology team. The Academic Technology team is responsible for providing support to faculty and students at the university. The tool goes through a thorough vetting process and is reviewed for functionality, limitations, cost, required support or integration, accessibility, and other aspects and features. If the course developer is unsure of any tools the students may need in the course, the instructional designer makes them aware that there is a vetting process in place and needs to be taken into consideration with the course development deadline.

While these items are addressed in all Design Meetings, each of these meetings are unique as the courses created. They are beneficial to ensure all concerned parties are on the same page, expectations from the chairs and college deans are expressed, along with the expectations from the IDD team. The Design Meeting helps set the tone for the entire online course development process.

Step 3: CDW Completion

As previously mentioned, the instructional design team follows the Backward Design approach as the primary framework for all online course developments. The Backward Design approach is a framework that begins with the end result in mind and consists of three stages: the identification of the desired results, the determination of acceptable evidence, and, lastly, the establishment of learning experiences and instruction (Wiggins & McTighe, 2006). In this setup of the course development process, the course developer completes the CDW, which is based on the three stages of the Backward Design approach.

The first stage of the Backward Design approach is the identification of the desired results. As previously mentioned, before course development projects come to the IDD team, the colleges have already created the Master Course Outline (MCO), which contains the course description, course goals, and the LOs. The information from the MCO, once approved, is made available to the students through the campus catalog. Therefore, when the instructional designer and the course developer begin working on the course, the LOs are already determined. However, because the university's online courses are segmented into weekly modules, which are discrete units of instruction, the course developer creates granular, measurable learning goals for each module. Those learning goals, which are called Module Objectives (MO), provide support to the course learning outcomes. Measurable verbs from the different levels of cognition in accordance with Bloom's Taxonomy are used to create the module objectives. According to Adams:

The [Bloom's] taxonomy is useful in two important ways. First, use of the taxonomy encourages instructors to think of learning objectives in behavioral terms to consider what the learner can do as a result of the instruction. A learning objective written using action verbs will indicate the best method of assessing the skills and knowledge taught (2015, p. 153).

The revised Bloom's taxonomy includes the following levels of cognition: knowledge/remember, understand, apply, analyze, evaluate, and create (Stanny, 2016). Within each of these cognition levels, corresponding measurable verbs are used to create observable learning goals in which learners can demonstrate the knowledge and skills they have acquired (see Table 2). Since the online courses are undergraduate and graduate-level courses, and the main student population consists of adult learners, faculty course developers are strongly encouraged from the instructional designers and the college deans to create module objectives which align with the higher levels of cognition. This ensures the learners are

Table 2. Concise list of suggested measurable verbs for the six different levels of cognition adapted from Stanny (2016).

Knowledge/ Remember	Understand	Apply	Analyze	Evaluate	Create
Recall List Select	Distinguish Explain Summarize	Demonstrate Prepare Solve	Appraise Compare Differentiate	Argue Critique Defend	Construct Formulate Produce

Table 3. Stage 1 of the course design worksheet

Stage 1 - Establish Desired Results (Learning Outcomes from Course Outline) In Stage 1, locate the learning outcomes listed in the course outline and transfer them to the section below (you may need to add or subtract LO#s.) LO 1: LO 2: LO 3: LO 4: LO 5: LO 6: LO 7: LO 8: LO 9: LO 10:
Take some time to reflect on these learning outcomes. Are there themes or big ideas around which you can organize and sequence learning in the course? What are some low risk (quizzes, discussions, blogs, wikis, etc.) and high risk (projects, debates, presentations, research papers, etc.) ways in which students could demonstrate mastery of these outcomes? Sketch out some of your ideas in the text box below.
Initial Ideas

Table 4. Stage 2 of the course design worksheet

Stage 2 - Determine Acceptable Evidence (Assessment)			
Stage 1	**Stage 2**		
Learning Outcomes	**Module Objectives**	**Assessments**	**Criteria**
If the desired result is for learners to:	Then you need evidence of students' ability to:	So, the assessments need to include some things like:	And the assessments will be evaluated with this criterion:
Example: *LO1: Evaluate the operating characteristics of aircraft propulsion as well as electrical and hydraulic systems.*	***Example****:* *1. Explain aircraft propulsion.* *2. Assess aircraft electrical and hydraulic systems.* *3. Criticize the characteristics of aircraft propulsion as well as electrical and hydraulic systems.*	***Example:*** *Presentation recording explaining aircraft propulsion.* *Quiz about characteristics of electrical and hydraulic systems.* *Writing assignment about the characteristics of aircraft propulsion, electrical systems, and hydraulic systems.*	***Example****:* *Thoroughness of explanation.* *Use of supporting literature.* *Grammar and spelling.*
LO 1:			
LO 2:			
LO 3:			
LO 4:			
LO 5:			
LO 6:			
LO 7:			
LO 8:			
LO 9:			
LO 10:			

applying, analyzing, evaluating, or creating as they complete their assignments, which will be aligned to these higher-level objectives.

In the Stage 1 Table of the CDW, the course developer examines the LOs and writes down their initial ideas for the course (see Table 3).

The second stage of the Backward Design approach is the determination of acceptable evidence. In this stage, the developer examines the LOs and MOs and creates assessment ideas that will properly and accurately verify whether the students achieved the LOs and MOs supporting the course (see Table 4). For example, if the MO states that students will 'explain' a concept or process, then there should be an assessment where the students are asked to explain the concept or process. A writing assignment, discussion activity, or an audio narrated presentation are some examples of assessments that would measure that objective.

The third stage of the Backward Design approach is the establishment of ideas for the instructional materials that will support the student in achieving the learning goals. In addition to planning the instructional materials, the developers also organize the module objectives that they created in stage one into the module sequence of the course. The Stage 3 Table is organized into the appropriate number of modules, one for each week of the course term (see Table 5). The Stage 3 Table provides an opportunity

Table 5. Stage 3 of the course design worksheet

Stage 3 - Plan Learning Experiences and Instruction (Activities)				
Module #	**Title**	**Module Objectives**	**Learning Activities**	**Resources**
Example: M1	*Aircraft Propulsion, Electric Systems, and Hydraulic Systems*	*1. Explain aircraft propulsion.* *2. Assess aircraft electrical and hydraulic systems.* *3. Criticize the characteristics of aircraft propulsion as well as electrical and hydraulic systems.*	• *Readings* • *Video* • *Presentation* • *Discussion about systems*	• *Textbook* • *Web Resources*
M1				
M2				
M3				
M4				
M5				
M6				
M7				
M8				
M9				

for the developer to organize and scaffold the content by connecting and building on the concepts and topics throughout the course.

Once the CDW is completed, the instructional designer sends it to the senior instructional designer and academic chairs for their review. They ensure the module objectives are aligned to the course learning outcomes, that the objectives are written with measurable verbs, and that the level of Bloom's Taxonomy is consistent between the outcomes, objectives, and assessment activity ideas. After the course developer addresses the feedback and suggestions, the academic chair reviews the CDW. Once the CDW is approved in the reviews, the course developer begins working on the course content by completing the Module Template pages.

Step 4: Content Creation

Incorporate Learning Theories/Best Practices

Within the Development area, the course developer begins to fill out the Module Template pages, one page for each module in the course. The Module Template is preceded by a Module Guide page, which describes the components of a module and explains how course developers should fill out the Module Templates. The Module Guide also provides guidance for best practices of creating online learning activities. The Module Template page consists of content placeholders for each component of the module, such as the Module Overview, the Module Objectives, several activity placeholders, and the Module Wrap-Up.

Module Guide

The course development integrates the basic principles of *Backward Design* (Wiggins & McTighe, 2006), equipping and enabling students to demonstrate deep understanding of the learning outcomes through authentic assessment.

The nine module weeks of learning activities and assessments follow the WHERETO elements of instructional design, outlined by Wiggins and McTighe (2006): W-Ensure that students understand WHERE the unit is headed and WHY; H-Hook students in the beginning and HOLD their attention throughout; E-EQUIP students with necessary experiences, tools, knowledge, and how-to to meet performance goals; R-Provide students with numerous opportunities to RETHINK big ideas, REFLECT on progress, and REVISE their work; E-Build in opportunities for students to EVALUATE progress and self-assess; T-Be TAILORED to reflect individual talent, interests, styles, and needs; and O-Be ORGANIZED to optimize deep understanding as opposed to superficial coverage.

This guide explains the various elements of the Module Template you will complete for each module in the course. Refer to the Course Design Worksheet to help you maintain focus on the logical flow between modules and the alignment of learning outcomes, assessment strategies, and learning activities.

1. **Title:** Strive for a descriptive title that captures the essence of the module. Be original; avoid using chapter titles from the book.
2. **Overview:** Each module is designed to flow with an opening narrative (overview), a description of what students will achieve in the module (objectives), engaging, purposeful work and assessments (activities), and a summary (wrap-up) that reinforces the objectives and leads students into the next module. The module overview HOOKS students in the beginning and HOLDS their attention by presenting thought-provoking questions, challenging problems to be addressed, or puzzles to be unraveled.

   The overview typically consists of one or two paragraphs of text but may be presented as audio or video.
3. **Module Objectives**

   Recall the following table from the Course Design Worksheet and refer to the objectives you sketched out for your modules:

Learning Outcomes	Module Objectives	Assessments	Criteria
If the desired result is for learners to . . .	Then you need evidence of students' ability to . . .	So, the assessments need to include some things like . . .	And the assessments will be evaluated with this criteria . . .

   For each module, you will list the targeted goal statements (objectives) that define skills or abilities students will have mastered after successfully completing the learning activities. Each module objective must be supported within the module by an assessment that measures the objective. By referring to the completed Course Design Worksheet, you will be able to maintain focus on the alignment between learning outcomes, module objectives, and assessments as you design the learning activities for each module.

Module objectives are statements that begin with a measurable action verb. Typically, modules contain between three and five objectives. For each objective, indicate, in parentheses, the number of the course learning outcome to which it is aligned.

4. **Activities**

There is no requirement for a specific number of activities per module. The general target for student time on task per module is 10 - 12 hours for undergraduate courses and 12 - 15 hours for graduate courses.

In designing effective and engaging learning activities, the focus is on (a) interesting and important ideas, questions, issues, and problems, (b) obvious real-world application, (c) variety, (d) opportunities to learn from trial and error, (e) collaboration, and (f) logical flow between the parts and the whole. Learning activities may include readings, videos, research, discussions, debates, group projects, wikis, blogs, quizzes, and so forth.

In reference to the WHERETO model, learning activities are designed to EQUIP students with necessary experiences, tools, knowledge, and how-to to meet performance goals; provide students with numerous opportunities to RETHINK big ideas, REFLECT on progress, and REVISE their work; build in opportunities for students to EVALUATE progress and self-assess; be TAILORED to reflect individual talent, interests, styles, and needs; and be ORGANIZED to optimize deep understanding as opposed to superficial coverage.

For each activity, include:

- Name of the activity (Example: Competitive Advantage)
- Type of activity (Example: Discussion)
- Activity description and instructions. Be sure to add context to the instructions, explaining why the activity is important, how it relates to the course outcomes, and how this activity prepares students for upcoming activities.
- Attach any supporting files needed for activities. Discuss test bank pool requirements and formatting options with your instructional designer.
- Learning Outcome and Module Objective alignment (Example: LO1 & MO5)
- Ensure to incorporate activities that address critical thinking, problem solving, and communication skills as appropriate.
- Whether the activity is graded or ungraded. (Note: Graded activities in Worldwide courses are normally set at 100 points possible, and then weighted in grade calculations according to the assessment schema determined by the developer.)
- If graded, the criteria or rubric to be used for assessment.
- Estimated amount of time students will spend on the activity.

Refer to the completed Course Design Worksheet in order to maintain focus on the alignment between course outcomes, assessments, and learning activities, as well as the design strategy for sequencing and flow of instruction. Review the Quality Matters Rubric to ensure that your activities are balanced and include the appropriate elements of an exemplary course. Additionally, have a look at our IDD Innovation Showcase, which presents exemplary activities created by instructional designers and course developers, as well as tools and resources available for our online courses. Lastly, use the Module Workload Estimator to estimate student workload for each module.

5. **Wrap-Up**
   The wrap-up summarizes and reinforces the module objectives and leads students into the next module. The wrap-up is an important element in helping students make connections between what they have just learned and how it prepares them to meet the objectives in the next module.
   Wrap-ups are typically comprised of one to two paragraphs of text and may also be presented in audio or video format.
6. **Instructor Guidance**
   Provide guidance for future instructors about how to teach the module. Include tips, suggestions, key points to highlight in discussions or announcements, possible issues, and so forth.
7. **Additional Information**
   Include any additional information regarding strategies for the module, ideas you would like the instructional designer to include, and so forth, in this section.

Module 1 Template

Please refer to the **Module Guide** for detailed guidance in completing this template. Attach any supporting files needed for activities. Use the Module Workload Estimator to estimate student workload for this module.

1. Title:
2. Overview:
3. Module Objectives
   Upon successful completion of this module, you will be able to:
   1. x
   2. x
   3. x
   4. x
   5. x
4. Activities
   Add or subtract activity sections below to meet your course design needs.
   [Readers: Please note, in the actual template there is a placeholder for five activities. For space only two placeholders are shown as examples. There is no requirement for the number of activities each module must have, as long as the workload for each module is met: 10-12 hours for undergrad courses and 12-15 hours for graduate courses.]
   Activity 1
   Name:
   Type of activity:
   Activity description/instructions:
   Graded or ungraded:
   If graded, the criteria or rubric that will be used to assess activity:
   If graded, please indicate:
   - **Learning Outcomes** that align with this activity:
   - **Module Objectives** that align with this activity:

   Estimated amount of time students will spend on this activity:

Activity 2
Name:
Type of activity:
Activity description/instructions:
Graded or ungraded:
If graded, the criteria or rubric that will be used to assess activity:
If graded, please indicate:
- **Learning Outcomes** that align with this activity:
- **Module Objectives** that align with this activity:

Estimated amount of time students will spend on this activity:

5. Wrap-Up
6. Instructor Guidance
7. Additional Information

The instructional designer reviews the content created by the course developer in the Module Template pages and builds the actual module activity items based on the submitted content. However, this is not a simple copy/paste process. When creating and organizing module content, the instructional designers provide guidance to the developers based on design principles pertaining to adult learners and asynchronous online environments, along with multimedia learning theory principles, best practices of web design and usability, and best practices based on the standards of the Quality Matters Higher Ed Rubric. These models, theories, principles, and best practices will be referred to throughout the chapter as they pertain to the design and development process. As previously mentioned, some of the common design principles incorporated into the online course development process include, but are not limited to, Gagné's Nine Events of Instructions (Gagné et al., 1992) and Keller's ARCS model (Keller, 2008). See the next section for a sample of module lesson content from a course about mechanical and structural factors in aviation safety.

Sample Module Lesson Content

MODULE 3: DESIGN AND MANUFACTURING CONSIDERATIONS AND TRADEOFFS

Overview and Objectives

Overview

Think about the classic fable of The Three Little Pigs. Straw, sticks or bricks? Which would you build your home out of? Well, the answer there might be pretty straight-forward. How about an engine turbine blade where strength, weight, cost, structural stiffness, machinability, thermal resistance, fatigue resistance, wear behavior, and fracture toughness are all important and "compete" against one another? For example, as tensile strength increases fatigue life may decrease. That's a little more difficult to answer. Now add geometric constraints (e.g. size, shape, orientation) along with manufacturing and assembly considerations. Now multiply that by thousands of components on an aircraft. Now consider many of those components interact and influence one another. Wow! That's complicated. Module 3 intends to allow us to explore some of these considerations within our framework of aviation safety.

Module Objectives

Upon successful completion of this module, you will be able to:

1. Summarize how and why engineers vary materials and structural configuration to optimize performance. (LO 1)
2. Compare and contrast the structural behavior of metal alloys, ceramics, and composites. (LO 3)
3. Given an aircraft component under axial loading, select a material and geometric configuration to ensure safe performance within design loads. (LO 4)
4. Explain the concept of mechanical strain and its relationship to stress through Hooke's Law. (LO 1)
5. Explain the cost-benefit relationship between metal alloys, ceramics, and composites as they relate to aviation safety. (LO 10)

[*Readers: Please note*, module readings, videos, and presentations are provided to the students. However, they have been left out of this chapter for logistical reasons.]

MODULE 3: WING DESIGN/BENDING STRESS (DISCUSSION ACTIVITY)

Overview

Structural bending is an important constraint in aircraft design, aerodynamic performance, and aviation safety. Just consider that in flight the wingtip of a Boeing 787 can deflect greater than 10 feet compared to its neutral resting position on the ground, resulting in significant internal stress on the wing skin and internal spars. The bottom of the wing in tension, the top in compression. Plus, cyclic fatigue – both mechanical as the aircraft wing "flaps" and thermal as temperature changes with altitude.

In this assignment, you'll conduct a "bending experiment" and post your thoughts in this Discussion activity.

Part 1:

Conduct your bending experiment:

Pick an object that you have around your home/office that bends. It could be a ruler as pictured in Figure 2 & 3, a wooden 2x4, bookshelf, diving board, aircraft wing, etc. For simplicity, we'll call the object you chose a beam.

If it's not already, support the beam on one or both ends. Load the beam with enough weight such that it bends to a point where you can measure (or estimate) the maximum deflection.

Figure 2. Side view of quarters stacked on a metal rule demonstrating a bend in a beam
Source: Dr. Jim Solti, 2018

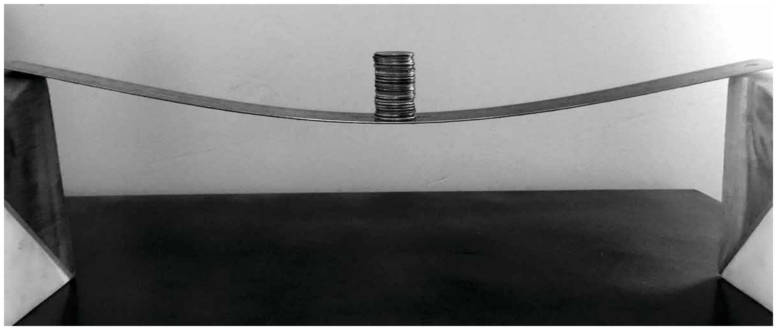
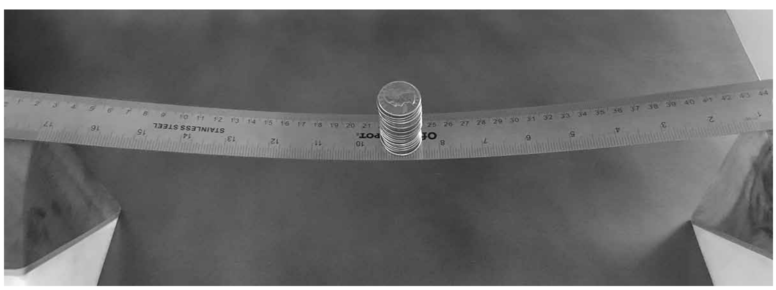


Figure 3. Top view of quarters stacked on a metal rule demonstrating a bend in a beam
Source: Dr. Jim Solti, 2018



Part 2:

Summarize your experiment and results:

Include a picture of your setup. Discuss your thoughts on the beam's structural response. Comment on deflection/deformation, stress profile (e.g. tension/compression), and the influence of the "beams" geometry, material, and end/support conditions. How would the structural response differ if the beam was manufactured from a metal alloy, ceramic, or composite? Summarize why engineers probably designed your beam (materials and structural configuration) to optimize performance. Make your post relevant and conversational.

You are only required to **post and reply once** but are encouraged to reply to as many of your classmates' posts as you wish.

You should submit your initial post by the **fourth day** of this module week, and your reply is due at **the end** of this module week.

This activity supports Module Objective(s) 1 & 4 and Learning Outcome(s) 1.

MODULE 3: MODULE EXERCISE – TENSILE TEST (ASSIGNMENT ACTIVITY)

Overview

After reviewing the module presentation and materials, complete the following activity.
You will also need to view the SFTY 335 Tensile Test (8:28) video.
Download Tensile Testing transcripts (DOCX).

Figure 4. Screen shot from video of Dr. Solti explaining material strength
Source: Authors, 2019

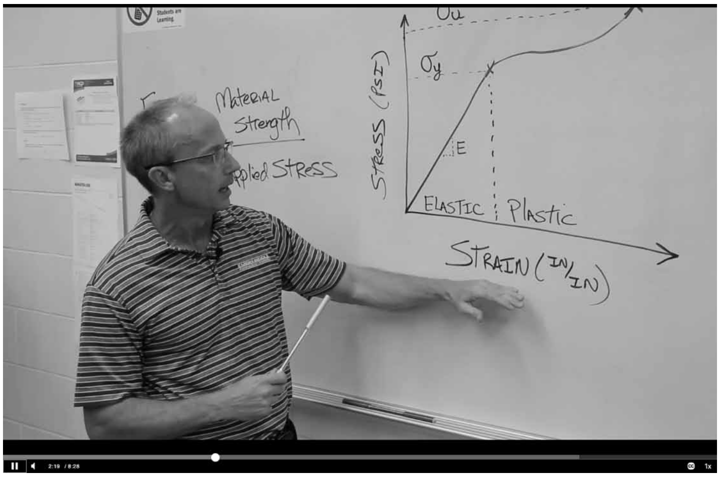


Figure 5. Screen shot from video of Dr. Solti explaining Tensile Testing machine
Source: Authors, 2019

When completing the exercise problems, be sure to show all of your work so the instructor can see where you may have made a mistake. If there are minor mistakes, you will receive partial credit for the question. For major mistakes that result in a wrong answer, you will receive a zero for the question.

Please show your solution to the problems using an equation editor or by handwriting your solutions and scan/take a photo of the results with a smartphone or tablet and submit as a jpeg or PDF. Save your assignment using a naming convention that includes your first and last name and the activity number. Do not add punctuation or special characters. Be sure to include your name in your document and files. This assignment is due by the end of the module week.

Exercise

Complete the following:

1) Research and select a metal alloy, a ceramic and a composite material used in the aviation industry. Compare and contrast the expected Tensile Test response of the materials if you were to conduct such experiments. Include stress-strain sketches for each material. Label relevant properties (e.g. yield strength).
2) Given the metal alloy you selected for question 1, estimate the required diameter of an F-35 landing gear strut under pure axial loading if we are to achieve a Factor of Safety of 2.0 on a "hard landing." Assume the strut has a *solid* circular cross-section (unlike the hollow cross-section in the module presentation). Assume a solid cross-section simplifies the "cross-sectional area" equation to A=πr2. Assume the same "hard landing axial force" of 90,000 lbs, as in the presentation. Assume the strut experience only pure compressive loading, i.e. Normal Stress = Force/Area.
3) Explain the cost-benefit relationship between metal alloys, ceramics and composites as they relate to aviation safety.
4) **Important:** In order to answer this question, you'll need to watch the SFTY 335 Tensile Test video at the beginning of this page.
   A. During the Tensile Test at the Materials Testing Lab at the ERAU Daytona Beach campus, Dr. Solti **may** have switched the test specimen to something other than 6061-T6 Aluminum – or maybe he didn't. Your task is to determine if he did by identifying the material used based upon the video test results.
   B. The specimen diameter was measured and determined to be 0.35 inches. Hints: 1 Newton = 0.2248 pounds. The test specimen came from one of the four bins identified in the image below at the end of the activity.
      i. Bin 1: Al-6061-T651
      ii. Bin 2: Al-2024-7351
      iii. Bin 3: Al-7075-T651
      iv. Bin 4: Steel C1018
   C. Write a concise **technical memo** justifying your findings. Include all calculations. No particular format is required; however, note that half of the points for this question will be based upon your ability to professionally and logically communicate your technical findings. The other half will be based upon the accuracy of your calculations. Assume the following material properties:

Material	Ultimate Tensile Strength
2024-T3 Aluminum	70,000 psi
6061-T6 Aluminum	42,000 psi
7075-T6 Aluminum	75,000 psi
C1018 Steel	64,000 psi
4340 Steel	176,000 psi

Figure 6. Bins of test specimens for Tensile Test
Source: Steve Anest, 2018

This activity supports Module Objective(s) 2. 3. & 5 and Learning Outcome(s) 3, 4, & 10.

MODULE 3: KNOWLEDGE CHECK (REFLECTION DISCUSSION ACTIVITY)

As you've seen, there have been a fair number of engineering equations and mathematics presented in this course. Undoubtedly, some of the material is confusing and you likely have questions. Moreover, if there are concepts that you don't fully understand or just have trouble with some of the math, chances are some of your classmates have the exact same questions.

For this activity, post your question here. Something relevant dealing with the mathematics associated with the engineering equations which have been presented. Maybe you're wondering where the constant "Pi" (3.1415) came from, how to calculate the area of a circle, what "t" is in the Hoop stress equation, how to work through the algebra for a given homework problem, or something else. Here's your chance to ask.

If you don't have any questions at this point, reply to a classmate and assist them with their question.

Please post your questions by the fourth day of the module week, so your classmates and instructor can post replies by the end of the week.

MODULE 3: MODULE WRAP-UP

Now that we thought conceptually about many of the structural and mechanical aspects of aviation safety, we can begin to explore some of the power engineering theory, which begins to allow us to make design decisions. There's a lot of math upcoming in Modules 4 and 5 – but don't worry, we'll take it slow, show plenty of relevant examples and by the end of the modules you'll be comfortable at analyzing stress fields in aircraft components. Way cool!

Module Overview and Objectives

Each module begins with a Module Overview and Objectives page. The Module Overviews provide an opportunity to gain the learners' attention and to demonstrate the relevance of the module topic and content. For adult learners, the relevance of how and why the content is important for them is helpful to keep them intrinsically motivated and engaged in the course. According to Keller, in order for students to have motivation to learn "they will have to believe that the instruction is related to important personal goals or motives" (1987, p. 1).

When working on the Module Overviews, the Course Developer is encouraged to take the opportunity to gain the learners attention. The instructions in the Module Guide page, along with the guidance from the Instructional Designer, ask the developer to create a scenario from their experience in the field or a scenario that the learners can relate to regarding the module topic. The Module Overviews can be presented in a combination of text, images, audio, or video. Many course developers will create a video of themselves telling a story with accompanying images, or sometimes the videos are full scripted productions created in conjunction with the media production team. Other examples are engaging stories in text in conjunction with an interesting, yet relevant image.

Additionally, the module objectives for that specific module are listed for the students on the Module Overview and Objectives page. This module component follows the second event of Gagné's Nine Events of Instruction, "Informing learners of the objectives" (Driscoll, 2005, p. 373). Listing the module objectives upfront allows the students to have an understanding at the onset of that they will be able to achieve by participating in the learning activities in the module.

For the activities and assessments, the Course Developer includes materials such as readings, links to scholarly articles from the university's library or professional organizations, and other applicable learning resources, along with the assessment instructions. On the Module Templates page, the placeholders for these activities prompt the course developer to indicate which module objective(s) and course learning outcome(s) the graded activity is measuring. This action helps the course developer to ensure that all the module objectives are being assessed and that all assessments are aligned to an MO. Clearly stating the alignment between LOs, MOs, and assessments in the Module Templates helps instructional designers, senior instructional designers, and academic chairs as they review the course content. The instructional designer includes those alignments in the Module Overview and Objectives page of each module, which informs the learner what LO and MO each assignment is measuring. This is following best practices from the Quality Matters Rubric standards (Quality Matters, n.d.).

Module Activities and Assessments

The first priority of the activities and assessments is to ensure they are supporting the LOs and MOs. The majority of the online courses offered by the university are 9-week long, so the workload is often heavier than a traditional 16-week term. Therefore, all activities and assessments need to be purposeful and promote the LOs. In addition, creating activities and assessments relevant to the goals of the course, the activities should also be relevant to the learners to keep them engaged and motivated. According to Keller, "Motivation to learn is promoted when the knowledge to be learned is perceived to be meaningfully related to a learner's goals" (2008, p. 177). Since the students are in an asynchronous learning environment where face-to-face and synchronous interaction can be non-existent, it is important to motivate them and keep them engaged with the content to help the student succeed in the course.

The direction provided to the course developer is to create authentic assessments that would simulate activities that students would do in the workplace. Projects, group work, field interviews, case studies, technical or field reports, and research papers are some examples of student assessment activities that the course developer is encouraged to integrate in the course.

The university's advancements towards the design and develop of online courses following the principles and aspects of authentic learning are followed by the creation and adoption of original content by the course developers, instructional designers, instructional technologists, and media producers. Regarding online courses, one of the university's initiatives is the creation and adoption of original content. The overarching goal of the strategy behind the creation of original content is the intent to provide the learners with a unique learning experience.

The first goal of the initiative is related to the creation of original content to do away from the design and development of textbook-centric online courses. There are two reasons supporting this goal: academic integrity and course maintenance. In the past, the design and development of online courses that were inherently depended on a textbook often resulted in online courses in which all learning activities derived from components of the adopted textbook. In those courses, the introduction to each module would be tightly connected to the introduction of its corresponding textbook chapter, the reading activities listed only the textbook chapters, the online discussions and writing assignments derived from the end of chapter questions, and the quizzes and exams used only the question banks provided by the textbook publisher. The academic integrity initially upheld by those courses was compromised the moment that the learners taking those courses shared their discussion posts, writing assignments, and quizzes and exams questions with other learners by uploading those artifacts to learning resources services such as Course Hero and Chegg. That issue seems to be non-existent in courses that adopt authentic learning activities, given that the artifacts created by the learners are inherent to their own experience and context. Additionally, with regards to course maintenance, textbook-centric courses had to be entirely updated every time a new edition of the adopted textbook was published to ensure that the course remained current. That issue also seems to be non-existent in courses that are not textbook-centric, whether they adopt a textbook as a learning resource among many other learning resources or they do not adopt a textbook at all.

The second goal of this initiative is to leverage the extensive academic and professional expertise of the university's large poll of subject matter experts among its full time and adjunct faculty members. The majority of the faculty members, whether full time or adjunct, is composed of professionals who have chosen academia as their second career or by professionals who are still fully immersed in work environments outside academia. In both circumstances, those faculty members bring a wealth of expertise in their fields. Their knowledge base is current, vast, and layered. Therefore, the university has established ways to ensure that that faculty members share their knowledge base with their learners. One of the methods that faculty members have followed to share their expertise with their students is through the design and development of multimedia learning assets. The creation of those assets occurs through the collaboration between course developers and members of the Media Production and Instructional Technology team. As previously mentioned, a team of media producers, videographers, photographers, graphic designers, and audio specialists was assembled to support the instructional design team as the team engages in the online course development process with the course developers.

Learning Objects and Media

With course developers creating original content for the online courses, multimedia learning assets or videos are needed to deliver some of this content. The instructional designer and course developer attend a brainstorming meeting with the Media Production and Instructional Technology team to determine the most appropriate approach for the learning asset. These learning assets could include infographics, interactive timelines, audio narrated presentations, drag and drop knowledge check activities, interactive eLearning units, or other multimedia assets. Several factors are taken into consideration before learning assets are created. Those include the priority of how the content will benefit the student, the alignment of the asset with the learning outcomes, and the feasibility of the asset creation within the development time frame. While the instructional designer works on the module content, learning assessments, and the overall course materials in the Canvas course, the instructional technologist is focused on the multimedia learning asset(s) for the course. Details on the process for the creation of learning and media assets are described in the Step 8 section of this chapter.

Per the student end of course evaluations, instructional videos for the online courses are a popular request. Students often indicate their desire to see more videos explaining the topic explored in the course. According to Draus, Curran, and Trempus, “instructor-generated video content can have a positive and moderate influence on student satisfaction with and engagement in asynchronous online courses” (2014, p. 250). The instructional designers explain to the course developer the importance of including videos in the course to help the students learn the concepts. There is a dedicated studio space with professional green screens, lighting, cameras, and teleprompter for the faculty and course developers who live locally or can travel to the university so they can record videos. However, many course developers are located around the world and work remotely, so they will record videos with their webcams or present material using screencast software. The Media Production and Instructional Technology team will work with the course developer to provide them tips and tricks for creating videos that have clear audio and professional appearance. When the course developer is finished, those videos are provided to the media production team for minor edits and branding.

Course Design

As the instructional designer collaborates with the course developer to develop the learning activities, recommendations from several design practices, such as Gagné’s Nine Events and Keller’s ARCS Model are taken into consideration. In addition to providing content to gain the learners attention and stating the objectives, learning activities are created in a way to provide guidance to the students. Assessments are designed to elicit and assess performance with the goal of the student being able to retain and transfer the knowledge outside of the classroom (Driscoll, 2005).

In addition to incorporating instructional design models and learning theories, other frameworks and best practices are used in the overall design of the course content within Canvas, along with any multimedia and video learning assets included in the course. These include best practices from Universal Design for Learning (UDL), Mayer's principles of multimedia instruction, along with web design and accessibility standards.

According to Bernacchio and Mullen:

The UDL framework provides guidance for creating flexible curricula and instructional environments, and for using technology to maximize success for all students, including those with physical and/or psychiatric disabilities. Flexibility requires variation in the modalities through which information is presented, in the opportunities provided to students for expressing their knowledge and demonstrating competencies, and through engagement among students in a learning community that offers choices, incentives, supports, and learning contexts (2007, p. 167).

According to Rao, "the Center for Applied Special Technology (CAST) has been instrumental in the development of the UDL framework, defining a set of principles and guidelines for applying them" (2014, p. 121). Whenever possible, the course activities are designed to include all learners. Several activities in the courses allow for students to submit content in various formats. For example, various discussion activities allow the students to submit a written post or the student can choose to submit an audio or video file for their post. Regarding content delivery, multiple formats are provided for students. For instance, if an interactive presentation is created for the course, an accessible print version is also provided. "UDL is not just for students with disabilities. Various populations of learners have access issues" (Tobin, 2014, p. 14).

In addition to students with different physical and psychiatric disabilities, UDL practices have helped addressing issues for the military students deployed around the world and may not have as many technological capabilities as others. For example, while video transcripts may help learners with different needs for accessibility, the transcripts can be beneficial to those students who may not be able to stream video due to poor Internet connection at their location. Factors such as those identified above are taken into consideration when developing the course content.

While the videos and learning assets from the Media Production and Instructional Technology team fall under the typical description of multimedia learning activities, the content pages and assessments built in the online course are also considered multimedia. These pages within the Canvas course contain a combination of text, images, audio, and video. They are treated as instructional web pages and their overall design should adhere to web design and multimedia learning principles. When designing the content within the course, the instructional designers follow a style guide that contains guidance based on these practices.

Some examples of implementing different principles include, but are not limited to, the following: modality, coherence, signaling, contiguity, redundancy, and personalization (see Table 8 for descriptions and examples).

In addition to best practices of multimedia principles, another priority in online course design is accessibility. Several practices are in place to ensure the course content is accessible. Those practices include, but are not limited to, the following:

Table 8. Multimedia principles and examples - table adapted from Mayer (2014)

Principle	Definition	Example
Modality	"People learn more deeply from a multimedia message when the words are spoken rather than printed" (Mayer & Pilegard, 2014, p. 317).	Audio narrated presentations, videos, and stand-alone audio files of the course developers are created and used in the course.
Coherence	"Avoid adding any material that does not support the instructional goal" (Clark and Mayer, 2016, p. 151).	Not adding background music to videos and multimedia objects, not including irrelevant images, audio, and/or text to the content pages within the course.
Signaling	"People learn more deeply from a multimedia message when cues are added that highlight the organization of the essential material" (Mayer and Fiorella, 2014, p. 279).	Organize content on the page with the use of proper headings. Apply appropriate use of bold text for important words or phrases. Use icons or alert boxes to signal important notices and action items.
Contiguity	Placing corresponding text and graphics next to each other (spatial contiguity). Presenting spoken words at the same time as the corresponding graphics (Mayer, 2014)	Organize important informative images and corresponding text close together in the page layout. If audio narration is used, the audio, text, and/or images are synced to correspond with each other, so it makes sense to the learner.
Redundancy	"Present graphics with spoken words rather than graphics with spoken and printed words" (Mayer, 2014, p. 391).	When incorporating audio narrated media items, ensure that the narrator is not reading the text on the screen, or avoid including on screen text when there is audio narration. While closed captions are provided in all the videos created by the course developer, the user has the option to enable and disable the closed caption.
Personalization	When presenting text or audio narration, use conversational style instead of a formal style to improve learning. Clark and Mayer, 2016, p. 151).	All of the text, directions, audio narrations, videos, and media pieces are written or spoken in a conversational ton. Also, use the word "you" instead of "the student" to make the learning experience more personal.

- Closed captions for all videos created in-house by course developers or the Media Production and Instructional Technology team
- Transcripts provided in addition to the closed-captioned videos
- Alt text provided on all images
- Course documents and presentations are run through an accessibility checker
- Proper use of headings on content pages, documents, and presentations
- Indication of file document types text of hyperlinked documents
- Alternative versions of media assets that may have accessibility limitations

The departmental style guide consists of criteria and guidance for the instructional designers and the criteria is based on these different factors (see Table 9).

Quality Matters

The university subscribes to the Quality Matters Program and has several courses that are Quality Matters Certified. As a program subscriber, the university follows the program rubric, titled Quality Matters Higher Ed Rubric. The rubric is comprised of eight general standards and forty-two specific standards

Table 9. Style guide

Style Guide *Please note* this is an excerpt from the full style guide. **Font** ● Use the predefined body text and headings and observe the hierarchy of the headers. ● Do not change default font size, color, or typeface. ● Do not use bold or italics excessively. ● Do not add an underline. **HTML** *Tables* ● Only use HTML tables to display tabular data. ● Do not use images to represent tabular data. ● Do not use tables to create page layouts. **Images** ● Check **all** image alt text. Go through Cidi Labs Design Tools Accessibility check and double check Alt text (make sure they are there and correct.) ● Do not use Clip Art. ● When using bulleted/numbered lists or indentation and images in the same item, the image should be right-aligned. o Best practice – align the initial image to the right. o On long pages with several images, stagger the images from right-aligned to left-aligned. ● Use Cidi Labs Design Tools or HTML float tags to float images. ● Save image as a JPEG file, unless it has some sort of transparency. For images with transparency, save it as a PNG file. ● Prioritize Adobe Stock and the public domain when procuring imagery. **Videos** ● When adding videos use the following format: Video title (##:##) (i.e., My Cool Video (1:15:25)) ● Indicate video title and duration before the video thumbnail. ● Clearly identify the target of each link; students must be able to determine where a link will take them. [i.e., Video Title (YouTube 1:15:25)] **Modules & General Content** ● Suggest including the module title in the Overview and Objectives item. ● All syllabi are linked to the PDF file. However, all other ERAU created course documents should be linked to the original document type (e.g. Word, PowerPoint, Excel, etc.). Exceptions should be discussed with your Sr. ID and/or Director. **Links** ● In general, create links utilizing Canvas default settings: Internal links usually open in the same window, and external links open in a new window. ● In general, include attached punctuation within hyperlinks to avoid separation of link and punctuation in Canvas – except for email addresses. ● For accessibility do not spell out the URL. Link descriptive text instead. o When linking out to articles or documents, please use the title of the article/document as the linked text. This will help find a new link if/when the link breaks and is a best practice for accessibility. ● Clearly identify the file type for internal and external links. Either include (DOCX), (PDF), (PPTX), (XLSX), etc. In the link text, or in the verbiage introducing the links. ● Indicate source of links outside of Canvas (FAA, Hunt Library, etc.).

(Quality Matters, n.d.), which guide the design and development of online courses. The program rubric is provided to the course developer in the Design Meeting so they can use it as a guide when they are developing their course content. The instructional designers also use the rubric when building the course content to ensure the course is in compliance with the program standards.

Since the courses follow the template model, there are several boilerplate items in all of the courses that cover many of the Quality Matters Rubric standards. For example, providing information about different student services (Standard 7- Learner Support) and technology requirements (Standard 6 – Course Technology) (Quality Matters, n.d.). Other standards from the Quality Matters rubric influence the information provided to the students within the activities. For example, in addition to stating the module objectives in the Module Overview and Objectives pages throughout the course, the individual assessment activities include verbiage that informs the student which module objectives and learning outcomes that activity is assessing (Standard 2 – Learning Objectives) (Quality Matters, n.d.).

All of these theories, practices, frameworks, and guidelines are important to the overall success of the course. These are the major items that the instructional designers bring up throughout the course development as they collaborate with the course developer to build the course content.

Step 5: Submit Required Course Materials to the Bookstore

The bookstore for the distance learning campus serves students in locations all over the world, including military bases. Given the nature of having to maintain an inventory and allow a sufficient amount of time to ship materials overseas, all of the required materials that the student needs to purchase are listed on the Master Required Materials List (MRTL) on the bookstore website. In order for this material to be posted on the MRTL, the instructional designer has to submit the information about the course required materials to the bookstore staff approximately 75 days prior to the course start date. If there are special materials such as custom books or integrations and key codes from publishers, this information is due 100 days prior to the term. This allows the bookstore staff to coordinate with the course developer and publisher to ensure the custom materials will be available in time to be sent to the students.

Step 6: First Round of Reviews (Design Reviews and Academic Reviews)

The courses generally go through two rounds of reviews. The first round of reviews occurs when the course has the first two to four modules built at about 85-90%. This means that the majority of the module content and activities are built, but some media pieces may be missing since they are in production. The second round of reviews (Step 9) takes place at the end of the development, when the course is reviewed again from the beginning to end.

Both the first round of reviews (of the first few modules) and final round of reviews (the entire course upon completion) consists of a Design Review and an Academic Review. The final review process also includes a Quality Review that takes place before the Design Review. The Quality Review strictly looks for spelling, grammar, broken links, and certain course settings.

Design Review

The Design Review is conducted by the senior instructional designer (ID). The purpose of the Design Review is to ensure the module objectives are being properly assessed and that they are aligned. The senior instructional designer reviews the course activities and look for engagement, authentic assessments, and workload balance.

The senior instructional designer also examines the course to ensure that its content is accessible, designed to meet the standards of the style guide, and complies with multimedia learning principles. The senior instructional designer also looks at the course from the student perspective and ensures that the instructions are clear, with focus on usability and technical functionality.

Feedback is given to the instructional designer in the review document. If there are questions about the objectives, alignments, or assessments regarding content, the instructional designer takes those to the course developer for clarifications or alternative suggestions in order to address the items.

Academic Review

The academic review is conducted by the academic chairs. The chairs are looking for the quality of the assignments and activities, if the course fits within the program curriculum, and if it meets the recommendations from the college dean regarding engagement, workload, and the use of original content.

Step 7: Content Creation - Complete Remaining Modules

Once the instructional designer and the course developer receive the feedback from the reviews, the items are addressed. Then, the course developer, the instructional designer, and if needed, the instructional technologist, continue to collaborate and produce the content for the remaining modules.

As the course is being completed, several items are reexamined including the module objective and assessment alignment. One helpful tool that instructional designers and course developers use is an alignment matrix (see Table 10). A table is created for all modules, each module objective for the specific module is listed in the table, along with the learning outcome to which it aligns. The course developer runs through the course and fills out the rest of the alignment matrix table with the assessments that are measuring the module objectives.

Step 8: Complete Learning Asset Media Pieces

The Media Production and Instructional Technology team follows multimedia learning theories and best practices to create multimedia learning assets based on original content provided by the course developers. The team has used several types of formats to display original content in the university's online courses, including videos, narrated presentations, interactive presentations, graphics, infographics, interactive quizzes, and imagery. The selection of the format in which the original content is going to be displayed is driven by the goals of the course as well as the goal of the multimedia learning asset. The creation of the multimedia learning asset is an iterative process that involves brainstorming sessions among all concerned parties, storyboarding, and rounds of reviews aimed at promoting quality assurance in the creation of those multimedia learning assets. Additionally, a number of aspects guide the media production process, such as accessibility of the multimedia learning asset, copyright compliance, and branding.

Table 10. Objective alignment matrix

Module Objective **Upon completion of this module, you should be able to:**	**Learning Outcome**	**Assessments**
EXAMPLE: ***1. Measure ingredients.***	*LO 1*	*1.2 & 1.4*
1.		
2.		
3.		
4.		
5.		*Add more rows if needed.*

Accessibility is an important aspect of the creation of multimedia learning assets by the Media Production and Instructional Technology team. As the university attempts to design, develop, and delivery instruction to all learners regardless of their limitations and challenges, the team has followed best practices with the regards to the creation of multimedia learning assets to be adopted in the online courses. Some of those practices include the provision of closed captioning and transcripts to accompany of all video and audio files created in house, the addition of alt text to all images included in the multimedia learning assets, the use of appropriate headers in text-based documents, the mindful use of bold and italics typeface, the use of tables to display only tabular data, and the observance of color contrast. It is important to note that those practices are also followed by the instructional designers as they build content directly into the course. Just like the instructional designers, the team is regularly reviewing the followed practices to ensure they address the needs and limitations of the online students.

Copyright compliance also plays an instrumental role in the creation of multimedia learning assets by the Media Production and Instructional Technology team. According to the Technology, Education, and Copyright Harmonization (TEACH) Act of 2002, the use of copyrighted material in distance education should be limited to a number of learners enrolled in a specific class, which is not the case of the university's online courses. As previously explained, the university designs, develops, and delivers its online courses via a templated model to a large number of online learners. Therefore, the university falls outside the purview of the TEACH Act. With that in mind, any and all external material used by the team will either be part of public domain or will need to have its copyright acquired by the university. It is also important to note that the instructional designers also follow this procedure when adopting external resources in the courses.

Lastly, branding is also an important component of the creation of multimedia learning assets by the Media Production and Instructional Technology team. The team follows the style standards and guidelines established by the university's marketing department. Those standards and guidelines include color scheme, proper university logos and trademark, font typeface, and a variety of practices related to web standards. The primary intent of the application of style standards and guidelines to multimedia learning assets is to ensure consistency among all multimedia learning assets created by the team. Additionally, by following the style standards and guidelines for branding established by the university's marketing department, the team promotes consistency between external and internal student-facing materials.

Step 9: Final Round of Reviews (Quality, Design, and Academic)

The final round of reviews is similar to the first round of reviews; however, an additional review is added. Before the course is submitted for the Design Review, the course goes through a Quality Review. At this stage, the Quality Reviewer runs through the course and looks for spelling, typos, grammar, and broken links. The Reviewer also reviews the course for other items listed in the Quality Review Checklist, such as settings for the overall course, settings for the individual assessment activities, and settings for the assessment due dates.

Once the instructional designer addresses the items from the Quality Review, the course is sent in for the final Design Review, conducted by the senior instructional designer or level two instructional designer. The reviewer starts at the beginning of the course and looks for the same items as the first Design Review, this time through the entire course, all course documents, and media assets. In addition to the course content, the reviewer also compares the syllabus to the master course outline to ensure the

Course Goals, Course Description, and LOs are identical. The syllabus is also compared to the required materials list in the bookstore to ensure the information is also correct.

Similar to the first round of reviews, when the instructional designer addresses the items from the Design Review, the course is submitted to the academic chairs for the final Academic Review. The chairs review the course for the same items as the first Academic Review. Once the academic chairs provide their feedback in the review and the items have been addressed, the course moves on to the final stage of the process, course copy.

Step 10: Course Template Copied into Sections for Launch

The final step of the online course development process is the copying of the course from its production template into its sections. This process is a little more involved than just one simple course copy. There are multiple templates involved in the course creating process. The production template is copied into a master template, called the 'builder' template. This builder template is where the sections are generated from for each term. Once the builder template has the new content, then the sections are created by an internally-created program called Snapshot Generator (SnapGen) and the new content from builder is copied into the sections, along with the student enrollments and instructor enrollment.

Once the course sections are created with the new content, the instructor customizes his or her section by following the pre-term course setup steps, which include adding their instructor bio, module dates, posting an initial welcome course welcome announcement, reading through the Information for Instructors area for any additional setup. The eLearning Support (eLS) team, under the Academic Technology department, runs through the course and completes course checks and does any technology setup if needed. The Faculty Quality Managers team performs their checks to ensure the instructors set up everything they were supposed to in accordance with the Information for Instructors area and the university's teaching policies. Once all of these checks and balances have been completed, the course is ready to be launched. One business day prior to the official term start date, the section will be published and available to the students.

The steps explained above compose the online course development process conducted by the instructional design team in collaboration with the course developers. As described, the process is based on a theoretical foundation that enables instructional designers, course developers, and media producers to create learning experiences that are aligned with the challenges and demands of the aviation and aerospace industry. The adoption of Backward Design supported by Gagné's Nine Events of Instruction, Keller's ARCS Model, authentic learning practices, and multimedia design theories and practices provide the team with structure and orientation in the creation of those learning experiences. Those learning experiences are created to provide the students with opportunities to hone specific skills and competencies, including critical thinking, decision-making, problem-solving, and communications, which are the backbone of the aviation and aerospace industry. This online course development process has enabled the university to deliver excellence in online learning over the years and to be recognized for its advancements in aviation training.

SOLUTIONS/RECOMMENDATIONS

Limitations

As explained in previous sections of this chapter, the university's online course development process is clearly segmented and supported by learning and teaching theories and best practices. The process has resulted in the creation of instructionally-sound undergraduate, graduate, doctoral, and continuing education online courses, which are delivered to students who are either part of the aviation and aerospace industry already or have the desire to join the industry. However, the process is only as effective as the professionals who follow it. The most prominent factor changing the execution of the process is the performance of the course developers. The limitations related to the performance of course developers vary and include the lack of understanding regarding the process itself, the theories and practices guiding the process, the aspects related to the design of accessible learning, and the relevance of copyright compliance.

The limitations related to performance of course developers are also extended to their lack of time management skills and to academic plagiarism. As previously explained, online course development projects span several months and are segmented into a number of steps. Therefore, deadlines are an important aspect of the projects. The failure to meet project deadlines triggers a negative chain of reaction which compromises the quality of the online course. In case of delays in the execution of a course development project, the course is delivered either with missing learning activities and instructional materials or with poorly designed learning activities. Additionally, a number of course developers attempted to use content created by other education professionals as if it was their own content. Failing to acknowledge or properly cite the authorship of the adopted content constitutes a case of academic plagiarism. While the adoption of that content does not necessarily compromise the quality of the instructional material, it jeopardizes the integrity of the online course, and, consequently, of the university.

Limitations with the Backward Design approach often stem from the association of standardized testing and curriculum, especially in the K-12 environment, since it focusses heavily on assessments aligned to learning goals and "draws a new image of the teacher as an assessor" (Cho & Trent, 2005, p. 112). While Backward Design is used in that type of testing environment, the encouragement of creating and incorporating authentic assessments through the Backward Design approach in these online courses are creating a learning experience that is extremely different from standardized testing environments. Within this specific course development system environment, the faculty course developer is encouraged to think like an assessor when creating the module objectives and assessments which will align to them. However, as criticized by Cho and Trent (2005), this process does not take away from the individual instructors of each online course section to "connect knowledge and skills to various student interest and needs" (p. 117).

Another limitation presented to instructional designers and course developers pertains to the adoption of learning technologies to support the achievement of the LOs and MOs by the student. The intricacies inherent to each learning technology adopted in the university's online courses may present some challenges to the instructional designers and course developers. Some of those challenges are mainly related to the accessibility of the technology, to security concerns, and to the scalability of the technology to the online learners. Depending on the complexity of the challenges presented by the learning technology, the timeline of the course development project might be jeopardized. Additionally, in those circumstances, the quality of the course is usually affected.

RECOMMENDATIONS

A number of recommendations would work as potential solutions for the limitations related to course developer performance. With regards to the lack of understanding presented above, a professional development course covering all aspects of the university's online course development process would likely provide course developers with the necessary knowledge and skills to create online courses. That professional development course would potentially enable course developers to successfully work with the instructional designers, media producers, and instructional technologists on the creation of pedagogically- and instructionally-sound learning experiences. By taking that professional development course prior to engaging in an online course development project, course developers would probably approach the process with a thorough understanding of what it takes to build an engaging and authentic online course.

Holding the course developers accountable for their performance would potentially mitigate the additional limitations related to time management and academic integrity. Academic chairs could hold course developers accountable for their failure to meet the project deadlines and to uphold academic integrity with development the content for their online courses. Such accountability could be held through the application of performance metrics and evaluations during and after the execution of the online course development project. Additionally, academic chairs would provide regular and practical guidance to their course developers to ensure they have proper academic support throughout project execution.

With regards to the adoption of learning technologies in the university's online courses, an attempt has been made to thoroughly review all learning technologies early in the online course development process. The intent is to identify and find solutions to any and all challenges presented by the learning technology prior to course development project completion. However, for this review to be successful, course developers and instructional designers must initiate the review process as early as possible so that the review can be conducted in a timely and effective fashion without jeopardizing the course development project.

FUTURE RESEARCH DIRECTION

The analysis and explanation of the university's online course development process could pave the way for a number of research opportunities. This study defends the notion that the adoption of Backward Design supported by authentic learning, among other theories and practices, facilitates the effective creation of learning experiences for adult students in the aviation industry. It would be perhaps beneficial to verify whether such course design approach would be beneficial to specific segments of the aviation and aerospace industry, such as aviation management or unmanned aerial systems. Another potential research opportunity would be the verification of efficacy of Backward Design as a model for aviation education when compared to other learner-centered course design models, such as Integrated Course Design (Fink, 2003) or the Experiential Learning Cycle (Kolb, Boyatzis, & Mainemelis, 2001).

CONCLUSION

This chapter was aimed at describing the online course development process executed by instructional designers, instructional technologists, and media producers in collaboration with course developers working at an aviation-oriented university. Given that the curriculum is designed for a specific industry, this chapter covered the intricacies of an online course development established for a specific type of instruction. Such analysis is warranted by the need to describe the process applied to successfully design and develop online courses to educate working adults that are part of the ever-evolving aviation and aerospace industry. Because of its constant growth, the industry requires a specific workforce, which is able to demonstrate specific skills, such as problem-solving, decision-making, critical thinking, collaboration, and communication (Kearns, Mavin, & Hodge, 2016). The development of those skills is facilitated by learning experiences that truly reflect the challenges of the industry.

The comments left by the students through the end of course evaluation validate the approach taken in the design and development of the university's online courses.

Student feedback on the human factors in the aviation industry course: *"This was an intense but very interesting course. I am an air traffic controller, and a lot of the topics I have learned about here, I have actually presented to my coworkers, allowing us to engage and grow together. I love how thought provoking some of the topics were, and my coworkers have helped me learn even more by sharing their insights. There was a lot of work in this course, but overall, I greatly enjoyed it!"*

Student feedback on the aircraft accident analysis and investigation course: "*Really cool set-up and the Lab made it seem like we were actually part of the Accident Investigation throughout. Really well set-up with extra material for learning such as videos and powerpoints on top of the reading which made things easier to understand. I really enjoyed the video where we went to the actual crash lab and learned about the black-boxes. Overall, I was very impressed, and AB was an outstanding instructor. Would highly recommend this for everyone.*"

Student feedback on the aviation law course: "*To be honest, I kind of dreaded taking this course, just the name made it sound dry and I figured the textbook would be just as dry. However, I was pleasantly surprised to find this course extremely interesting and very applicable to my flying career. The textbook was written in a way that kept me interested and made the reading assignments enjoyable and easier to absorb. It didn't have that typical "textbook" feel to it and spoke in a plain English kind of way instead of an over use of legal jargon. The instructor gave great feedback on early assignments that definitely helped me do better in later assignments*."

However, the application of the online course development process described in this chapter is not limited to the aviation and aerospace industry. Although the process was aimed at the design and development of online courses for a particular industry, it may be easily transferable and applied to other industries and contexts. The overall intent is to ensure that the student is provided with learning experiences that are based on learning goals and emulates the intricacies and challenges of real-world work environments.

The explanation of the process through which the university's online courses are designed and developed emphasizes the relevance and application of Backward Design as an approach to the construction of effective learning experiences. Within the context explained in this chapter, Backward Design is supported by theories, practices, and frameworks, such as Gagné's Nine Events of Instruction, Keller's ARCS Model, and authentic learning. These practices are prominent in this context since the courses are created for adult learners in an asynchronous online environment, where motivation can influence the academic success of the students. This chapter illustrates the synergy of those theories, practices, and frameworks, which provide the instructional design team and the course developers with the structure and the pathway to successfully design and develop the university's instructionally-sound online courses. The complexity of the online course development process established by the university illustrates the applicability of Backward Design as a design approach, especially for aviation-related education. It also shows how that design approach facilitates the construction of authentic learning environments and the creation of original instructional materials to provide students with unique learning experiences.

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KEY TERMS AND DEFINITIONS

Academic Review: Quality assurance review conducted by the academic chairs at the midpoint and end of the course development process to ensure the course is meeting the needs of the degree program and expectations of the college dean.

ARCS Model: Learning model that consists of four different categories of motivational concepts which include attention, relevance, confidence, and satisfaction (Keller, 2008).

Backward Design: Framework to plan and design curriculum by focusing on what the learner will be able to do upon the successful completion of the learning experience (Wiggins & McTighe, 2006).

Course Design Worksheet: Seminal document for the course development process that is based on the Backward Design approach. Course developers complete this worksheet near the beginning of the course development process. The worksheet serves as the foundational outline for the course.

Course Developer: Faculty member that serves as the subject matter expert (SME) and collaborates with the instructional designer to create the online course.

Design Meeting: Brainstorming meeting between the course developer, instructional designer, Sr. Instructional Designer and/or Director, and the academic chairs. The concerned parties in the meeting discuss the details and logistics of the course development process, the course developer's vision for the course, timeline and important due dates, and the best practices and principles of instructional design models.

Design Review: Quality assurance review conducted by the Sr. Instructional Designer at the mid-point and end of the course development process to ensure the course is meeting the following: Proper objective and assessment alignment, appropriate workload for the weekly modules, appropriate authentic learning assessments, the course follows sound pedagogical and instructional design best practices, the course functions and flows logically from the student perspective, and the design of the course content and instructional materials adheres to the departmental style guide (which covers accessibility, web design, and multimedia best practices).

Instructional Designer: Member of the Instructional Design and Development (IDD) department that collaborates with the course developer to create online courses. Serves as the project manager, coordinator, designer, developer, and provides guidance for pedagogically sound course design based on instructional design principles.

Instructional Technologist: Member of the Instructional Technology and Media team within the Instructional Design and Development (IDD) team. Creates graphics, presentations, and other interactive learning assets for the online courses in collaboration with the course developer and instructional designer.

Kickoff Meeting: Initial meeting of the design process for any new course developers, or course developers who have not developed a course within the past year. Webinar meeting that goes over the main points of the course development process from a big picture perspective.

Learning Outcomes (LOs): The overarching goals of the course which are predetermined and approved in the Master Course Outline (MCO) prior to the course development process.

Master Course Outline (MCO): The official approved document that contains the course description, course goals, and learning outcomes (LOs).

Module Objectives (MOs): Granular learning goals for the weekly course modules that are derived from the learning outcomes (LOs)

APPENDIX

Application Activities

Discussion Question #1: The chapter described the successful application of Backward Design in the design and development of aviation-related online courses. Such application lends itself to the nature of the aviation industry, which is dynamic, ever-evolving, and dependent on a workforce that must demonstrate specific skills. In your opinion, is Backward Design the most adequate approach to design courses that target specific skills and competencies? Justify your answer.

Discussion Question #2: As described in this chapter, Backward Design is supported by other theories and design approaches, such as Gagne's Nine Events of Instruction, ARCS Model, and authentic learning. In your opinion, how can course design projects benefit from the application of several theories and approaches? What other models, theories, or design approaches would you use? Justify your answer.

Discussion Question #3: Within the context described in the chapter, through the application of Backward Design and authentic learning, the instructional design team has promoted the creation of original content by course developers. The creation of original content has helped the university design and develop unique online courses. Would other learning design theories and approaches facilitate the creation of original content by subject matter experts? If so, how?

Discussion Question #4: With regards to the collection of evidence of student mastery, course developers often struggle with establishing assessments that truly measure student achievement of the learning goals. What techniques can course developers follow to align assessments with learning goals?

Discussion Question #5: Working as a team when designing online courses often presents challenges with regards to communication and differences in opinion about the direction the course should take. The university's instructional design team face those challenges on a regular basis, whether working with the course developers or with graphic designers and media producers. How can those individuals overcome those challenges to ensure that the course is designed and developed as intended?

Chapter 10
The Role of Management in Instructional Design

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ABSTRACT

A great deal of instructional designers' time is spent designing the course content and managing projects. This chapter provides a comprehensive review of literature examining the project management knowledge, skills, and abilities performed by and expected of instructional designers from different sectors. To fully demonstrate the importance of management in the instructional design process, the author examines prior research and highlights the significance of reviewing the competencies and standards developed by professional organizations within the field. This chapter also discusses the importance of management to the instructional design process, how to successfully align and bridge the gap between instructional design models – ADDIE and SAM – and project management, as well as how the Project Management Body of Knowledge (PMBOK) complements the instructional design process. The author examines project management, cost and budget management, people management, and timelines and deadline management. The author concludes by explaining how the chapter will benefit new instructional designers entering the field while also enhancing current instructional designers' knowledge about management trends and expectations.

INTRODUCTION

Instructional design is a thriving field and one that is constantly growing and evolving. Instructional designers work in various professions including business and industry, K-12, colleges and universities, military, healthcare, and government. Although the expectations for instructional designers may vary based on the sector, many are expected to be versatile and flexible while designing and developing quality, rich, and robust blended or online course content. Versatility and flexibility are challenging in and of themselves, as the instructional design field is a deadline-driven environment that relies on collaboration and interaction with other instructional designers, graphic designers, multimedia developers, technical

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support staff, learning management system administrators, faculty/subject matter experts, managers, marketing professionals, and so forth.

The roles and responsibilities of instructional designers have been well-documented in previous studies. Instructional designers analyze, design, implement, evaluate, provide faculty support and development, offer technical and student support, collaborate with stakeholders, manage projects, participate in committees, attend meetings, write learning objectives and assessment activities, identify the appropriate media and instructional strategies, use instructional design processes and models, apply learning theory, integrate technology, and examine tools (Association for Talent Development (ATD), International Association for Continuing Education and Training (IACET), & Rothwell & Associates, 2015; Ritzhaupt & Kumar, 2015; Kumar & Ritzhaupt, 2017).

Given these roles and responsibilities, the nature of the projects instructional designers manage can vary tremendously for a single individual. Instructional designers engage in course development and improvement; faculty development and training; technology integration; learning management system implementation and support; technical support for online, face-to-face, and hybrid courses; research; and so forth (Ritzhaupt & Kumar, 2015). Instructional designers are informal leaders who are bridging the gap between instructions and technology while using their technical expertise to support faculty.

In spite of the wealth of knowledge and experiences instructional designers possess, the role for many have shifted to guiding subject matter experts through the development of content. Due to technology's evolution and ease of use, some companies are turning to the designers-by-assignment model to create instructional content. In this model, companies use existing professionals who have experience and knowledge of the subject matter rather than formally trained instructional designers to create the content. As a result, this arrangement decreases the need for instructional design professionals within a particular organization (Merrill, 2007). If this need decreases, how does the company ensure the content is sound, meets standards, follows guidelines, and is efficient and effective? This is where the role of instructional designers shifts from developing content to managing, training, and directing the work of designers-by-assignment (Merrill, 2007).

In Pesce's (2012) analysis of designers-by-assignment, it was found that while subject matter experts are pressed to perform as instructional designers, subject matter experts still need to be supported by instructional designers (Merrill, 2007; Pesce, 2012). This relationship would allow the instructional designer to manage content development, provide recommendations for improving instructions, and identify tools that will aid in the development of content (Pesce, 2012). Whether the instructional designer is designing content or guiding subject matter experts, they are expected to be managers of some sort.

No matter the role, following instructional design models and processes and applying best practices do not guarantee the development of quality course content. One of the most essential tasks for an instructional designer is project management (Brill, Bishop, & Walker, 2006; Williams van Rooij, 2010).

Project management encompasses more than managing the instructional designer's workload. It involves "identifying project requirements; identifying stakeholder needs and expectations when planning and executing the project; establishing and maintaining active, effective, and collaborative communications among stakeholders; and balancing competing project constraints such as scope, quality, schedule, budget, resources, and risks" (Williams van Rooij, Moore, & Benson, 2013, p. 2). Essentially, a project manager must be a well-versed and goal-oriented individual who is skilled at performing administrative functions while assuming leadership responsibilities. The project manager is responsible for keeping track of the big picture. Therefore, project management is critical to the success of the project and the responsibilities should not be underestimated (Pinto, 2016).

To help instructional design practitioners identify the project management responsibilities and understand the scope of project management, management competencies and standards can be found in the latest versions of standards governing the design and development of online content (AECT, 2012; ibstpi®, 2012). Several articles and studies have been written and conducted to show the importance and success of project management for instructional designers (Allen, 1996; Brill, Bishop, & Walker, 2006; Cox & Osguthorpe, 2003; Kumar & Ritzhaupt, 2017; Merrill, 2007; Ritzhaupt & Kumar, 2015; Williams Van Rooij, 2010). In addition, numerous studies have concluded and recommended that instructional designers need project management skills and should take project management courses to ensure they have the necessary skill set to perform the job (Kumar & Ritzhaupt, 2017; Merrill, 2007; Williams Van Rooij, 2011; 2013). Thus, management in instructional design is critical and evolving within the field.

While research has been conducted on the management expertise needed by instructional designers, a more comprehensive review of the literature is necessary to thoroughly inform instructional design practitioners of current practices. Therefore, the purpose of this chapter is to identify through a review of literature the various management knowledge, skills, and abilities performed by and expected of instructional designers. This review will benefit new instructional designers seeking to enter the field and existing instructional design practitioners who are looking to improve their practices and stay current with the trends.

To help new and existing practitioners, it is important for them to recognize the significance of project management to the instructional design field. When projects are ineffectively managed, the results can be poorly designed content, lack of resources, and issues with budget and deadlines (Abdous & He, 2008). Through an effective and efficient management process, content would be successfully designed and developed, resources would be efficiently used, new results can be achieved, development processes would be streamlined, and challenges will be better managed (Abdous & He, 2008; Pinto, 2016).

With these benefits in mind, this chapter seeks to go beyond providing recommendations and identifying project management models. This chapter will define project management, provide an overview of project management tasks required for instructional design projects, differentiate between the various components of project management, investigate how to align project management tasks with instructional design models, and examine various studies of instructional designer lived experiences. As a result, it will provide current and future instructional designers with an in-depth view of the level of management knowledge, skills, and abilities needed to accurately perform the job no matter the sector.

WHAT IS PROJECT MANAGEMENT?

Project management has been defined and characterized by numerous individuals and organizations based on their practices. The best fitting definition for this chapter comes from the Project Management Institute (PMI), which is also supported by Pinto (2016). Project management is "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Pinto, 2016, p. 530; PMI, 2017, p. 10). Project management augments the instructional design process because it is project-based and provides repeatable processes that complement the phases of instructional design (Williams van Rooij, 2013).

Project management is more than juggling multiple projects. Individuals managing learning and design projects have to identify requirements, identify the tasks needing completing and in the correct order, address stakeholders' expectations, and balance all the projects and the projects' constraints. The project manager is responsible for ensuring all of these tasks are completed and that the project objectives are met (Williams van Rooij, 2018).

Project managers can use the Project Management Body of Knowledge (PMBOK®) Guide to lead them through the various aspects and stages of project management. The PMBOK® Guide contains five Process Groups. The Process Groups are initiating, planning, executing, monitoring and controlling, and closing. These Process Groups align with Pinto's (2016) project life cycle, which consists of conceptualization, planning, execution, and termination. By aligning with a project life cycle or the Process Groups, managers are able to follow a plan for completing the project. Given the project setup, there may be a management team to fulfill the tasks in the initiating, planning, monitoring and controlling, and closing phases while the instructional design team may only complete the tasks in the executing phase (Gardner, Bennett, Hyatt, & Stoker, 2017).

In addition to the Process Groups, the PMBOK® contains 10 Knowledge Areas. Project managers typically must develop competencies in these Knowledge Areas, which include knowledge, processes, practices, inputs, outputs, tools, and techniques (PMI, 2017). The Knowledge Areas are integration, scope, schedule, cost, quality, resource, communications, risk, procurement, and stakeholder management (PMI, 2017).

This review of the literature will demonstrate that many instructional designers are performing tasks in many of these Knowledge Areas and sometimes may be asked to assist with performing tasks associated with the Process Groups. Therefore, this assertion strengthens the argument and supports the current literature that many instructional designers are not just scoping projects, creating timelines, and managing budgets. They are solving problems, leading and managing teams and stakeholders, supporting subject matter experts, analyzing data, estimating project requirements, collaborating, developing processes and standards, and championing communication (Brill, Bishop, & Walker, 2006; Williams van Rooij, 2010).

CONNECTING INSTRUCTIONAL DESIGN MODELS AND PROJECT MANAGEMENT

Before we examine the actual lived experiences of instructional designers, we will analyze the project management skills necessary for instructional designers by exploring how agile and waterfall instructional design models can be integrated into project management.

There are a variety of instructional design models that instructional designers use in the development of content. The Association for Talent Development (ATD), International Association for Continuing Education and Training (IACET), and Rothwell and Associates (2015) conducted a study with 1,381 talent development professionals. These participants were individuals in the instructional design field and had various titles including Instructional Designer, Director of Training, Trainer, and Learning Specialist. The participants were asked to identify the instructional design models they use in their design practices to guide their work. About 78% of the participants indicated they often or always use the ADDIE model, while another 64% indicated they often or always use the Bloom's Learning Taxonomy model. Another 63% of the participants indicated they often or always use the Kirkpatrick's Levels of Training Evaluation. Only 20% of the participants stated they have often or always used the Successive Approximation Model, also known as SAM (ATD, IACET, & Rothwell & Associates, 2015).

Agile

Agile instructional design models such as SAM have provided instructional designers with a more effective model for designing and developing instructional content. An ideal agile process model is iterative, collaborative, efficient and effective, and manageable (Allen & Sites, 2012). While only 20% of the participants indicated they use SAM in their design practices, agile methods are becoming widely used in various industries – including instructional design – as these methods provide an opportunity to better connect project development with critical stakeholders and top management (ATD, IACET, & Rothwell & Associates, 2015; Pinto, 2016).

Agile project management is built upon flexibility due to evolving client requirements throughout the development process. Traditional project management such as the waterfall process establishes the planning of the work and then working the plan. However, agile project management recognizes the waterfall process does not reflect the actual experiences and expectations of modern projects. Because of evolving and ever-changing client's needs, an agile method provides an iterative process that constantly connects clients during the entire project. Thus, planning is not completed only at the beginning, but also throughout project development (Pinto, 2016). This process provides a continuous plan, execute, evaluate cycle that is active across the entire project development. This cycle creates "incremental value, through steadily developing subfeatures or elements in the overall project" (Pinto, 2016, p. 371).

ADDIE

In contrast to the agile process – Successive Approximation Model (SAM) – ADDIE is a waterfall instructional systems design model with five sequential phases of Analyze, Design, Develop, Implement, and Evaluate. It is considered a waterfall process as all phases must be completed before advancing to the next phase. As such, many instructional designers have modified the process to accommodate their practices, resulting in countless variations of the ADDIE model (Allen & Sites, 2012).

Given that 78% of instructional designers indicated they apply the ADDIE instructional design model in their practices, we will further examine how to align and bridge the gap between ADDIE and project management (ATD, IACET, & Rothwell & Associates, 2015). Establishing this relationship will enable instructional designers to use the ADDIE model and project management techniques – as outlined by the PMBOK® Guide – to design effective learning content that is quality, cost-effective, and on time.

As stated in the PMBOK® Guide, the Process Groups provide a logical grouping of project management processes to achieve specific objectives and are independent of project phases. The project management process entails initiating, planning, executing, monitoring and controlling, and closing (PMI, 2017).

Cox (2009) created a Four-Step Combo to help instructional designers, trainers, and project managers unite ADDIE and the Process Groups and know how and when to use them simultaneously. Step 1 consists of the analysis phase from the ADDIE model and the initiating process from the Process Groups. Step 2 includes the design phase of the ADDIE model and the planning process from the Process Groups. Step 3 consists of the development and implementation phases from the ADDIE model and the executing and monitoring and controlling processes from the Process Groups. Step 4 includes the evaluation phase from the ADDIE model and the closing process from the Process Groups (Cox, 2009). The Four-Step Combo as outlined by Cox (2009) is shown in Table 1.

COMBINING ADDIE AND PROCESS GROUPS

Step 1: Analyze-Initiating Phases

Analysis Phase. The analysis phase of the ADDIE model is where the instructional designer conducts an analysis to determine the performance gap and training needs. In this phase, the current situation and tasks, along with the learners, are analyzed to ensure the instructional designer has a thorough understanding of the problems and clients'/subject matter experts' needs. The instructional designer meets with the client to learn more about the problems, concerns, needs, and goals. After this meeting and if time permits, a survey is carefully crafted and administered to the potential learners to further identify the problem and overall needs (Cox, 2009; Morrison, Ross, Morrison, & Kalman, 2019).

Initiating Process. The initiating process of the Project Management Process Groups is where authorization is given to begin a new project or a new phase of an existing project. In this phase, the project manager learns of the goals of the project, individuals who will be involved in the project, and the overall scope of the project. A project charter is developed and the stakeholders are identified. The project charter contains the project's description, services to be provided, and the outcome of the project and must be approved before proceeding to the next phase (Cox, 2009; PMI, 2017).

Step 2: Design-Planning Phases

Design Phase. Step 2 includes the design phase of the ADDIE model and the planning process of the Project Management Process Groups. The instructional designer takes the task analysis that was started in Step 1 and begins to identify, write, and sequence objectives. Once the objectives are sequenced, the instructional designer identifies the best instructional strategies or product based on the task analysis and objectives. This phase is extremely important, as the instructional designer designs instruction in a way that meets the subject matter expert's instructional needs as well as the learner's needs. Since the design phase is another critical component of the project management process, the instructional designer should seek approval of the design document (Cox, 2009; Morrison, Ross, Morrison, & Kalman, 2019).

Planning Process. While the design document is being approved, the project manager begins to work on the project plan document. During this planning process, the project manager creates a plan describing the approach for the project. The planning document includes the project scope, objectives, actions to ensure the objectives are achieved, timeline/schedule with a work-breakdown structure for all major product deliverables, schedule and resource allocation, and budget (Cox,

Table 1. Four-step combo

Group	Framework	Step 1	Step 2	Step 3	Step 4
Instructional Design	ADDIE	Analysis	Design	Development and Implementation	Evaluation
Project Management	Process Groups	Initiating	Planning	Executing and Monitoring and Controlling	Closing

2009; Morrison, Ross, Morrison & Kalman, 2019). The quality management plan, along with communication, risk management, and procurement plans, may also be included in the planning document (Cox, 2009; PMI, 2017).

The scope of work details the parameters of the project to ensure all stakeholders are aware of the purpose of the project, what is being done, why it is being done, anticipated roles, expected outcomes, and projected delivery date (Morrison, Ross, Morrison, & Kalman, 2019). Once the scope of work has been defined, schedule and resource allocation must take place. The project manager identifies all the tasks that must be completed during the project, sequences those tasks, allocates resources (e.g. equipment/software, people, facilities, etc.) for those tasks, identifies milestones that will indicate completion of major tasks, determines deliverables, and identifies the best path for completing each task and, thus, the overall project. It is important for the project manager to factor in employees' availability when making these decisions and identify how to effectively use their time (Morrison, Ross, Morrison, & Kalman, 2019).

Once there is an approved scope of work, defined schedule, and allocated resources, the project manager will need to prepare a budget. In some cases, the budget may have been defined at a high level in the scope of work. The project manager will use this information along with the schedule and resource allocation to create the budget. Before creating the budget, it is vital that the project manager fully understands the scope of work and the role the budget plays in the organization. Morrison et al. (2019) state some organizations may require the project manager to prepare a detailed budget while others may only require the tracking of costs that can be charged back to the project. In some cases, an organization may not budget or track costs. Whatever the role of budgets in the organization, the project manager must have a thorough understanding of the budget and create it following the schedule and resource allocation identified (Morrison, Ross, Morrison, & Kalman, 2019).

Once the team has been identified, the schedule has been established, and the budget has been created, the project manager will need to determine the communication plan with the client and the team. In order for the project to be successful, communication with the client and the team must be clear and constant. When establishing the communication plan with the client, it is important for the project manager to ask the client the following: how he or she wants to be kept informed of the project progress; how often he or she would like updates on the project; the process for approving milestones/deliverables; and the communication plan for communicating with stakeholders. When establishing the communication plan for the team, the project manager must communicate the vision and purpose of the project, explain available resourcing and how to request additional resources, and describe how often the project manager must be updated on the project status (Morrison, Ross, Morrison, & Kalman, 2019). It is also important for the project manager to establish the communication tools (e.g. email, instant messaging, etc.) that will be used internally to communicate about the project.

Step 3: Development and Implementation-Executing and Monitoring, and Controlling Phases

Development and Implementation Phases. Step 3 of the Four-Step Combo includes the development and implementation phases of the ADDIE model and the executing and monitoring and controlling processes of the Process Groups. Using the approved design document, the instructional designer proceeds with designing the instructional message or product and developing the content. The instructional designer must know how to best introduce and effectively communicate the content to the learners in an engaging and motivating way using the specified instructional strategies. Also, equally important is the use of verbal emphasis such as cues and repetition, along with visual emphasis such as bold text, numbered lists, and so forth to help learners easily identify the important content and access key ideas. After the message has been designed, the instructional designer develops the instructional content. It is important to create and share prototypes with the client. This sharing process will give the client a glimpse of what the final products could look like and allow all stakeholders to share feedback early in the project development phase. With this feedback, the instructional designer can modify and revise content accordingly to meet the client's or subject matter expert's expectations. Once all content has been developed and approved, the instructional content or product is ready to be implemented. In some instances, a pilot test of the course may be conducted with a select sample of the learners before officially rolling out the full training (Cox, 2009; Morrison, Ross, Morrison, & Kalman, 2019).

Executing and Monitoring and Controlling Processes. The success of the project is dependent on the executing and monitoring and controlling processes. During the executing process, the project manager ensures that all work as defined in the project management plan is completed. The appropriate team is assembled and provided with all the project information to develop content. The monitoring and controlling process ensures the project is going according to plan and the deliverables are meeting the expectations according to the project management plan. If changes are required to the plan, the project manager works to identify and initiate them (Cox, 2009; PMI, 2017).

During these phases, it is important for the project manager to maintain project momentum and team energy. As projects move forward, the overall momentum and team members' enthusiasm may dwindle due to various constraints and the magnitude of the project. To keep the project moving and ensure the scope of work is fulfilled accordingly, the project manager has to be creative with keeping the momentum. Offering rewards, recognizing team members, and celebrating achievements and completion of projects are all ways to keep the momentum alive and the team's energy high. Team members can be recognized, praised, and rewarded individually or collectively during team meetings, as the project progresses, or at the close-out of the project (Morrison, Ross, Morrison, & Kalman, 2019). In order to keep the momentum, project managers must understand the importance of recognition. In a study conducted by ATD, IACET, and Rothwell and Associates (2015), instructional designers were asked to identify challenges they have faced in their role. Of the participants, 15% responded they "always" felt they receive a lack of recognition for the value added by instructional designers while another 36% reported they "often" felt they receive a lack of recognition (ATD, IACET, & Rothwell & Associates, 2015). To keep a thriving team with high energy, project managers should foster an environment that encourages teamwork and collaboration (Fortney & Yamagata-Lynch, 2013). Being genuine, showing honest appreciation and gratitude, and offering praise to team members can go a long way in keeping the momentum and energy high (Morrison, Ross, Morrison, & Kalman, 2019).

Obtaining legal clearances is another important task for project managers during the executing and monitoring and controlling phases. The project manager is also responsible for ensuring the team develops ethical course content that meets legal requirements. Therefore, it will behoove the project manager to be knowledgeable of contractual obligations as well as state and federal regulations (Morrison, Ross, Morrison, & Kalman, 2019). In the development of content, instructional designers use a variety of resources to enhance the overall learning experience. These resources can include graphs, charts, images, articles, videos, etc. The beauty of the World Wide Web is that it gives users immediate access to such media.

Because these resources are easily accessible on the web, individuals outside of the field may believe that those involved in the design process can download and use any material within the course content. However, the freedom to use any material found on the World Wide Web is limited, as the resources may be copyrighted materials. In order to use the resources, copyright permissions must be sought and obtained (Morrison, Ross, Morrison, & Kalman, 2019). The process for obtaining copyright clearance can be tedious and time-consuming. However, obtaining proper permissions is a critical step in the design process and can have significant legal ramifications and implications for future projects if regulations are not adhered to. As such, project managers, instructional designers, and all interested parties should consider identifying appropriate vendors with acceptable resources and establishing clear processes for obtaining permissions for all copyrighted materials that must be used in content development (Morrison, Ross, Morrison, & Kalman, 2019).

Step 4: Evaluation-Closing Phases

Evaluation Phase. The final step in the Four-Step Combo concludes with the evaluation phase of the ADDIE model and the closing process of the Process Groups (Cox, 2009). Evaluation is essential to the instructional design process (Morrison, Ross, Morrison, & Kalman, 2019). While evaluation should occur throughout the process, the ADDIE model places it at the end. Placing evaluation at the end of the entire development process is risky, which is one of the reasons many have chosen to modify the process to include continuous evaluations and corrections (Allen & Sites, 2012). Nonetheless, during the evaluation phase, the instructional designer measures whether learners have gained the knowledge and can perform the skills outlined in the project planning documents (design plan or project charter). A formative evaluation occurs early in the process and may be used to inform how the instructional designer, project manager, and project team should manage project objectives, tasks, and milestones. The summative evaluation is conducted at the end of the project and provides data to the entire development team and stakeholders as to how well the project outcomes are being met and attained (Cox, 2009; Morrison, Ross, Morrison, & Kalman, 2019).

Closing Process. During the closing process, the client and/or stakeholders formally sign off on the project, signifying its closing to the project manager. Properly closing out the project is a necessary and crucial component to the overall development process. As part of the closing, the project manager reviews the project management plan to ensure all the deliverables are met within the specified budget; reflects on the project; verifies the team has saved all final files in the appropriate location; shares the appropriate files with the client; and makes notes of successes, failures, and improvement areas. If a budget is involved, the project manager analyzes the project data and budget before the close-out meeting. Using this data, the project manager can inform the team of areas in which they did well and where they can improve. This data can also be used in the planning of future projects, such as to identify tasks where additional time or resources should be allocated.

Once all these preliminary close-out tasks have been completed by the project manager, a close-out meeting can be conducted with the team. During the project close-out meeting, the project manager, instructional designer, graphic designer, videographer, photographers, multimedia developers, and any other team members meet to discuss and reflect on the project. They review the project, discuss what went well and areas to improve, identify lessons learned, address concerns, and discuss the budget. The project manager should make note of these points and ensure they are considered and addressed in future projects. Also at this time, the project manager can share any of the notes and ideas he or she noted; reward, recognize, and praise team members individually and collectively; and celebrate the overall accomplishment of the team. After all tasks are completed, the project is officially concluded and closed out (Cox, 2009; Morrison, Ross, Morrison, & Kalman, 2019; PMI, 2017).

COMPETENCIES

The roles performed by instructional designers and project managers using the ADDIE model and PMBOK® Process Groups combo approach have been examined. The combo model provides a clear picture of what each phase of the ADDIE model and Process Group entails to support the successful completion of a project. In addition to understanding how to unite instructional design and project management, it is paramount that instructional designers know how to manage and lead projects and teams in order to be marketable, stand apart, and stay on the cutting edge (Williams van Rooij, 2018).

To do so, professional organizations have developed competencies and standards to provide practitioners with guidelines for developing quality content. Management-related standards include competencies used by practitioners to enhance the instructional design process. In this section, we will examine the management-related competencies developed by prominent organizations including the Association for Educational Communications and Technology (AECT), Association for Talent Development (ATD), and International Board of Standards for Training, Performance, and Instruction (ibstpi®).

The Association for Educational Communications and Technology (AECT) developed professional education standards that educators in the field of learning and design can use to develop instructions. Three of the five standards have management indicators. The indicators measure one's ability to effectively manage people, processes, infrastructures, resources, and technological processes while also establishing mechanisms for maintaining the technology infrastructure. Fulfilling these standards results in achieved goals; flexible, diverse, and supportive learning environments; and improved learning and performance (AECT, 2012). In 2017, AECT developed the Instructional Design Standards for Distance Learning. The standards are purpose, assumptions, sequence, activities, resources, application, assessment, reflection, independent learning, and evaluation (Pina, 2018). While the standards do not specify competencies needed by instructional designers or managers, they are "intended to inform and provide guidance before, during, and after the design and development of online and blended/hybrid courses" (Pina, 2018).

The Association for Talent Development (ATD) created a Competency Model discussing the foundational competencies needed by trainers. Specifically, the business skills and interpersonal skills competencies address the management component. In the business skills competency, individuals are expected to apply business skills, drive results, think strategically and be innovative. From an interpersonal skill perspective, the ability to build trust, communicate effectively, and influence stakeholders is ideal (ATD, 2014).

Perhaps the most referenced competency in the literature is the International Board of Standards for Training, Performance, and Instruction (ibstpi®). The ibstpi® competencies and standards have been validated for training, instruction, and instructional design professionals and practitioners. The competencies include five domains with 22 competencies and 105 performance statements. The ibstpi® standards include a management domain that describes the ability for instructional designers to apply business skills to manage the instructional design function, manage partnerships and collaborative relationships, and plan and manage instructional design projects (ibstpi®, 2012). The structure of the ibstpi® competencies enables instructional design practitioners to benchmark their professional progress and career development against best practices in the instructional design field (ibstpi®, 2012; Williams van Rooij, 2018).

Table 2 includes a summary of these three organizations and their competencies.

METHODS

While extensive research on project management exists, only moderate research has been completed on project management in instructional design. Therefore, there is a significant need to clearly identify the project management role instructional designers are expected to perform in today's workforce. The author used various databases and keywords related to project management and instructional design to locate peer-reviewed research journal articles and books. The author also referenced the studies compiled in Sugar's (2014) book on instructional design practices and used them to perform additional research. Furthermore, the "Cited by" feature in Google Scholar was also used to locate additional articles on the topic. During this process, the author found a prominent researcher – Williams van Rooij – who has been exploring and studying project management for instructional designers. Using these various approaches, the author was able to cast a wide net of articles on the topic. After analyzing the articles and books, the author then created and coded nodes using NVivo to identify and label the various themes among the resources.

Importance of Management in Instructional Design

According to the PMBOK® Guide (2017), "using project management processes, tools, and techniques put in place a sound foundation for organizations to achieve their goals and objectives" (PMI, 2017, p. 11). Hence, project management complements the instructional design process. It provides repeatable processes that include steps for describing, organizing, and completing tasks for the various phases of the instructional design process (Williams van Rooij, 2011, 2013).

Furthermore, management is vital to the course development process, as projects that are ineffectively managed can result in poorly designed content, lack of resources, issues with the budget, and delay in delivery of the course (Abdous & He, 2008). Ineffective management can also lead to repeating tasks

Table 2. Professional organizations and competencies

	AECT	**ATD**	**ibstpi®**
Target Audience	Educators	Trainers	Instructional design practitioners
Standards	AECT Standards	ATD Competency Model	ibstpi® Competency & Performance Statements
Competencies	Manage people, processes, infrastructures, resources, and technological processes Establish mechanisms for maintaining technology infrastructure	Apply business skills Drive results Think strategically Be innovative Build trust Communicate effectively Influence stakeholders	Apply business skills Manage partnerships and collative relationships Plan and manage instructional design projects

that were not completed correctly; unsatisfied stakeholders; loss of reputation for the organization; and uncontrolled expansion of the project (PMI, 2017). Projects with effective and efficient management processes lead to quality courses being developed and delivered on time and within budget (Abdous & He, 2008). They also result in satisfied stakeholders, optimized use of resources, increased chances of success, the right product delivered on time, and objectives that are met (PMI, 2017).

The importance of management can also be found in job ads. Williams van Rooij (2018) compared and contrasted instructional designer job postings from 1995 and 2015. While there were noticeable differences in regard to the overall tasks requested to be performed by instructional designers, the most noteworthy, perhaps, was requiring instructional designers to have skills in project and budget management, building relationships, collaborating with stakeholders and subject matter experts, and understanding and aligning with the organization's goals to contribute to their business results (Williams van Rooij, 2018).

In some organizations, the instructional designer and project manager role may be served by the same individual or by different individuals. Regardless of the role and who performs the task, project management processes must be defined and implemented. When the processes are successfully implemented, clearly defined and organized projects that operate in an efficient manner are evident. As a result, projects keep to realistic schedules, including implementing manageable changes after appropriate details and methodology have been identified; meanwhile, the project team can dedicate time to building and enhancing skills (Williams van Rooij, 2010, 2011).

Categories of Project Management

With an understanding of the essential project management tasks, let's examine the lived experiences of instructional designers completing management tasks. The term "project management" is an all-encompassing term covering the variety of management responsibilities. Specifically, instructional design professionals manage projects, costs, people, and timelines. Having these management skills are integral to instructional designers.

The competencies that align with project management include the ability to plan and manage educational/training product development projects, identify and manage risks that can affect the project, identify barriers and provide solutions, manage the scope of the project, set clear expectations, communicate effectively, analyze the project environment, create project plans that align with the project scope, and keep projects moving (Williams van Rooij, 2010; 2018).

When it comes to cost and budget management, project managers are expected to plan, estimate, budget, and control costs. They must be skilled in determining the number of hours needed for designing and developing projects (Williams van Rooij, 2010; 2018).

As for people management, it is important that project managers are able to organize, lead, and manage project teams; provide timely and accurate project information to stakeholders; and collaborate and build relationships with participants and stakeholders. It is key to know how to effectively communicate with, manage, and use subject matter experts and stakeholders--and to be skilled at obtaining validation from stakeholders (Williams van Rooij, 2010; 2018).

While fulfilling all of these management tasks, project managers are expected to adhere to a detailed schedule and deliver a completed project on time (Williams van Rooij, 2010; 2018). Given the vast number of management tasks expected of instructional designers, this analysis will examine each management component individually rather than as a whole. This literature review will identify the management tasks performed, management expectations, and management roles of instructional designers in a variety of industries.

Project Management

Managing projects for instructional designers is not a new phenomenon. Several studies have been conducted to demonstrate how instructional designers have been managing projects over time.

Allen (1996) conducted a study to examine the practices of instructional designers in Australia. Among numerous activities, the participants reported managing material development from beginning to end, including managing the writing process, development of material, editing, publishing content, and the production process. The author concluded that project management is "done more frequently than many other activities" (Allen, 1996, p. 24).

Cox and Osguthorpe (2003) conducted a similar study investigating how 142 instructional design professionals from academia and corporate spend their time. The top two tasks reported by the participants were designing content (23%) and administrating and managing projects (22%). These studies show that instructional designers have been performing management duties for quite a while. More recent studies provide a clearer picture of current management tasks and distinguish how those skills are transferrable to different projects.

The process of developing online courses does not always start from scratch. In many cases, the courses have been taught face-to-face and transitioning them to the online environment is necessary in order to stay current and viable in today's society. Li and Shearer (2005) outlined this transition process and discussed the project management model necessary to accomplish this task. The authors reported the instructional designers created a project management Gantt chart and a website. Using the Gantt chart, all project team members were able to see the details of the project and tasks needing to be completed. The website complemented the Gantt chart in that it was available to view in printed format, convenient for checking tasks and deadlines, and easy to update (Li & Shearer, 2005).

In another study, Ritzhaupt and Kumar (2015) studied eight instructional designers in the United States. Several participants stated they had to juggle multiple projects involving various stakeholders and deliverables. Furthermore, they had to be able to solve and troubleshoot problems. The authors deemed having the ability to effectively manage projects was essential to their job role. Kumar and Ritzhaupt (2017) built upon this study and interviewed eight instructional designers working at higher education institutions in the United States. The participants reported they applied project management practices during the course development process. As for managing projects, the participants stated they managed websites, scoped projects, and managed multiple projects. One instructional designer reported working on eight to twelve projects per year and another one stated he spent about 30% of his time managing projects. The participants employed various approaches and techniques in order to keep track of the projects. They also emphasized the importance of instructional designers possessing project management skills. These skills will aid in managing multiple projects, stakeholders, team members, deliverables, and timelines while also allowing designers to successfully interact and deliver quality courses for higher education institutions (Kumar & Ritzhaupt, 2017).

In an analysis conducted by Williams van Rooij (2018), the author analyzed various research studies and summarized why projects fail. The top four common reasons were due to "a lack of clear project definition and scope, little or no systematic application of project management processes, unclear or unrealistic stakeholder expectations, and lack of concrete senior management support" (p. 217). Three of these four reasons are underlined by management tasks that are necessary for instructional designers. It is critical for instructional designers to stay current and have the knowledge, skills, and abilities to manage and lead instructional design projects (Williams van Rooij, 2018).

These studies corroborate the project management competencies identified by ibstpi® as necessary for experienced instructional designers or individuals serving as managers. The planning and management of instructional design projects encompass the capability to establish project scope and goals, write proposals, use various planning and management tools, and identify and solve issues (ibstpi®, 2012).

Cost Management

Managing the budget/cost is another expectation that instructional designers and project managers are expected to integrate into their daily practices. Once budgets are created, it is imperative that instructional designers follow the budget and regularly monitor it to ensure projects are completed within the given parameters (Williams van Rooij, 2018).

In addition to following budgets, instructional designers should seek to understand the budgetary approaches – top-down or bottom-up – used by the company. With a top-down approach, the instructional designer is given a pre-determined budget and works to complete the project within the given budget. On the contrary, with the bottom-up approach, the team identifies the tasks and associated costs and seeks approval for the overall total cost (Williams van Rooij, 2018). By understanding the approach, the instructional designer will be able to maximize efficiencies and design products that are within budget.

For institutions of higher learning, budget and cost management are also important because of the return on investments the institution hopes to receive as more students enroll in their universities (Li & Shearer, 2005). As such, instructional designers should understand the budgetary approach employed by the institution and for the project, and be skilled at estimating the hours needed to design and develop online courses (Williams van Rooij, 2013).

When Williams van Rooij (2018) analyzed instructional design jobs posted in 2015, budgeting and cost management skills were found to be a key responsibility desired by employers. Instructional designers were expected to help establish budgets, adhere to budgets, and manage and analyze budgets. These results were parallel to the findings in another chapter where Williams van Rooij (2018) concluded that project managers have to be able to "plan, estimate, budget, and control costs so projects can be completed within the approved budget" (p.241).

While budget and cost management concepts are not typically included in education curricula that produce instructional designers, these professionals' ability to adhere to the established budget is vital to the overall success of a project. Furthermore, ibstpi® classifies applying business skills and developing financial plans as a managerial task and is a "must have" competency for anyone managing instructional design projects (ibstpi®, 2012).

People Management

Designing and developing content that is rich, captivating, and effective requires teamwork and collaboration from multiple individuals. Instructional designers interface with other instructional designers, administrators/directors/managers, faculty members/subject matter experts, multimedia specialists, graphic designers, accessibility specialists, technical support, editors, and other stakeholders. It is paramount for instructional designers to have people management skills when engaging with a number of people.

They must be able to listen and communicate effectively and have skills with building relationships with clients (Williams van Rooij, 2013). Prior research shows that leadership traits such as these are critical to instructional designers who manage projects (Brill, Bishop, & Walker, 2006; McDaniel & Liu, 1996; Williams van Rooij, 2013).

Managing people requires varying levels of management skills needed in order to effectively engage with each group. This section will further address how to engage with clients while managing their expectations, effectively communicate with all individuals, build customer relations, and collaborate with teams.

Client's Expectations. Depending on the sector, instructional designers work with faculty members, subject matter experts, and/or clients. These individuals may or may not be responsible for or aware of the overall budget. Therefore, when working with these individuals, instructional designers may have to inform them of the budget and the contractual obligations. Participants in Williams van Rooij's (2013) study reported that competency with managing clients and stakeholders was a viable and necessary skill. Hence, it is imperative for instructional designers to be skilled at clearly stating expectations and managing those expectations. During the pre-planning and planning phases, instructional designers should clearly identify the requirements, define the scope, and create a work breakdown structure. By setting clear expectations, deliverables can be easily achieved and people can be held accountable (Abdous & He, 2008; Williams van Rooij, 2013).

Communications. Effective communication is integral to the instructional design process since the instructional designer has such a large and diverse group of individuals to collaborate with. Brill et al. (2006) conducted a study with 147 participants who all had 20 or more years of project management experience. The participants in this study identified possessing communication, expertise specifically knowing how to listen effectively and having strong verbal communication skills, as one of the top competencies for project managers (Brill, Bishop, & Walker, 2006).

These results support the findings from McDaniel and Liu's (1996) study. In the study, the authors interviewed five project managers who were managing multimedia projects. The findings yielded that it is critical for project managers to understand and speak the languages of their team members. This ability goes beyond knowing the technical jargon and requires incorporating everyday communication into professional interaction. The respondents shared various techniques that have enabled them to be successful in their roles, indicating that instructional design project managers should provide encouragement to team members and practice good communication with team members (McDaniel & Liu, 1996). Additional communication techniques recommended in other studies included creating and using a regular communication plan and seeking an understanding of the technical aspects so instructional designers can effectively communicate with other individuals on the team (Li & Shearer, 2005; McDaniel & Liu, 1996).

Communicating with stakeholders is another expectation of project managers. Project managers must "ensure timely and appropriate collection and distribution of information to stakeholders" and must be skilled in effective communication with stakeholders (Williams van Rooij, 2013; 2018, p. 241). This need is also documented in Kumar and Ritzhaupt's (2017) study where instructional designers highlighted the importance of communication skills when interacting with stakeholders.

Soft skills such as the ability to communicate effectively – orally, visually, or in writing – are also necessary traits for effective project management (Ritzhaupt & Kumar, 2015; Williams van Rooij, 2018). Ritzhaupt, Martin, Pastore, and Kang (2018) examined the competencies of educational technologists. In addition to analyzing job postings, they administered a survey to educational technology professionals. With 219 participants completing the survey, the findings yielded that oral and written communication skills were the top skills for individuals in this industry. This "soft skill" is vital to the field and is an important component of project management (Ritzhaupt, Martin, Pastore, & Kang, 2018). This essential skill is another one that is supported by the ibstpi® competencies. While the communication competency is included in the Professional Foundations domain rather than the Management domain, its importance is apparent, as there are 10 performance statements that guide instructional designers on how to effectively communicate (ibstpi®, 2012).

Relationships. Another component of people management is the ability to build and maintain relationships with various individuals. As stated earlier, instructional designers work with a variety of individuals in the development of course content. Through this collaboration, the instructional designer is expected to interact, collaborate, and build lasting relationships with these individuals. Strong client relationship skills were identified as one of the "must have" project management skills (Williams van Rooij, 2013). This expectation was also listed in Williams van Rooij's (2018) review of the job postings. The job postings indicated the "cross-functional collaboration" that instructional designers are expected to perform with subject matter experts and other stakeholders.

Furthermore, this finding supports the skills expected of project managers as identified by 103 employers that work in public and private sectors. These employers expected project managers to have the ability to "promote collaboration, partnerships, and relationships among participants and stakeholders" (Williams van Rooij, 2011, p.147). In order to achieve this, the instructional designer must provide timely and appropriate information to participants and stakeholders, which is an essential communication skill.

Individuals who perform project management duties while working as instructional designers specifically in higher education are expected to do more than design courses. According to Kumar and Ritzhaupt (2017), these individuals engage with faculty committees and collect data from stakeholders and users before and after implementation. The participants from this study emphasized the necessity of managing stakeholders as one of the key project management skills. To successfully do this, it is essential for the instructional designer to have great and effective communication skills (Kumar & Ritzhaupt, 2017; Williams van Rooij, 2013).

As with other management expectations, a competency and several performance statements are included in the ibstpi® standards in regard to managing customer relations, partnerships, and collaborative relationships. The competencies and performance statements are considered managerial tasks (ibstpi®, 2012).

Teams. Having the right team is another key factor in the success of instructional design project management. One of the findings from McDaniel and Liu's (1996) study was that instructional design project managers must be able to assemble, manage, and lead teams. Of five instructional design project managers interviewed, all reported that team assembly and management are important and cannot be underestimated. These professionals also indicated that successful management requires understanding the languages of each team member, motivating team members to do their best, having open dialogue as a team with the understanding that the rejection of ideas is not a personal attack, and that ultimately the success of the project depends on everyone working together (McDaniel & Liu, 1996).

In Kenny, Zhang, Schwier, and Campbell's (2005) analysis of what instructional designers do, it was concluded that instructional designers performed supervising responsibilities including training and mentoring subordinates; conducting performance reviews; recruiting, interviewing, and hiring staff; managing contract employees; meeting with project team and other cross-functional colleagues (such as marketing, technical, etc.); and planning and conducting team meetings (Kenny, Zhang, Schwier, and Campbell, 2005).

In other studies, instructional designers reported leading a team with different strengths, recognizing and rewarding team members, creating a schedule that included the roles of different team members, managing team member priorities to ensure deadlines are met, and listening and communicating effectively with team members and stakeholders as part of their team management duties (Kumar & Ritzhaupt, 2017; Williams van Rooij, 2013).

The management of team and supervising personnel aligns with the applied business skills competency in ibstpi® standards. Within that competency, a managerial performance statement states that instructional designers are expected to recruit, retain, and develop instructional design personnel. In addition, there are performance statements within the manage partnerships and collaborative relationship competency that align with team management (ibstpi®, 2012).

Timelines and Deadlines Management

The instructional design world is driven by deadlines and timelines. Instructional designers are expected to develop and deliver content within the allotted timeframe (Li & Shearer, 2005). Given the sheer number of people involved in the content development process, managing timelines and deadlines can be challenging. As such, time management is vital to the instructional design process. This statement is supported in a study conducted by Wakefield, Warren, and Mills (2012) where the researchers examined 59 instructional designer job postings. Among other management and leadership responsibilities, they found that the Mid-Senior level job postings sought instructional designers who could manage production schedules and timelines. This finding is consistent with the study conducted by Ritzhaupt, et al. (2018). They found that time management skills ranked number six as a necessary skill for instructional designers. Schedules delineating the deadlines, resources, and individuals involved must be created and shared with all involved to ensure the project is completed by the agreed-upon deadline (Kumar & Ritzhaupt, 2017; McDaniel & Liu, 1996; Williams van Rooij, 2018). Delivering courses on time is also important because institutions and organizations want to receive a return on their investment (Li & Shearer, 2005).

Gantt charts are one tool instructional designers use to manage timelines and deadlines. With Gantt charts, they can identify tasks, who is responsible for the tasks, and if the tasks are parallel or sequential (Pan, 2012). In addition to Gantt charts, Pan (2012) recommended instructional designers follow a critical path method for determining the critical path of the project progress. This method allows instructional designers to complete other paths/tasks before the critical path as it takes the longest to complete (Pan, 2012).

Perhaps the best way to summarize time management is through Williams van Rooij's (2013) lens. In this study, the participants were eight Chief Learning Officers (CLOs). The participants stated having proven experience delivering to deadlines and the ability to create a project plan backwards from the project due date or allotted hours were "must have" skills (Williams van Rooij, 2013). These abilities are supported by ibstpi® (2012) standards. Many of the managerial performance statements indicate instructional designers must be able to manage multiple priorities to maintain project timeline while allocating resources that support the project plan.

IMPLICATIONS FOR PRACTICE

This chapter has provided readers with a comprehensive overview of the importance and role of project management in the instructional design process. Using the Four-Step Combo created by Cox (2009), instructional designers are knowledgeable on how to unite the ADDIE model or variations of it with the PMBOK® Process Groups to successfully design content. Furthermore, the lived experiences of instructional designers have been presented to further define and demonstrate real-world practices of the instructional design field.

Instructional design practitioners and students would benefit greatly from this chapter as it provides insights that will aid them in advancing to the next level in their education and profession. Using this information, practitioners will be able to examine their practices and identify where they can strengthen their knowledge and skills. As the project management trend within instructional design continues to gain momentum, current or prospective students could use this information to enhance their knowledge and skills. Some potential opportunities they can leverage include leading group projects while completing coursework, looking for chances to work with or shadow project managers during internships, and taking project management courses or completing certifications while completing coursework.

Instructional design and technology programs could use this chapter to improve and enhance their curriculum. It will serve the instructional design and technology programs and students well to add a project management course aligning with the PMBOK® Guide to their curriculum. Students would gain knowledge and relevant skills that would benefit them in obtaining employment while possibly fulfilling a prerequisite for one of the PMBOK® certification exams.

RECOMMENDATIONS FOR FUTURE RESEARCH

Project management within instructional design is still developing and unfolding. Therefore, there are numerous areas where future research can be conducted. The body of literature would benefit greatly from a current study on recent project management tasks performed by instructional designers and instructional design project managers. This current research will provide instructional designers with key competencies, effective strategies, and emerging trends necessary to successfully design quality content while improving outcomes and performance.

Instructional design and project management tasks could vary depending on the industry. More specific research examining the project management practices of instructional designers in higher education, business and industry, military, etc. is needed. Furthermore, examining the nature of instructional design managers who are leading faculty development departments or centers for teaching and learning will provide a more accurate depiction of their practices. This type of research will inform instructional designers seeking to work in specific industries.

Cox (2009) explored the uniting of ADDIE model and the PMBOK® Process Groups. As a waterfall approach, ADDIE has presented some challenges. Therefore, a new agile instructional design model – SAM (Successive Approximation Model) – has been developed. The SAM model emphasizes the importance of iteration, collaboration, efficiency, and manageability. A study that builds upon Cox's (2009) work uniting SAM and the Process Groups would enhance the literature and provide instructional designers and organizations with useful insight on how to use the Process Groups with an agile development process.

CONCLUSION

The management role for instructional design projects is vast. In addition to designing quality content, instructional designers are expected to manage projects, cost and budgets, people, and timelines and deadlines. In order to fully understand the scope of management and to compensate for the lack of project management courses in the instructional design curriculum, instructional designers should evaluate the various professional organizations and their competencies and select one that best aligns with their practices. Instructional designers must do this in order to stay current and keep up with the trends in the field. Through this literature review, new instructional designers entering the workforce will have a thorough review of the expectations. Current practitioners will be able to examine their practices and see how they can use the lived experiences of other instructional designers to improve their knowledge, skills, and abilities of instructional design management.

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KEY TERMS AND DEFINITIONS

ADDIE: a linear waterfall instructional design model with five sequential phases of Analysis, Design, Development, Implementation, and Evaluation.

Cost Management: the process of planning, controlling, and evaluating a budget to ensure the project is designed within the scope of the project.

IBSTPI®: instructional design standards and competencies used to govern the design and development of content.

Instructional Designer: a skilled and trained individual who uses models and processes to analyze, design, develop, implement, and evaluate content or training materials.

People Management: the process of leading and training individuals while managing the client's expectations, communicating effectively, building relationships, and guiding teams.

Project Management: the use of knowledge, skills, tools, and techniques to enhance the instructional design process.

SAM (Successive Approximation Model): an agile instructional design model that focuses on iteration, collaboration, efficiency, and manageability.

Subject matter experts: the individuals with knowledge of the content.

Timeline Management: the process of adhering to timelines and schedules to successfully deliver projects on time.

APPENDIX

Application Activities

Discussion

As part of your job as an instructional designer, you have been tasked with creating and managing the timeline for the development of your project. Discuss the following: What is your process for creating a project management schedule? What tool(s) will you use to manage the project? How will you ensure all team members involved will be kept abreast of the deadlines and expectations?

Activities

Examine your current instructional design practices in order to identify what management tasks (e.g. project, cost and budget, people, and time) you have completed and ones you have not completed:

1. Using the list of management tasks you have identified, update your resume/curriculum vitae, LinkedIn profile, and ePortfolio to reflect your management knowledge, skills, and abilities. Using the list of management tasks you have identified, develop a plan for gaining experience in the management areas you lack.
2. Review various positions and job descriptions posted on job boards to identify the management expertise required by instructional designers and/or instructional design project managers. If you lack the necessary management skills as outlined in the job descriptions, devise a plan for how you will improve your knowledge and skills.

Chapter 11
Andragogy and Online Discussions:
The Design and Facilitation of Effective Online Discussion for Adult Learners

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ABSTRACT

This chapter considers the functions of online discussion and concludes that discussion alone does not guarantee deep and lasting learning. Discussion should be rooted in a sound andragogical design practice to promote meaningful learning. Online discussion requires effective instructional design to enable adult learners to be engaged and to achieve learning outcome. The chapter explores discussion board design linked with adult learning traits and preferences as well as practical strategies to assist instructors and moderators as they facilitate instruction.

INTRODUCTION

Online discussion is commonly used as a means to promote student understanding of a topic and to facilitate social engagement among students or between students and instructor. Group discussion activities have long served as a standard learning strategy for online instruction. Research indicates the discussion activity to be a valuable approach to promote student and faculty engagement (Garrison, Anderson, & Archer, 2000; Sher, 2009; Lai & Savage, 2013; Selhorst, Bao, Williams, & Klein, 2017).

Many researchers support the idea that discussion in online learning enhances student learning and facilitates social engagement (An, Shin, & Lim, 2009; Hew & Cheung, 2013; Hrastinski, 2008). Synchronous discussions are convenient for students, particularly adult learners with professional and family commitments. Online discussion has the potential to enhance student collaboration (Hew & Cheung, 2013) and help students meet learning outcomes (Palmer, Holt, & Bray, 2008). The asynchronous online discussion environment offers students a flexible option to participate in online learning regardless of

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geographical location (Hew & Cheung, 2013). Most relevant to the online adult student, online discussion offers the potential for collaborative knowledge-building process learning where each student becomes reflective, thinks critically, and understands concepts better than if she or he were studying alone (Hew & Cheung, 2013). Contrasted with informal online synchronous “chat” sessions, an asynchronous discussion board provides a written transcript of the conversation by which the discussion potentially becomes an additional text in the course (Hlinak, 2014).

However, the effects of online group discussion on student learning have rarely been investigated. Very little empirical research has been done through experimental design (Oh & Kim, 2016). The literature regarding asynchronous online discussion also indicates common pitfalls, including learners’ limited participation in online discussions (Hew, Cheung, & Ng, 2010; Tallent-Runnels et al., 2006) and lack of depth in thinking and reflection (Garrison & Cleveland-Innes, 2005). While online discussion activities can serve as a strategy for reinforcing cognitive material and promoting a deeper understanding of course content, discussion boards have the potential to lack rich and dynamic dialogue and instead “serve as a field of obligatory discourse, hasty postings, and repetitive content” (Mooney, Southard, & Burton, 2014). Factors such as group dynamics (Mabrito, 2006), content (McLoughlin & Mynard, 2009), and instructor skill (Bliss & Lawrence, 2009) have the potential to positively or negatively influence student attitudes and overall success in discussion board activities.

While some debate exists about the overall effectiveness of discussion boards as pedagogical tools (Pao-Nan, 2012), threaded discussions have been a ubiquitous strategy for asynchronous online student social interaction (Mandernach, Gonzales, & Garrett, 2006; Pao-Nan, 2012). The use of online discussion alone does not guarantee deep and lasting learning (Darabi & Jin, 2013). Significant learning online requires effective and appropriate design for students to be cognitively engaged and reach the learning outcomes. Rotgans and Schmidt (2011) describe cognitive engagement as the extent to which students are willing and able to take on the learning task at hand. Adult learners’ cognitive engagement is important for success in online learning (Oh & Kim, 2016). Lai and Savage (2013) found that the greatest level of student engagement took place when faculty used the learning management tool as a means to share their interests. In their best form, discussions provide a venue for teaching in an online setting that can be engaging, educational, and inclusive of all students (Selhorst et al., 2017).

In this chapter I explore the history of online discussion as part of the evolution of online learning. I also explore what has been found in the literature regarding the types of student interaction; adult learner motivation; the potential role of online discussion in adult learning; the Community of Inquiry framework; specific andragogical approaches for quality online discussions online media-based discussions; rationale for utilizing critical reflection; adult learner autonomy; and best practices for online discussion facilitation. A critical approach to the current theories and relevant examples of sound pedagogical practices are included.

LITERATURE REVIEW AND BACKGROUND

The Evolution of Online Discussion

Many instructional theories place an emphasis on the learning itself (Kiely, Sandman, & Truluck, 2004). No single learning theory or instructional model provides the complete blueprint for designing the most effective instruction for adult learners or establishing informative learning context and learner understanding (Arghode, Brieger, & McLean, 2017; Merriam, 2001). However, it is important to take learning theory into consideration when designing online discussion activity for adults.

In search of the effects of distance education on learning outcomes, Michael Moore (1973) developed Transactional Distance Theory. This theory does not describe the physical distance between the instructor and student as much as it describes the psychological and communication distance, which roots the theory more in social science (Saba, 2005). In Moore's (1973) theory, the dialogue, structure, and learner autonomy domains moderate the extent of transactional distance. Moore (1973) defined transactional distance as the psychological and communicative space between the instructor and the learner. Moore's (1973) Transactional Distance Theory was the first pedagogical theory to result from analysis of the learning process happening at a distance. Moore (2013) explained that, as learning structure increases, dialogue decreases and the capacity for individualization (autonomy) decreases, which results in increased transactional distance (Figure 1).

According to Moore (2013), the introduction of Transactional Distance Theory proved distance education was distinctly different from face-to-face instruction and had its own pedagogical characteristics. While Moore's theory is invaluable in the field of distance education and online learning, the dialogue dimension within Moore's Transactional Distance Theory is particularly relevant to this chapter and any discussion regarding online discussion activities. I will frame the bulk of this chapter and the relevant case studies at the conclusion within the ideology of creating practical, useful dialogue for adult learners.

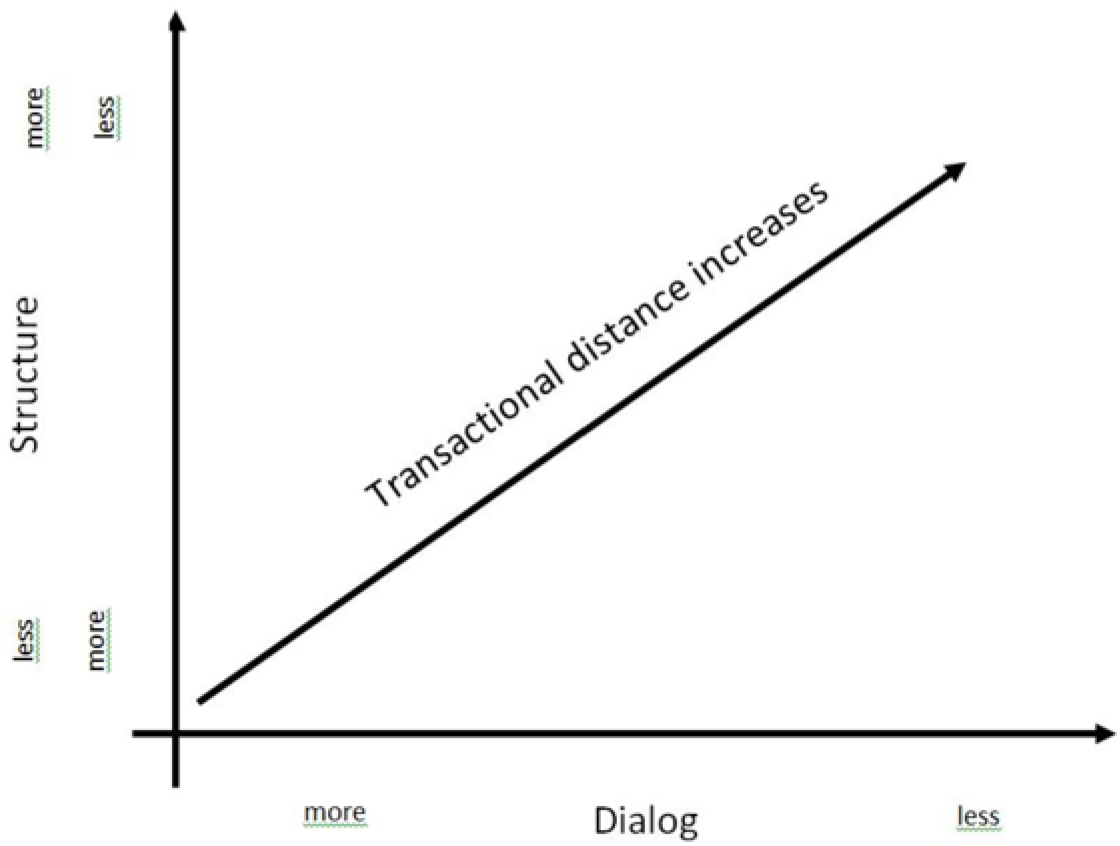
Types of Online Student Interaction

The first wave of early online instruction to evolve after the emergence of the World Wide Web often utilized static Web pages coupled with the use of e-mail for asynchronous communication or chat sessions to facilitate synchronous dialogue. A common philosophical approach was to replicate the classroom by converting traditional face-to-face instruction to online delivery and to establish the same type of instructor-centered experience. Unfortunately, these early forms of online instruction lacked real pedagogical design and substantial evidence of the main pillars of instruction.

Fortunately, current design practices and learning technologies have filled the pedagogical void and deserve consideration. Instructional designers and subject matter experts need to consider the various dimensions of the online learning context and student interaction that will impact the design of discussion activities (Dennen, 2013). The types of online student interaction that can potentially take place include learner-teacher, learner-learner, and learner-content (Moore, 1989). In light of this, instructional designers and subject matter experts should consider the desired course learning outcomes, types of intended student interaction and related outcomes, and how the temporal dimension of asynchronous vs. synchronous instruction will work together (Dennen, 2013). The approach of considering the instructional situation and type of student has strong merit and can increase the quality of design. Learner-content interaction provides an autonomous aspect of learning for the student (Moore, 1989). This aspect of introducing more control works well for design intended for adults.

However, designing to support student-student interaction is also important. A popular approach for adult students, especially for those enrolled in graduate programs, is asynchronous instruction. As opposed to meeting synchronously at scheduled times, utilizing this temporal format offers flexibility for students who manage both a career and family life. Asynchronous courses of this type tend to be designed in weekly modules (Dennen, 2013). As compared to other formats, weeklong discussion activities across multiple threads of discussion offer the potential for deep, meaningful posts, but some

Figure 1. Relation of course structure and instructor-student dialog in transactional distance. Adapted from Saba, F. (2013). Building the future: A theoretical perspective. In M.G. Moore (Ed.), Handbook of Distance Education (3rd ed.), New York, NY: Routledge.



messages may not garner a peer response (Dennen, 2013). In the adult learner setting, it is valuable to create well-designed asynchronous discussion activities coupled with appropriate facilitation strategies to increase full dialogue of responses discussed later in this chapter.

There can be great value in taking the time to consider how the type of student taking the course relates to the type of student interaction. Online programs may have adult learner enrollments that include full-time students switching careers or an employer cohort created through an institutional relationship or agreement. These types of learning situations create opportunity and potential for more instructor-centered synchronous communication in the forms of short lecture, orientation, virtual office hours, tutoring, or student presentations. A cohort of adult learners with a common employer or professional organization may benefit from meeting in the same room where the instructor joins remotely though Web conferencing software. The opposite can be true of online graduate learning situations. Part-time online graduate students who balance work and family schedules will likely benefit more and meet the learning outcomes if student-instructor and student-student interaction is designed to be an asynchronous dialogue. An asynchronous approach to course design offers the type of flexibility preferred by the online graduate market.

Motivation and Discussion Participation

Historically, pedagogy has been the leading method of instruction where the instructor is the center of the instruction. Malcolm Knowles's early work with adult learning developed the new conceptual framework of andragogy to describe adult learning preferences and teaching adults to learn. Knowles (1980) argued that andragogy should be considered learner-focused and pedagogy should be thought of as teacher-directed, and that these two concepts act as the basis for a continuum that both adults and children share. In andragogical situations, the instructional climate is ideally relaxed and trusting; the adult learners should be prepared by the instructor, with the mechanisms for learning planned by the learners themselves for increased autonomy (Knowles, Holton, & Swanson, 2015). Learning in adulthood is usually voluntary but can also be required for professional development, which can present challenges regarding motivation. Online instruction for adults should create an experience that will motivate them to participate by connecting with individual needs and utilitarian content to solve a real-world problem (Knowles et al., 2015).

Some concern has developed in higher education about the overreliance of discussion boards, specifically evidence supporting the claim that discussion board activity alone does not guarantee deep and lasting learning (Darabi & Jin, 2013). Selhorst, Bao, Williams, and Klein (2017) hypothesized that decreasing the frequency of weekly online discussions for adult learners from twice per week to once per week would result in increased GPA, decreased withdraw rates, decreased fail rates, and increased progression. The authors compared online courses that required two postings per week to courses requiring only one post per week at an online institution of higher learning. In experimental courses, pedagogical design was revised with additional readings and increased emphasis on the remaining discussion activity in terms of length, rigor, and assessment. Findings revealed reducing weekly activity to one discussion resulted in no significant difference in average GPA across the groups and that students' fail rate and progression also remained relatively unchanged. The authors did report a trending decrease in the withdraw rate across all courses upon the shift from two discussions to one, indicating a student preference for one larger discussion activity. In other words, the researchers felt the data suggested there is a limit to the amount of discussion that is preferred by the adult learner (Selhorst et al., 2017).

While the concept of overreliance on discussion boards should be noted, the function of well-designed discussion boards in student learning far outweighs the concerns. Accordingly, instructors and program designers should take an andragogical approach also rooted in cognitivism and humanism and design for learner motivation. It is useful to promote adult learner intrinsic motivation by designing discussion activities around content appropriate for and relevant to both the weekly module and the larger instructional context. An example is a design that ties professional current events and weekly learning objectives to what is happening in the student's local situation as a teacher, accountant, nurse, manager, therapist, human resources professional, or attorney. This approach has the potential to elicit the best academic performance from the adult learners.

The Community of Inquiry Model

Hall (2016) explained that the benefit of online discussions compared to discussions in the classroom is that classroom conversations can be controlled by the dominant few, while online carries the potential for all students to have an equal voice. In an online setting, all students are afforded an opportunity take time to reflect before contributing to the dialogue. A common challenge for online learning is that the online student can feel isolated (Gillett-Swan, 2017; O' Shea et al., 2015; Kresse & Watland, 2016). This phenomenon creates a larger need for engagement from a psychological and communal standpoint for the adult learner. The domain of instructor presence to aid in adult student engagement can be viewed as a continuum in that engaging instructor presence strategies are not mutually exclusive in the online classroom. Garrison, Anderson, and Archer (2000) summarized three dimensions of instructor presence as part of their larger Community of Inquiry model for effective online course design: instructional management, building understanding, and direction instruction. Specifically, instructional management describes the cognitive structure of course content and organization. Indicators include designing appropriate methods of assessment that link to the course learning outcomes, establishing time parameters, and utilizing the instructional medium. Building adult learner understanding is something all online teachers should do through intervention and timely feedback. It is a process of creating an effective group consciousness to share meaning. Direct instruction can and should be provided through online media lectures, video, synchronous sessions, course resources, and textbook materials. Instructor presence can be established through frequent and predictable communication, consistent feedback on student performance, and by providing critical discourse (Garrison et al., 2000).

Online courses can and should be designed with adult student engagement in mind. Lohr and Haley (2018) conducted qualitative research connecting the Community of Inquiry model with the utilization of biographical prompts for adult graduate education students to build community in the online setting. Participating students in an online education course were prompted to recall features of their childhood homes as part of a memory identification activity to understand how cognitive memory works. Findings from the study revealed the window prompt activity generated active reflective experience that promoted a sense of community through teaching, cognitive, and social presence (Lohr & Haley, 2018). The researchers explained the window prompt activity created additional student questions, observations, and general dialogue "rich with reflections" aligned with the teaching presence, cognitive presence, and social presence (Lohr & Haley, 2018, p. 14). This study exemplified the use of a community-based model to promote reflection on prior experiences in a group discussion setting to generate deep and engaging learning. Direct online instructor involvement early in the course also aided in building learner confidence in the online classroom, the absence of which can often be a barrier for adult students accustomed to instructor-centered learning experiences (Lohr & Haley, 2018).

The Community of Inquiry framework has received considerable attention in higher education. At the time of this publication, the supporting research (Garrison et al., 2000) has garnered over 5,000 citations in twenty years since its publication. The attention is well- warranted. The Community of Inquiry framework fits well with andragogical learning and is worthy of utilization. The Community of Inquiry framework calls for instruction that prepares learners and is engaging, motivating, flexible for student autonomy, reflective, social, and relevant. The overlap of the three separate elements of social presence, cognitive presence, and teaching presence in the framework is relevant to this discussion and has great value in creating online discussion activities for adults--both in the physical classroom and online. Specifically, online discussions for adults should link to weekly content and be constructed to promote purposeful critical discourse and reflection through social interaction. This approach has strong potential for the adult learners to create personal meaning and confirm mutual understanding across the group.

Andragogical Approaches to Online Discussions

Adult learners do not fully participate in online discussions for several reasons. Adult students are less likely to participate fully when they do not see the purpose of the discussion, do not understand what to contribute, do not receive responses to their postings, do not understand the discussion structure of the online forum, or do not understand the grading criteria (Hew et al., 2010). Therefore, an online discussion that clearly communicates its purpose, the expectations set for the students, and the activity's alignment to the course learning outcomes can especially benefit adult learners. The implementation of an instructor's vision is equally important and must be actively and attentively furthered for the duration of the course.

Appreciative Andragogy

With relevance to online learning, Glowacki-Dudka and Barnett (2007) posited that critical reflection for adult learners coincides well with online learning as "critical reflection does not just involve adults thinking and reflecting during practice, but it refers to reflecting back on prior learning experiences under specific conditions" (p. 44). Glowacki-Dudka and Barnett's (2007) qualitative multi-case study on critical reflection investigated two online courses that utilized Brookfield's (1995) anonymous Critical Incident Questionnaire (CIQ) to focus students' attention on significant experiences from their pasts. Results determined that critical reflection was an effective tool in facilitating meaningful learning online for adults. Glowacki-Dudka and Barnett (2007) mentioned that "when students are allowed to provide those reflections, they provide evidence of group development and a feeling of ownership in the class" (p. 51). A case study by Phelan (2012) confirmed Glowacki-Dudka and Barnett's (2007) experience that Brookfield's (1995) CIQ instrument can be an effective strategy for developing online instruction using andragogy. Referring to the CIQ tool, Phelan (2012) stressed, "an ongoing conversation between students and lecturer about course structure and functioning may facilitate students' capacity to conceptualize and value learning as an interactive, social activity" (p. 42).

The rationale for utilizing critical reflection in discussion board activities is valuable and appropriate. Adult students bring a host of previous experiences that can serve as fodder for meaningful reflection-based activities. Consider the background of registered nurses enrolled in a palliative care course where many of the learning objectives are rooted in the affective domain (Krathwohl, Bloom, & Masia, 1973) and include reflection activities related to beliefs, attitudes, and appreciation for working with patients living with a serious or terminal illness. In a similar manner, consider working school teachers enrolled in a graduate education course related to classroom discipline. These adult students will possess and reflect on a wide breadth of previous knowledge and experience in order to create connections with the course content and, as a result, new meanings.

Media-Based Discussion

In theory, educators should not utilize technology tools for technology's sake and risk diluting adult learning situations. However, current cloud-based solutions utilizing media have the potential to make it easy and effective for adult students to leave voice messages as part of discussion activities. Prior studies report the perceived usefulness of audio as a discussion channel, especially through its tendency to create liveliness in encouraging participation (Ching & Hsu, 2013; Hew & Cheung, 2013). The capability of adding audio to collaborative learning activities to solve authentic problems can enable adult learners to form a community of inquiry. A variety of available Web 2.0 technologies with integrated mobile apps, including VoiceThread and Wimba Voice, makes it possible to post audio to discussion board activities. Research shows strong positive student perceptions of VoiceThread, a cloud-based platform that facilitates recorded voice communication that can be integrated with discussion activities, for the ability to add in-depth, information-rich audio files to asynchronous group activities while creating the potential for deeper relationships (Augustsson, 2010; Chan & Pallapu, 2012; Kidd, 2013; McCormack, 2010). While some students feel the structure of audio threads is more convenient for posting, general student feedback from research indicated audio threads carry the potential to communicate emotion and personality, and thus seem more effective than text-based discussions at conveying meaning accurately (Ching & Hsu, 2013). In fully online courses where there is no face-to-face interaction, audio threads feel more authentic, comments can be easier to interpret, and communication can be personal (Ching & Hsu, 2013). Instructional designers and subject matter experts should consider linking streaming media creation, using either short videos or audio files, to asynchronous group activities.

Using the Community of Inquiry framework as a theoretical guide, Delmas (2017) explored the role of VoiceThread with adult learners. The adult students participating in the study indicated VoiceThread positively contributed to the creation of online community (Delmas, 2017). The adult learners reported feeling more united with their classmates due to the tool's ability to add voice recordings to online activities, as well as create a closer connection to their instructor due to the audio's tendency to "humanize, or make the instructor seem real" (Delmas, 2017). The use of video can also be utilized as a discussion channel. Sites such as Flipgrid can be used to allow students to quickly engage in recorded video comments (Green & Green, 2018).

The research of Oh and Kim (2016) explored the use of scaffolded, audio-based argumentation activities and how adult learner discourse was characterized and perceived. The audio-based debate activities were designed based on the Scaffolded Online Dialogic Argumentation (SODA) framework created by the authors. This three-phase approach of SODA includes an initial argumentation generation followed by argumentative interaction and then interaction. Utilizing audio-based discussion, students posted media files of their arguments using the five types of scaffolds provided: conceptual, procedural, strategic, meta-cognitive, and social. To aid in reviewing and responding to peers' questions, arguments, and counterarguments, the scaffolding approach included question prompts and a checklist to guide learners in thinking about and formulating their arguments. Results indicated students used sound arguments in their postings, employing valid evidence and the use of real examples. Students reported positive learning experiences, strong preferences for using media-based discussion, increased cognitive effort, and acknowledgment of the benefits of scaffolding in their discussions (Oh & Kim, 2016).

All of the media solutions discussed here have andragogical value to promote deeper learning and student motivation. Posting a quickly-recorded media file can potentially be easier for adult students than typing their responses. However, media solutions are not without their course facilitation pitfalls. It is necessary for instructional designers and instructors to provide appropriate student support and orientation when utilizing technology outside the online course shell so that students do not waste valuable time learning about the tool itself instead of focusing on the course work. Any technology tool used in an online course should support the learning objectives or competencies and promote learner engagement. Finally, special consideration should be made regarding the protection of student data and privacy outside the learning management system.

The Role of Online Discussion

The research of Cho and Tobias (2016) sought to examine the role of online discussion in student learning experiences. The authors argued past research on the use of discussion boards were based on correlation analysis without control and experimental groups (Cho & Tobias, 2016). The researchers conducted a comparative study examining the role of online discussion in student learning in the context of the Community of Inquiry model. One instructor taught the same online course for three consecutive semesters, varying the degree of discussion from no discussion at all to weekly discussions including instructor participation, while providing the same level of feedback through e-mail and keeping grades up-to-date within the week (Cho & Tobias, 2016). While findings showed no significant differences among conditions in cognitive presence, there was a significant difference in overall social presence. Teaching presence and cognitive presence were not significantly different across the three courses. However, the authors admit these results need more replication in different instructional contexts to establish more conclusive implications for online discussion related to the Community of Inquiry model. To be clear, the findings from this study may not apply to graduate situations with adult enrollments who may be looking for a socialized aspect to their learning. Educators are still encouraged to incorporate discussions throughout their graduate instruction. However, this research does provide a marker indicating that it is possible to integrate too much discussion, which may not always be better for the adult learner.

Philosophies vary regarding the level of instructor engagement in discussion boards. An, Shin, and Lim (2009) argued that instructor facilitation can influence how students interact and participate in online discussion activities. Specifically, when instructors required students to post responses to each other coupled with intentional instructor non-participation, student-to-student interaction increased and the students relied on the comments and feedback of each other instead of defaulting to the instructor (An et al., 2009). However, the findings of Nandi, Hamilton, and Harland (2012) showed students highly valued instructor interaction for periodic feedback, appreciated the instructor keeping students on track, and confirmed the concept of student-facilitated discussions as not always effective.

It is recommended that the instructor participate in the discussion. Nonparticipation on the part of the instructor creates a lack of instructor presence. It is important for instructors to participate in weekly discussions to teach, guide, and support the learning process. Student- instructor interaction is one of the most critical factors of online student satisfaction (Nandi, Hamilton, & Harland, 2012). Instructors are encouraged to participate in a way that can be predictable for the students, increasing the socialization aspect of their learning process. Weekly discussions are an opportunity to insert instructor-centered features into the learning. By providing strong social presence on a weekly basis, instructors can integrate their own past experiences, determine the level of understanding, and provide useful feedback. Yet, the level of instructor interaction is necessary to consider. Instructors and designers are encouraged to consider the context of the instructional situation and the level of instructor engagement. Dennen (2005) stated that different discussions require different approaches. Some instructional situations will call for discussions requiring frequent direction and feedback while others may only call for minimal instructor involvement.

Design of Online Discussion

In an attempt to better define the pedagogical value of discussion boards and promote meaningful interaction, Mooney, Southard, and Burton (2014) conducted a qualitative study in which the researchers created an innovative group discussion activity they termed the "suspense model," utilized in two undergraduate hybrid online courses to promote student-centered learning and to increase the quality and quantity of student postings. Students subsequently participated in two separate asynchronous discussion exercises during the course of the semester. In the suspense model, students were randomly divided into groups and advised to check back for additional information relevant to the assignment. At key times, the instructor released necessary information to each group to complete the assignment. In the same courses, the researchers also included a second discussion board activity whereby students were provided with the problem and supporting material at the outset of the exercise. Results indicated that students more promptly and thoroughly engaged in the discussion board utilizing the suspense model, and students generally favored the exercise over the traditional approach (Mooney et al., 2014).

Different approaches to facilitating discussion can help to avoid student cognitive overload. Busy working adult learners can often feel overwhelmed with the amount of student work, which includes reading all the discussion activity and making the required responses to their peers. Deeper learning is dependent upon student participation. Stearns (2017) tested a new discussion design to encourage online students to read all the discussion posts. Stearns (2017) stressed the value of thematic analysis assignment (TAA), requesting students to read *all* the weekly posts and find three themes occurring throughout the responses. Students were then to name and describe the themes, and present two examples (direct quotes) from fellow students. This approach can take the place of meeting the minimum of two response posts. Results indicated students recommended this strategy in the future. The use of this learning tool encouraged students via a constructivist process to think critically.

Integrating an approach that forces the students to check back for further details on an assignment can be a useful approach to increase adult student motivation. A caveat to adopting a design that requires students to check back for more details is that the designer will need to factor in the other work occurring in the module. Another consideration surrounds the creation of additional discussion assignment details, which needs to be accomplished in a way that promotes motivation and engagement and does not distract the student.

Varied Design and Adult Epistemology

Instructors and subject matter experts should vary the discussion design for each module to avoid cognitive overload issues when designing for the adult learner. Such a varied approach can aid the cognitive aspect of learning so that the adult learner can more easily differentiate each learning experience as it relates to the learning objectives. Failure to adopt a varied approach can leave the students open to cognitive dissonance or fatigue across the weeks as design features start to look similar.

Educators should consider adult pedagogical epistemology when designing discussion activities. When students come to online courses with the epistemic view that instructors are the transmitters of knowledge and students are passive recipients, the instructor is faced with the challenge of moving learners to a position of co-constructed knowledge creation (Smith, 2010). Course design should emphasize student reflection and discourse to shepherd students to a more self-directed orientation (Coulson & Harvey, 2013). Adult learners prefer to understand why a particular learning object or activity is being used (Arghode et al., 2017). Subject matter experts and instructional designers should consider utilizing an explanation of the different philosophy as part of the discussion instructions or a short orientation media clip. It is important for educators to explain the rationale behind a particular discussion activity so that the adult learner can link the activity to the learning objectives. Bloom's Taxonomy may be consulted in order to determine and articulate the purpose of an appropriate graduate-level activity.

Authentic Assessment

Discussion activities can serve the purpose of authentic assessment. Adult learners prefer assessment and student activity to be connected to the real world. The student activities can be situations where the students assume a role that reflects something they are likely to encounter in reality or their places of work (Huang, 2002). Huang (2002) emphasized that when designing effective social constructivist pedagogy for online adult learners, key strategies that align with andragogy include interactive, collaborative learning activities and authentic learning that connects with real-world scenarios. The importance of authentic assessment in andragogical situations cannot be overstated.

Utilizing real-world scenarios connected to authentic assessment is related to considering the context of the learning situation. Fink (2003) presented the Integrated Course Design model and explained the basic components of integrated design for significant learning are learning goals, teaching and learning activities, feedback and assessment, and the situational factors of learning. Context describes the surrounding aspects of the learning and the characteristics of the learner (Fink, 2003). Adult learner characteristics are an important consideration when designing discussions for adult learners. Coupling these unique learner characteristics with authentic assessment has the potential to further engage the learner. Assessment is authentic when it is rooted in real-world scenarios (Wiggins, 1998). To create authentic assessment, activities should employ realistic elements, require a decision, replicate or simulate a context for adults in professional or personal life, and assess the student learning (Fink, 2003; Wiggins, 1998). Therefore, educators should take care to include aspects of authentic assessment in discussion design. Online discussion design should include real-world scenarios in which the adult learner can apply and synthesize varied solutions or approaches.

Arghode, Brieger, and McLean (2017) explained that the constructivist approach is effective for the adult online learner. Compared to pedagogical settings where students may share a similar starting point in their learning, adult students bring a different set of experiences and needs to an instructional setting. The authors explain that many institutions in higher education have adopted constructivist instructional strategies, often employing open-ended questions that require online students to engage in collaborative discussion (Arghode et al., 2017). These types of activities are certainly collaborative and have the potential to represent authentic assessment (Arghode et al.,2017). Online adult learners can introduce new dynamics for which online instructors need to remain flexible. Taking a constructivist approach can introduce new viewpoints from peers during online weekly discussions, increase learner confidence, and utilize peers for technology support (Ruey, 2010). In a case study research (Ruey, 2010), constructivist-based instructional design helped adult online learners in two ways: instructional activities requiring collaboration and interaction encouraged adult students to support one another, and constructivist-based online instruction assisted adult learners to develop a sense of becoming more self-directed in their learning and broadening the role of the student.

DISCUSSION

The effectiveness of online discussion board activities for adult learners is contingent on design as well as facilitation. Well-designed online discussion activities linked with aligned participation rubrics and well-crafted instructions have the potential to create meaningful and relevant learning experiences in which adults will be motivated to participate. Online discussions can serve different purposes and be created for low-stakes activities, content engagement, research, exploration, or investigation.

Online discussion activities for adults are most effective when the design is rooted in andragogical best practices and aligned to specific learning objectives. Adult learners are typically practical, partial to information that can be immediately applicable to their real-world situations or professions, and generally prefer practical knowledge that will improve their skills, help facilitate their work, and boost their confidence. Therefore, instructional designers and subject matter experts should design online discussion activities that utilize real-world scenarios, problems, cases, or ethical dilemmas. One example is to utilize a case study of an ethical situation or phenomenon typically experienced in a particular profession; such an activity should connect with topics covered in the module and require the learners to provide solutions. Adults have lived longer and accomplished more than younger students. As a result, adult students have the tendency to link their past experiences to anything new and validate new concepts based on prior learning. Online discussion activities are best when they encourage the learner to reflect and share, which also carries the potential to create a community of learners. Adult learners often have high expectations. They prefer to be taught about things that will be useful to their work and expect experiences to have immediate results. It is beneficial to create online discussions that will maximize their advantages, meet their individual needs, provide a sense of autonomy, and address learning challenges.

The solutions and recommendations that appear in the succeeding sections are quality strategies to promote learner engagement and meaningful learning and are intended to foster aspects of facilitation that are of an andragogical orientation. Specifically, the examples are meant to call the adult learner to do more than answer a simple question or predictable problem. The examples are designed in a manner that can be linked to Bloom's Taxonomy. Such an approach is highly effective because the students are participating in an online discussion that is well-aligned to the learning outcomes and not being utilized simply for technology's sake. The solutions are congruent with the philosophy of engagement through quality discussion activities. This type of design approach has the potential to bring about deep and impactful learning. Engaging activities can also promote the growth of the online student community. However, it is important for educators and training designers to vary the design of student-to-instructor and student-to-student interaction across the duration of the course.

Finally, when taking into account any solution or approach for the design of a discussion, instructional designers and subject matter experts should think about the larger context. Important questions to consider include: What purpose does the discussion serve? Which learning outcome aligns to the discussion? Does the prompt foster dialogue and encourage the students to think? Including the answers to these questions within the student instructions can provide additional clarity and purpose.

SOLUTIONS AND RECOMMENDATIONS

Instructions and Expectations

Thorough instructions have the potential to further reduce confusion and cognitive distractions for the adult learner. Instructions should include general information that explains if and how the activity is graded. Adult learners have the potential to be less open-minded; maturity and profound life experiences usually lead to rigidity, which can work against learning. As a result, it is important to provide the rationale behind the discussion activity and how new concepts and learning can be linked to already established concepts, promoting the need to explore. Instructors should be clear about their intended role in the online discussion activities (Simon, 2018). Setting expectations as part of the instructions helps students to understand how often to anticipate the instructor's guidance or general presence in the course (Simon, 2018).

Online discussion activities for adults should have specific and clear expectations. Expectations for content and participation should be stated at the outset so adult students will know what to anticipate as well as understand how to structure the content of their messages. These aspects of the discussion expectations are best stated through the use of well-constructed instructions and an aligned grading rubric. The instructions should communicate minimum and maximum lengths for the postings, general formatting expectations such as APA or MLA guidelines, and to how many peers the student should respond. Applying a value of a grade to the adult learners' participation can help provide motivation to participate. The instructions should include proper communication techniques such as the necessity for students to remain thoughtful and professional and to avoid harsh or aggressive language. There are many openly available "Netiquette" student communication statements online that institutions can use as models for articulating expectations.

Adult learners are typically juggling everything that comes with having a family as well as their professions. This circumstance can create challenges for adults to prioritize their own learning while accommodating busy schedules. It is beneficial to limit confusion and cognitive stress by retaining a common format the learner can predict across each module. It is best practice for designers and instructors to utilize the same initial post deadline as well as the same peer response deadline across the modules. An initial response deadline of the middle of the module duration provides the adult learning time to conceptualize the activity instructions, grading criteria, and purpose and to work the activity into his or her activities outside the course. For consistency, it is useful to provide full instructions for each module that contains a discussion activity, even when the activity follows the same posting and response deadlines found throughout the course. Module discussion activities should be varied across the course to provide variety for adult students. Adopting nearly identical approach formats across the modules could lead to unnecessary and undesirable confusion or cognitive overload if module activities have the same format across the online course. Some learning management systems offer a "post first" feature that requires students to submit their initial post before having access to those that have been posted prior to their own. This useful feature has the potential to limit the phenomenon of "coasting," or simply paraphrasing earlier posts, and instead force students to think critically.

Facilitation of Discussion

Improved facilitation of online discussion includes providing effective and timely feedback within the scope and duration of the graded activity. Feedback on high quality online discussions for adult learners includes acknowledging the student post, building on the strengths of the content of the posts, and offering ideas for the future or a follow-up question. In adult learning situations, students should be discouraged from taking over the discussion and instead encouraged to leave adequate space or speaking time for the other students. The first two weeks of an online course are especially critical, as students are acclimating to the course and developing study behaviors during this period (Simon, 2018). Therefore, it is beneficial for the instructor to provide detailed feedback during the time of transition (Simon, 2018).

Critical Reflection

The online discussion is an opportunity for critical reflection for the adult learner. In contrast to synchronous discussions, which lend themselves to quick and conversation-like responses, asynchronous discussions provide the opportunity for deeper reflection connected with past experiences. Online discussion activities can take the form of a group reflection (Glowacki-Dudka & Barnett, 2007), which can then be connected to authentic student activity. This approach can often include discussion activities where students connect past experiences to create a new outlook or to identify a solution to a problem. Examples include debating a common issue often encountered in a school district; challenges related to instituting a new business plan; ethical issues involving multiple points of view; or starting a project charter for institutional change. The pedagogical model used by Sinclair (2009) followed the Smyth (1989) framework of reflection, utilizing four forms of action when responding to group discussion activity: describe, inform, confront and reconstruct. Participants in this research indicated that the use of critical reflection and positive, yet challenging, instructor feedback promoted deeper learning of the self as compared to just the discussion and material (Arghode et al., 2017).

Socratic Method

The Socratic Method is a useful tool to illicit adult learners' best academic performance of thinking critically as part of a discussion activity. It is a useful strategy to actively engage learners in the learning process (Jarvis, 2004). By using well-structured, probing questions linked with appropriate grading rubrics that require student response, students have the opportunity to dive deeper into their learning. The student responses allow the students to play the role of Socrates to each other (Hlinak, 2014). The Socratic strategy allows adult students to take ownership of their learning through authentic questions and to leverage student questions as more significant learning experiences that develop critical thinking. The Socratic format also sidesteps the potential intimidation students report experiencing in face-to-face Socratic questioning (Hlinak, 2014). Instructors can play "devil's advocate" by asking probing questions, using contradictions and counterexamples. During facilitation, instructors can provide instructor presence by keeping the conversation on topic and challenging students to apply their learning to novel situations, practical scenarios, and prior learning. It is important for the facilitator to ask questions that guide the student dialogue and set the direction of the discussion. Some learning management systems offer the ability for the instructor to "pin" his or her post to the top of the forum. This visual cue can be an effective way to summarize the weekly discussion activity or to provide prominence to the instructor's message if the dialogue veers away from the intended topic.

Managing Online Discussions in Large Classes

Discussion boards can be applied to large class sizes as well. Research from Yang (2008) showed that the combination of the Socratic questioning format performed by teaching or grading assistants working with small groups of students proved to be effective. Grading assistants engaging with students across the six categories of Socratic questioning prompts in online discussions can have the potential to promote critical thinking responses (Yang, 2008). Teaching assistants working in small groups of 13-15 students can use responses that break down into categories of: questions based on perspective, questions of clarification, questions that probe assumptions or implications, and questions that probe reason or evidence (Yang, 2008).

Another solution for large scale discussion participation is utilizing the ability for students to rate the participation of one other. This type of structure is a strategy to encourage deeper, meaningful, and non-trivial dialogue (Sager & Chen, 2013). Specifically, student discussion activities can be structured in a way so that the student earns a set number of points for each discussion thread. In addition, students can earn more points for rating a peer's posting.

Online instructors and subject matter experts can utilize what is known as protocol for online discussions. Protocols define very specifically just who participates in what way and how often. One example is known as a "fishbowl" activity in which one student has to exhibit a certain type of behavior or skill for feedback or critique from the rest of the class. Examples of a "fishbowl" activity could be counseling scenarios, problem scenarios, or situations where students can act out particular roles for the rest of the group to provide feedback. Another example of protocols involves asking each student to submit at least one thought-provoking question based on the weekly reading to which all other students are to respond. Another example is the use of the Tuning protocol (McDonald, Zydney, Dichter, & McDonald, 2012). The goal of this protocol is for one student to improve a relevant work based on input from the class. Specifically, one student presents a certain type of written work, and the rest of the class provides relevant feedback (McDonald et al., 2012). The Tuning protocol dictates that all participants have a role, which increases their participation, and that all participants have the potential for different roles, which can be helpful when working with adult learners.

Adult Learner Autonomy

Connecting Moore's (1973) Transactional Distance theory with adult learning practices can be useful when designing discussion activity. According to Moore's theory, as course structure increases, the capacity for individualization or autonomy decreases. Online instructors and subject matter experts can introduce choice when creating discussion activities for adults as well as test for the appropriate balance between design and freedom of choice. The aspect of choice has the potential for increased control and self-direction for adults. Examples include adult students intentionally choosing a particular perspective, character, or stance when responding to the group in a way that they may not normally do.

Classroom discussion activities for adult learners can be adapted for the online format. Tell-help-check is a classroom activity similar to think-pair-share. In this format, the adult learner is given the opportunity to review and confirm their understanding during the learning process in front of their peers (Karge, Phillips, & Jessee, 2011). According to the authors, students are assigned to one of two groups. The instructor poses a question to group one. Once the question has been answered, group two is given the opportunity to add information or edit the existing information. Once both team members have given input, they check the text to determine accuracy of each group (Karge et al., 2011).

Problem-Based Learning (PBL) presents opportunities to link many of the approaches already discussed in order to actively engage adult students to solve complex, authentic problems. Working through the community of inquiry, adult students can collectively work to reach a problem resolution (Karge et al., 2011). Examples include cases, ethical problems, political problems, and common problems in the field. Problem-Based Learning can often be an opportunity for the instructor to facilitate the phases of the process rather than to direct students to any one solution to the problem. This aspect of Problem-Based Learning makes this approach conducive to online instruction for adults.

General Best Practices

It can be helpful for the first discussion activity in an online course with adult students to be low-stakes in terms of assessment (Simon, 2018). Instructors and course designers should design an initial discussion activity that allows the students to adjust to the process. This approach can also help students to understand how the discussion board works in the platform they are using (Simon, 2018). Instructors are also encouraged to provide an informal, ungraded discussion “water cooler” or “student café” area where students may discuss course- or program-related topics and further promote a sense of community.

The approaches discussed in this chapter can also be utilized in the hybrid setting or a design that approaches the “flipped classroom” model where the discovery phase of learning is shifted outside of class for student-centered learning. Carefully mapping out in-class activities as they relate to out-of-class activities can engage all learners, including adults, to make progress on a new topic so that when they meet face-to-face in the classroom, they are prepared and motivated for class activities (Fink, 2003).

FUTURE RESEARCH

The use of media-based discussion boards has potential for effective andragogical design. The media-based discussion has gained popularity and warrants more research to deepen our understanding of how the dynamics of recording audio may or may not fit with adult learner preferences. Future studies that explore student perceptions as well as academic effectiveness of media-based discussion can help promote a model for instructional designers and subject matter experts to utilize and increase the efficacy of their designs.

The design of online instruction would be stronger if we understood more about the frequency of discussion boards and student rigor across the duration of the course. Further research needs to be done comparing student academic performance and satisfaction in online course modules that have minimal discussions to student academic performance and satisfaction in course modules that utilize two or more weekly discussions.

More should be done to identify a particular design template related to particular fields of study that designers and instructors could easily integrate into new program design. Design templates or frameworks tested for student success could be implemented on a large scale that would save institutions design time.

Additional research needs to be done to replicate the comparative research study of Cho and Tobias (2016) in different types of online courses in an effort to examine the role of online discussion in student learning experiences. Specifically, more investigation is necessary to better understand the aspects of online cognitive presence as opposed to social presence and its relation to academic performance.

Increased interest in the online modality for graduate programs calls for future research on the elements that promote adult learner motivation the most. Design strategies to increase adult learner motivation would benefit higher education as well as the corporate training world. Understanding which of the adult learner elements discussed in this chapter carry the most impact would inform more effective design frameworks. Such research should identify and investigate how and to what extent relevant experiences, socialization, autonomy, and reflection create significant learning experiences-- independently or acting together.

CONCLUSION

The function of online discussion does not guarantee deep and lasting learning (Darabi & Jin, 2013). For meaningful, significant learning to take place, the frequency with which the adult learner engages with the online discussion, as well as the nature of the interaction and discourse, matter (Oh & Kim, 2016). Online learning requires effective and appropriate design for students to be cognitively engaged and to reach the learning outcomes. Therefore, for adult learners, online discussions are best used as an LMS tool for designed learning activity that includes group dialogue and reflection as a coordinated process between students as well as student-to-instructor. Online instruction for the adult learner should offer minimum structure and maximum autonomy (Arghode et al., 2017). Online self-directed learning activities for adults should not be designed as isolated activities independent from the rest of the module contents. Rather, the activity should connect to the larger module design while the instructor serves as a facilitator and content expert within the community of online learners. Ideally, the design involves authentic, relevant phenomena and links to authentic assessment so that adult learners are more likely to be engaged while having a sense of control in setting the direction of their learning.

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KEY TERMS AND DEFINITIONS

Asynchronous Learning: Distance education instruction that students can complete within the student's schedule and for which there is no coordinated meeting time.

Distance Education: For the purposes of this chapter, distance education is education that uses one or more technologies to deliver instruction to students who are separated from the instructor. Distance education supports regular and substantive interaction between students and the instructor synchronously or asynchronously. Technologies used for distance education include the World Wide Web, broadcasts, closed circuit, cable, microwave, broadband lines, satellite, or wireless communication. This study will focus primarily on the most common instructional format found in 2019: asynchronous Web instruction. Asynchronous Web instruction is often referred to as online learning, online education, eLearning, or online distance education.

Distance Education Course: A course in which 80% or more of the instructional content is delivered exclusively via distance education. Campus requirements such as orientation, testing, and capstone experiences do not exclude a course from being classified as distance education.

Distance Education Program: A program for which 100% of the required coursework for program completion is facilitated via distance education courses. This definition includes both degree and certificate granting programs.

Face-to-Face Learning: Traditional instruction where students and the instructor are located in the classroom.

Hybrid_Course: A course in which 30% to 80% of the instructional content is delivered exclusively via distance education with a face-to-face required component.

Instructional Design: A systematic process that is employed to design and develop education and training in a consistent and reliable fashion to ensure each pillar of instruction is represented in order to promote learner success in meeting the learning objectives.

Subject Matter Expert: An expert in a particular field or discipline that has been engaged by the academic department to design online instruction. This individual is often, but not exclusively a faculty member.

APPENDIX

APPLICATION ACTIVITIES

Discussion One

The chapter discusses the practice of utilizing common, ethical problems or real-world scenarios for the adult learners to discuss and establish a solution. What are some common real-world problems that occur in your related field or profession?

Discussion Two

The chapter discusses the practice of utilizing the SODA argumentative model. What are some topics adults may be dealing with in a professional development situation where the SODA approach would prove a useful strategy to further engage adult participants?

Case Study One: Online principal and superintendent certificate

You are an instructional designer for an institution in higher education that offers a principal and superintendent certificate online. You recently began designing one of the last courses that falls in the curriculum: the School Facilities and Budget course. Knowing adult learners prefer real-world scenarios, how would you design an authentic, high-stakes cumulative assessment rooted in the course topic? How could such an assessment be linked to weekly discussion activity? What types of group discussion techniques would offer the most potential for deep, significant learning?

Case Study Two: MBA: Employee Relations and Labor Law

A successful human resources manager at a Honda facility in the Midwestern United States has been asked to design and develop an online "employee relations and labor law" course as part of an online MBA program for a local state institution in higher education. This course is a survey of labor law issues designed to give the MBA student a fundamental, practical, working knowledge of the impact of various federal, state, and local laws on the workplace. The course has a focus on union avoidance, certification and decertification, elections, collective bargaining, arbitrations, and other elements of employee relations. The overarching goal of this course is that the adult students will be able to define the multiple legal issues faced by managers in the modern workplace, including basic legal terminology. The students will be able to describe employment relationships and labor unions. Students will be able to define and apply case law and collective bargaining laws affecting contemporary concerns such as Title VII of the Civil Rights Act, wrongful termination and reduction-in-force, the American with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA), the Occupational Safety and Health Act (OSHA).

The subject matter expert wants to design weekly discussion activities around these outcomes that culminate in a final, graded discussion activity based on a real-world union negotiation process. What are some group discussion techniques that would provide the adult learners the opportunity to experience the union negotiation process? How would you include aspects like critical reflection, decision-making, or critical thinking? Would you include media solutions?

Case Study 3: Sales and Business Training

A local business regionally recognized for its quality tools has recently contracted an instructional design team to design and develop online training for new sales schema as well as new business goals. The challenge is that there are different populations of employees across the organization, and some long-time employees feel the online training is ineffective and does not compare to the boring training already provided in human resources. What are some group discussion techniques that would provide the adult learners the opportunity to demonstrate their learning while providing an opportunity for rich, engaging conversation?

Case Study 4: Online Fresh Water Ecology

A successful director of a regional science center in the Great Lakes-Niagara region has been asked to design and develop an online “Fresh Water Ecology” course as part of an online program for a local state institution in higher education. The subject matter expert wants to design weekly discussion activities around what the students are able to find in their own local freshwater ways in their communities. What discussion design approaches that include media posting could the subject matter expert employ? How could these activities be facilitated in a way that would include student-student engagement for quality student interactions as well as reflection?

Chapter 12
Online Strategic Discussion Forum:
Models, Strategies, and Applications

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ABSTRACT

This chapter explores empirical research about online discussions to identify effective strategies for designing online discussions. A secondary objective is to summarize pertinent models of online discussions to develop an integrated model of online discussions. The integrated model provides instructional designers, faculty developers, and faculty members with a coherent framework for designing, facilitating, and participating in online discussions to meet the needs of adult learners. The review of literature showed that quality design of online discussion stimulates meaningful learning and supports a community of inquiry among learners. Scholars distinguish between two types of online discussions: convention, and strategic discussions. The consensus in the literature is that effective online discussions should be intrinsically motivating, support critical thinking and self-direction, as well as promote the negotiation of meaning and co-construction of knowledge. Lastly, the instructor should play an active role in the discussion forum.

INTRODUCTION

Adult learners are capitalizing on the inherent benefits of distance education (online and blended) with "71% of higher education institutions in America making online learning a strategic priority" (Champion & Gunnlaugson, 2018, p. 705). In institutions of higher education in the United States, "14.3% (2,902,756) of students" were enrolled solely in online courses (Allen & Seaman, 2017, p. 6). Adult learners make up a large portion of higher education institution's student population with "an increased number of graduate students (30 years and older) enrolling in online or hybrid degree programs" (Best Colleges, 2019, p.1)

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An adult learner is commonly defined using chronological age. Other factors that characterize adult learners include delayed postsecondary enrollment, part-time attendance, full-time work while enrolled, financial independence, single parenthood, military service, and lack of a standard high school diploma" (Schreyer Institute for Teaching Excellence, 2007, p. 1). The literature on adult learning revealed that definitions vary. Still, the prevailing consensus is that adult learners are either 24 or 25 years of age and bring a certain level of knowledge and experience to the learning environment (IGI Global Disseminator, 2019, p.1). Moreover, adult learners are often depicted based on their learning characteristics. They are typically self-directed and goal-oriented independent learners for whom instructional content should be meaningful and have practical applications. Online learning offers a myriad of advantages to adult learners, such as flexibility in terms of time and distance (Blieck et al., 2019). Higher education scholars agree that adult learners add value to online learning environments because they "bring a wealth of experience filtered through cultural, generational, and socioeconomic differences" (Lohr & Haley, 2017, p. 11).

Consequently, online educators need to rethink how they design instructional content to leverage and capitalize on the knowledge, skills, and experiences that adult learners bring to the learning environment (Lohr & Haley, 2017; Merriam, 2008; Merriam, 2001, Delahunty, 2018). Designers creating transformational instructional experiences for adult learners should first understand the critical role of *learning context.* Merriam (2008) traced changes and trends in adult learning and found a shift from "individual learning to a learner in context paradigm" (p. 95) emphasizing "the sociocultural context of adult learning" (p. 94) and "making meaning" (p. 94). Therefore, educators and instructional designers (IDs) should consider the adult learner's sociocultural and professional experiences as they design and facilitate online programs and courses. In addition to placing the adult learner at the forefront of online course design, Vella (2002) in Akyol and Garrison (2009) recommended that educators and IDs address three critical aspects of learning; cognition, affect, and psychomotor when designing adult learning content and activities.

All educators, regardless of teaching modality and learning environment, have in common the perspective that "facilitating learning is at the heart of our practice" (Merriam, 2008, p. 93). Merriam's (2008) assertion has important implications for online learning as educators continue to struggle with how to facilitate online learning effectively. The question the chapter endeavors to address is: how can educators best help adult learners to "connect to learn" (Delahunty, 2018, p. 12) in online courses? Adult education literature shows that adult learners want their online learning experiences to be germane to their professional goals and "intrinsically motivating" (Lohr & Haley, 2017, p. 12). The authors made a vital point that while adult learners are self-directed in traditional or residential classrooms because they are familiar with a teacher-led approach, they are not "self-directed in online learning" (p. 12). However, adult learners can learn self-direction in online learning when instruction is scaffolded and organized into challenging but achievable modules that "acknowledge their prior knowledge and experience" (p. 12).

Moreover, a synthesis of literature showed that online learners experience a sense of isolation, which can impact the course completion rates of adult learners. Students are more likely to succeed in online learning when instructors foster a sense of belonging and a community of learning and practice (Delahunty, 2018; Lohr & Haley, 2017; Kuh, 2009). Hallman (2019) reported on a study conducted by Wang, Rosson, and Sun with over 400 online students who were asked to join an "online chat community using Slack workspace" (para 4). The researchers' analysis of survey data revealed that students who took part in the online community indicated that it helped them to meet and work with students who shared similar work ethics, career goals, learning characteristics, external responsibilities, and challenges. This was especially important for adult learners who had the opportunity to network with peers who face similar difficulties associated with juggling schoolwork, career/jobs, and familial duties. The researchers found that developing connections among online learners is critical because it helps them to develop a sense of belonging and connectedness. Based on the findings, the researchers pointed out the vital role technology plays in developing learning connections and shared identities among students in online learning communities.

One successful method to help all online learners to discuss and apply instructional content is using online strategic discussion forums (Hsiao, Chen, & Hu, 2013). However, distance education scholars conceded that online discussions are often poorly designed and moderated (Darabi, Liang, Suryavanshi, & Yureki, 2013; Delahunty, 2018), which can impede students' online learning experiences and satisfaction.

The purpose of this chapter is twofold: (a) to examine empirical research on online discussions to identify effective ways to design, facilitate and participate in online discussions and (b) to develop an integrated model of online strategic discussion. The objective of the proposed integrated model is to provide a coherent framework that instructional designers, faculty developers, and faculty can use to design, facilitate, and participate in online discussions to meet the diverse needs of all learners, particularly adult learners.

DEFINITION, DESCRIPTION, AND PURPOSE OF ONLINE DISCUSSIONS

Early forms of online discussion consisted of static online bulletin boards and listservs that evolved to chat/message boards. Technological advances have transformed current online discussions to include a plethora of sophisticated features that enable users to integrate robust multimedia content and disseminate ideas in novel and creative ways.

It is crucial to note that scholars use a variety of terms such as "discourse," "interaction," "communication," "conversation," and "talk" interchangeably to refer to online discussion. The term "online discussion" will be used in this chapter. Online discussion is defined as conversations among participants in an online learning environment using a variety of discussion platforms (e.g. discussion boards, video conferencing, social media instant messaging tools, etc.) to support deep and meaningful learning (Delahunty, 2018; Hsiao et al., 2013; Fung, 2004; Salmon, 2016). Operationally, online discussion is a "text-based asynchronous learning activity" (Hsiao et al., 2013, p. 229) designed to engage and promote social, cognitive, and interpersonal interactions amongst adult learners on a topic(s) with minimal limitations.

Advances in learning technologies, especially in learning and content management systems, have helped to transform online learning from correspondence courses of old to interactive learning communities. The advent of cloud-based tools supports synchronous and asynchronous discussions and allow for dynamic learning opportunities that enable students to co-produce information that extends their learning and comprehension using audio, video, graphics, and drawing tools.

Types of Online Discussions

A review of literature showed that there are two types of online discussions: traditional/conventional and strategic/application. Traditional or conventional online discussion typically involves students responding to instructor questions/prompts and one or two classmates. The interactions tend to rely on students-to-instructor format with intermittent student-to-student communications which are not moderated by the instructor. Some academics argue that traditional or conventional online discussions do not stimulate dialogue and engage learners (Darabi et al., 2013).

Online strategic discussion (OSD) also requires students to respond to instructor questions and their classmates' posts, but OSD is designed to scaffold learning, enrich student interactions, and encourage the generation and dissemination of new ideas, thoughts, and strategies. OSD is "structured, monitored, and moderated" by the instructor (Darabi et al., 2013, p. 213). Also, online strategic discussion is conducive to meeting the needs of adult learners because it requires learners to take a stance and use evidence to support their position while drawing on their prior and current knowledge and experiences. Furthermore, another critical aspect of OSD is the instructor role, which involves addressing misconceptions and making connections between online learners' discussion posts and instructional content. Strategic discussions foster the co-construction of ideas and critical thinking (Champion & Gunnlaugson, 2018; Darabi et al., 2013).

Notably, there are similarities between conventional and strategic online discussions in that they involve question-response activity and allow for the integration of different types of media. However, from a pedagogical perspective, online discussions should expand the adult learner's understanding of course topics, promote higher-order thinking, and include consistent and constructive feedback. A critical point made by Darabi et al., (2013) is that online strategic discussions "should demand the cognitive collaboration of learners resulting in integration, synthesis, and evaluation of ideas" (p. 229), which are characteristics of high-order learning. This subsequent section of this chapter will examine the purpose and benefits of OSDs.

Purpose of Online Strategic Discussion (OSD)

OSDs serve a variety of purposes in online and blended learning environments. Educators use OSDs to expand learning and knowledge construction through course-related discourse among adult learners (Hsiao et al., 2013). Also, OSDs promote social interaction and connectedness among adult learners, which helps to reduce isolation in online courses (Champion & Gunnlaugson, 2018). Moreover, OSDs provide adult learners with opportunity and time to process and apply newly acquired knowledge. Studies on effective teaching strategies emphasized the importance of giving students *wait time* and *think time* to help them process questions, and commentary before responding to discussion prompts (Burgess, 2009). Conversely, OSDs support learners who do not participate actively in class discourse due to English language deficits (e.g., English language learners) or personality traits (students who are introverts) by providing them with opportunities to contribute to discussions at their own pace.

Current literature showed that the effective use of online discussions enriches student learning. Fung's (2004) examination of literature revealed that "online communication" (p. 137) stimulated supplemental learning, and increased critical thinking, autonomy, and "knowledge synthesis" (p. 137). However, Fung (2004) pointed out that documenting the benefits of online discussions is difficult because not all students actively contribute to online discussions. Fung also explained that learners tend to be passive participants in online discussions, citing external commitments, lack of time, and selective focus on different aspects of the course (e.g., assigned readings) as factors inhibiting their participation in online discourse. In response to this assertion, other scholars argued that the rationale for passive and reduced participation in OSDs is due to ineffective instructional design and a lack of requisite pedagogical knowledge on how to moderate online discussions successfully (Delahunty, 2018; Garrison & Cleveland-Innes, 2005). Additionally, participation in online discussions may diminish when learners—specifically adult learners—do not immediately perceive the immediate purpose and benefit of the online discussion and how they align with their learning goals. A synthesis of research revealed that students engage in discussions when OSDs engage their interests. Admittedly, while adult learners' motivations for participating in OSDs vary, participation increases when it is tied to grades (Lockwood, 1995), and the instructor actively facilitates and moderates meaningful discussions (Delahunty, 2018; Delahunty, Jones, & Verenikina, 2014). The subsequent section of the chapter explores and examines different effective online discussion strategies supported by nascent research.

EMPIRICAL RESEARCH ON ONLINE DISCUSSIONS

Instructors and students alike experience similar challenges associated with online discussions but from different perspectives (Delahunty, 2018). The researcher maintained that educators do not know how to create online discussions that support the social negotiation of meaning (The co-creation of knowledge and attaching meaning through reflection). while students sometimes lack the necessary communication strategies to engage in online discussion forums productively. Other scholars acknowledged that unmotivated students who do not want to engage in discussions pose a challenge for online educators and proactive learners in online courses. This problem is critical because both instructor and students rely on online discussions to help develop a community of learning and diminish the sense of isolation, and stimulate purposeful metacognitive learning (Darabi et al., 2013). Despite the documented merits of online discussions, a review of literature on distance learning showed that discussions in online courses do not supported high-order learning and knowledge construction because online communications are often poorly designed and structured (Darabi et al., 2013; Delahunty, 2018; Dennen & Wieland, 2007; Fung, 2004). To address this challenge, Darabi et al. (2013) identified characteristics of effective online strategic discussion forums based on their research study.

A meta-analysis of research studies conducted between 2000 and 2010 obtained from Web of Science, Google Scholar, and PsychINFO databases compared students' academic performances in conventional and strategic online discussion forums (Darabi et al.'s (2013). The researchers coded the forums based on key categories such as whether the objective of the discussions supported "elaboration, clarification, questioning, problem-solving, cognitive attainment, collaboration, self-efficacy, social interaction, learner interaction, and participation" (Darabi et al., 2013, p. 231). The researchers used specific indicators to develop the following categories:

1. whether online discussions were moderated
2. whether the instructor interacted in the discussions
3. the amount of interaction required from students in online discussions
4. whether a rubric was used to assess discussion forums
5. whether online discussions were collaborative
6. provision of guidance on how students participate and interact in online discussions

If the online discussions included three or more of the categories or indicators described above, the online discussions were coded as "highly instructional," and if they had fewer than three indicators, they were coded as "moderately instructional" (Darabi et al., 2013, p. 232). The researchers found that few studies examined the effectiveness of online discussion strategies (Darabi et al., 2013, p. 239). The authors' research findings showed that students excelled when they participated in a well-designed instructor-moderated strategic online discussion that supported the application of course content and encouraged students to collaborate and elaborate on course topics.

Darabi et al.'s (2013) research findings also showed that incorporating educational components in online discussions had an impact on student academic performances. Lastly, they found that discussion strategies that integrated sound pedagogical theories had a positive impact on "learner's performance" (Darabi et al., 2013, p. 239). They also found that students in educational and art majors tended to do well in strategic forums. There was a notable improvement in academic performance in courses where students were encouraged to apply and elaborate on instructional content. Darabi et al. concluded that strategic online discussion is a useful instructional tool when discussion activities have the following characteristics described in Table 1.

Darabi et al. (2013) also found that online discussions are successful when instructors model, coach, and scaffold instruction to encourage adult learners to engage in "articulation and self-reflection" (p. 229). Also, students are intrinsically motivated to learn and improve their learning experiences when instructors are personable in online discussions. Such behavior involves providing positive reinforcement, using students' names, and offering meaningful and constructive feedback to students (Gunter, 2007). Research findings confirmed that students exhibited a preference for systematic and well-defined discussion forums that include some level of difficulty (e.g., case studies and debates) that facilitate "higher levels of cognitive ability" (Darabi et al., 2013; Gunter, 2007, p. 229).

Empirical research online discussion tends to focus on best practices for helping learners make connections with their peers in online courses. There is minimal focus on the role the online educator plays in helping students connect their shared knowledge and experiences to instructional content. Within the context of adult learning, the instructor plays a crucial role in helping adult learners relate their professional and personal experiences in a way that meets learning objectives. Moreover, the instructor is vital to connecting the different components of the online learning ecosystem; students, technology, content to support learning (Hallman, 2019).

Delving further into the notion of facilitating online discussion, Ark (2016) found that scaffolding online discussion forums could lead to higher cognitive discourse and meaningful learning. Ark's quasi-experimental research consisted of 60 university students (42 females and 18 males) enrolled in a university in Turkey. Participants were placed randomly in three distinct groups: experimental group one (online discussion scaffolded with message labels and sentence openers), experimental group two (online discussion scaffolded with only message labels), and a control group (no scaffolding). Students participated in discussions for a month and generated 779 discussion threads. Students in scaffolded

Table 1. Characteristics of effective strategic online discussion forum

Design/Structure	Cognitive Processes	Social Presence
Clearly stated learning objectives	Promote a community of inquiry	Social interaction
Well-structured and organized discussion content	Support higher-order learning	Faculty moderation and facilitation
Task oriented	Provision of immediate feedback	Instructor presence /interaction
A level of complexity	Scaffold instruction	Develop a sense of belonging
Scaffold instruction	Relate instructional materials to learning activities (e.g., discussion)	Build a community of participation

online discussion forums tended to focus on course-related discussion activities such as problem-solving activities and less on "group management messages" (Ark, 2016, p. 690). Discussion strategies that included scaffolding, such as the provision of discussion starters and titles, resulted in a reduction of non-discussion related activities (Ark, 2016; Hirsh, Saeedi, Cornillon, & Litosseliti, 2004). Scaffolds enable students to think critically about their contributions in the discussion forum and focus their interactions.

Similarly, Delahunty (2018) examined student behavior in online discussion boards in four college-level hybrid courses. The research methodology consisted of analyzing discussion forum "talk" and the data collected from interviews with faculty, instructional designers, and students. The researcher examined discussions in three courses: course one included discussion forums that were 40% of the final grade; course two included online discussions that were actively facilitated by an instructor; and lastly, course three had discussions that were driven primarily by students. Delahunty found that students that had free reign in the forums with no faculty moderator were not engaged in the discussion. Also, the researcher concluded that building relationships and community among students is essential in online forums.

The author also found that some participants acquiesced with others (follower) while other students exchanged ideas and collaborated to construct knowledge (downloading). This finding supports the notion that students assume different discourse roles in online discussions. Equally crucial in online discussions is moderation; Delahunty found that when there was no instructor presence or mediation, students relied on what they already knew. Students were less likely to push themselves or engage in what Scharmer (2009) referred to as the "generative flow" of discussion. Furthermore, including guidelines in discussions helped both students and educators who do not have the requisite communication skills to interact effectively. Delahunty's study provided supporting evidence that instructor moderation and scaffolding have a positive influence on online discourse (Delahunty, 2018; Darabi et al., 2013; Ark, 2016; Magnuson, 2005). Additionally, the author stressed, "the need for explicit, theoretically informed protocols and asynchronous discussion guides about expanding the capacity to participate in dialogue" in online learning, which "epitomizes successful online teaching" (Delahunty, 2018, p. 20).

Another crucial finding is that few studies examine students' perspectives of their online discussion experience. Fung (2004) asserted that students tend to be passive participants in the forum because they are unable to engage in critical or reflective thinking. Students do not ask follow-up questions or elaborate on ideas and concepts examined in the course. Students may also experience "boredom, inattentiveness, frustration, lack of participation, and feelings of isolation" (Hall, 2015, p. 22) in online discussion forums. A study by Cox (2011) showed that learners perceive online discussion forums as irrelevant and worthless, colloquially describing them as "busy work." However, the consensus among scholars is that well-designed online discussion forums can provide opportunities for students to generate knowledge and reflect on each other's ideas (Hsiao et al., 2013). The literature highlights the differences in how students and instructors perceive the value of online discussions. There are many explanations for students' negative opinions about discussions, but one reason could be associated with the objective of the discussion forum. For example, online discussions are on occasion used for classroom management purposes such as tracking attendance and monitoring student participation rather than for promoting critical thinking (Hsiao et al., 2013).

A subset of online learning experts agreed on the importance of including critical thinking in online discussions because it helps to connect classroom learning and the world of work (Hall, 2015; Lee, 2007; Garrison, Anderson, & Archer, 2000; Anderson, Rourke, Garrison, & Archer, 2001). Strategies for increasing student engagement and cognitive application of content in online discussions necessitates using scaffolds and selecting topics that spark reflective and evocative discourse. Therefore, scholars stress the need to integrate critical thinking activities in online discussions. Hsiao et al.'s (2013) study examined 69 grading rubrics used to grade online discussion forums to determine whether critical thinking was included in the grading criteria on the rubrics. The researchers concluded that critical thinking was evident in "35% of 69" of rubrics provided by faculty who participated in the study. While research participants (faculty) recognized the importance of incorporating critical thinking in discussion forums, they do not understand what critical thinking is and how to integrate it into their online discussion activities (Hsiao et al., 2013; Hurd, 2013). The researchers concluded that online faculty need training and support to help them understand critical thinking and how to incorporate it into their online strategic discussions (OSDs).

Considering Hsaio et al.'s (2013) findings, Hall (2015) maintained that ineffective discussion moderator approaches might also inhibit the development of critical thinking skills. This issue poses a conundrum for distance instructors as educators vacillate between two approaches: (a) instructor absence from online discussion forums may stall online dialogue, and (b) high instructor involvement may result in learners being too reliant on instructor contributions. Deloach and Greenlaw (2007) in Hall suggested that discussion facilitators should "use prompts that are restricted to refocusing the group on the necessary assigned tasks that students must accomplish to complete the discussions" (p. 423). Dennen and Wieland's (2007) research study supported this conclusion by showing the importance of instructor-moderated discussion. Dennen and Wieland used Stahl's (2006) **computer-supported collaborative learning (CSCL) model** in conjunction with discourse analysis to examine students' responses in online discussions in two distance learning courses. The researchers collated data by conducting telephone interviews with instructors. Research findings showed that higher student participation was evident in classes that incorporated instructor-moderated discussions with prompts. The findings also supported peer learning and the sharing of information or artifacts compared to the online courses that did not have educator-moderated discussions (Dennen & Wieland, 2007; Stahl, Koschmann, & Suthers, 2006).

Other strategies identified by Hall (2015) that could enhance critical skills include using skilled or qualified individuals to initiate the first discussion posts, "virtual guest speakers, as well as peer support, scaffolding, and group structure, have an effect on students' patterns of critical thinking in online discussions" (p. 25). Reflecting on Hsaio et al.'s (2013) viewpoint that educators do not know how to recognize critical thinking or higher-order thinking in online discussions, Hall provided insights into how instructors can identify critical thinking in online discussion posts by assessing whether "the quality of student posts" (p. 26) reflect the following:

1. "the upper levels of Bloom's taxonomy (analysis, synthesis, and evaluation)" (Hall, 2015, p. 26)
2. demonstrable evidence that students connect ideas shared in the forums as well as distinguish between similar and dissimilar viewpoints, experiences, and conclusions
3. evident associations between prior and new knowledge and experiences
4. provision of meaningful and practical commentary that explicates their peers' responses and offers different perspectives on the discussion topics using exemplars to illustrate critical points

Hall's explanation provides educators with a way to assess critical thinking in students' discussion responses. Moreover, discussions can serve as an antecedent to paper assignments (DeLoach & Greenlaw, 2005 as cited in Hall, 2015), providing opportunities for students to assess their ideas before beginning the written assignment. The authors also suggested that discussion activities should have similar characteristics to ill-defined problems that can be examined and solved from multiple conflicting perspectives (Greenlaw & DeLoach, 2005 in Hall, 2015).

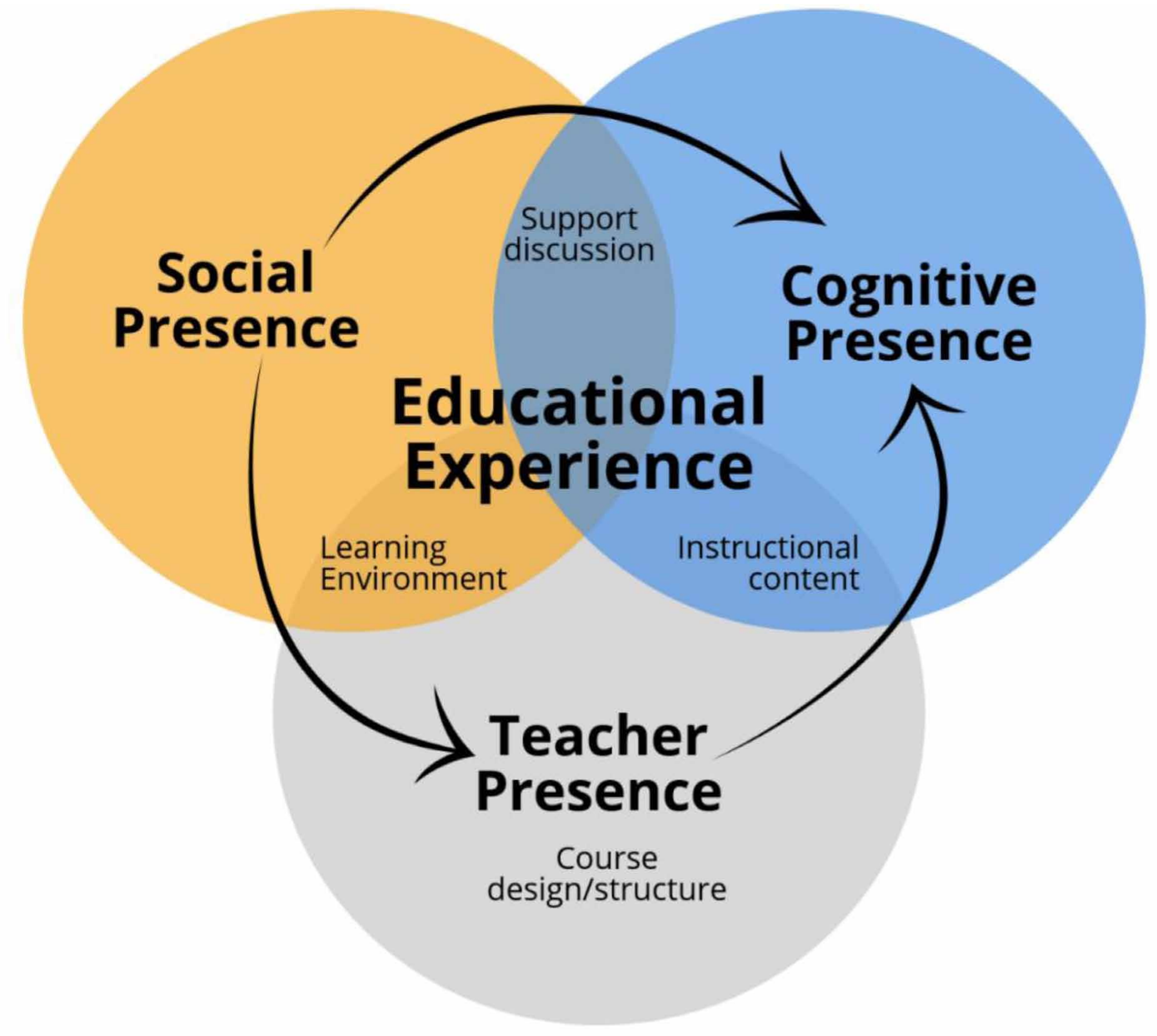
In support, Garrison, Anderson, and Archer (2000) contended that online discussions are vital to online learning when they are used to establish a **community of inquiry (CoI).** The CoI paradigm refers to the interactions between three constructs; **cognitive presence** (instructional content), **social presence** (online discourse), and **teacher presence** (teacher involvement, course design, and structure). These constructs interconnect to support learning and engagement (Garrison, 2017; Garrison & Cleveland-Innes, 2005; Garrison et al., 2000; Anderson & Garrison, 1997). According to Akyol and Garrison (2009), the community of inquiry framework extends the fundamental principles of adult learning theory. The framework "illuminates adult learning in an online environment" (p. 2) by leveraging student's knowledge and experiences, promoting collaborative inquiry, social and cognitive constructivist learning strategies, "community building" (p. 5), reflective critical theory, and the negotiation of meaning (Akyol and Garrison, 2009).

Teacher presence is evident in the development, design, and facilitation of online learning, as well as when course activities include "open-ended questions that make instructional content relatable, promote extensive dialogue, and empower self-directed learning" (Lohr & Haley, 2017, p. 13). Teacher presence also entails helping learners progress from being passive recipients of knowledge to active participants who create and co-construct knowledge (Lohr & Haley, 2017). Notably, students can also provide teacher presence through moderating and guiding discussion forums because they steer online discourse in ways the instructor cannot (Akyol and Garrison (2009). **Cognitive presence** is exemplified in how learners demonstrate understanding and mastery of instructional content through the exchange of information and problem-solving. Learners should engage in critical inquiry in OSD using four phases that include a "triggering event, then exploration, integration, and resolution" (Lohr & Haley, 2017, p. 13). Although most OSDs include initiation, exploration, and integration, they rarely include resolution. Lastly, **social presence** is evident through open meaningful dialogue, reflective inquiry, learner interconnectedness, a sense of belonging and community as well as "affective expressions" (Lohr & Haley, 2017, p. 13). Figure 1 illustrates the interplay of the social, cognitive and teacher presence.

The CoI paradigm recognizes the importance of course design and structure and their impact on student learning outcomes (Garrison & Cleveland-Innes, 2005; Garrison et al., 2000). In this context, online communications should be "structured and systematic" (p. 134) to enable adult learners to participate in a manner that supports meaningful and deep learning (Garrison & Cleveland-Innes, 2005; Garrison et al., 2000). To achieve this goal, educators need to create and implement active learning experiences that stimulate critical inquiry and enable the discovery and evaluation of ideas, with sustained reflection (Garrison & Cleveland-Innes, 2005).

Additionally, Garrison and Cleveland-Innes (2005) argued that a vital aspect of CoI is the "qualitative nature of interactions between cognitive, social, and teacher presence over quantitative measures to inspire purposeful and systematic discourse" (p. 135). The key takeaway here is that well-designed discussions can help to create structured and engaging online strategic discussions, (Garrison & Cleveland-Innes, 2005; Garrison et al., 2000) which encourages peer and inquiry learning as well as the transfer and application of knowledge (Darabi et al., 2013). This viewpoint is congruent with literature that advocates that meaningful online discussion is closely related to quality online instructional design. Structuring and aligning online instructional content with learning activities can allow for critical dialogue and reflection that enhance and support the learning preferences of adult learners (Shea & Bidjerano, 2009). Moreover, adult learners are more engaged in the OSD when instructors provide informative and immediate

Figure 1. Community of inquiry
**Image recreated from Garrison, R.D., Anderson, T., & Archer, W. (2000). The Internet and Higher Education, 2(2-3), 87-105.*



feedback. Such feedback promotes knowledge expansion and a deeper comprehension of instructional content (Vella, 2002).

A study conducted by Akyol and Garrison (2009) sought to examine how "CoI develops for adult learners" and "supports and moves adult learning" (p. 5). The research study consisted of 15 graduate online adult learners enrolled in an online education course that was designed using the CoI framework. The researchers analyzed interview and CoI survey data collected from participants about their perceptions of CoI and satisfaction with the online learning experience. The research findings showed that students described teacher presence as "frequent communication, immediate feedback, availability, good facilitation, correcting misunderstanding, and modeling use of tools" (p. 8). Although, research participants indicated that social presence was lower than teacher presence. They reported being comfortable engaging in discourse in the forums because they were able to build "trust and respect". Lastly, Akyol and Garrison (2009) found that students perceived cognitive presence as being very high in the course because they were able to apply newly acquired knowledge as well as co-construct knowledge. The researchers also found that cognitive, teacher, and social presence had "a significant relationship with students' satisfaction," while teaching and cognitive presence had "a significant relationship with learning" (p. 11). The research findings showed that adult learners valued the impact of cognitive and teacher presence on their learning, perhaps more so than social presence (Akyol & Garrison, 2009). Thus, research findings encouraged IDs and educators to design online strategic discussions that not only focus on social presence but incorporates different forms of teacher and cognitive presence.

In summation, empirical research showed that scholars' opinions differed when it comes to the function of discussion forums. Some support the necessity of incorporating online discussions effectively to enhance comprehension of knowledge and promote learner engagement (cognitive and social presence). Other scholars believed that online discourse should focus on developing professional relationships and a sense of belonging among students (social presence). Garrison and Cleveland-Innes (2005) called for a more robust approach to online discourse, arguing that solely focusing on social presence neglects the critical impact of teacher and cognitive presence. The role of the instructor in OSDs is to guide, facilitate, scaffold, assimilate, model, and assess students' critical inquiry of course topics. Teacher presence is essential in helping students to negotiate and progress through course concepts and the different stages of discourse (Champion & Gunnlaugson, 2018; Garrison & Cleveland-Innes, 2005). Notably, students are can also provide teacher presence in conjunction with the online instructor. Despite the wealth of research on productive online discourse, educators continue to struggle to design online communication that supports cognitive, teacher, and social presence (Delahunty, Jones, & Verenika, 2014). The subsequent section of the chapter will examine early and current models of online discussions to develop an integrated model of online strategic discussion to help educators, IDs, and faculty developers to design and facilitate OSDs.

MODELS OF ONLINE DISCUSSIONS AND THEORETICAL FRAMEWORK

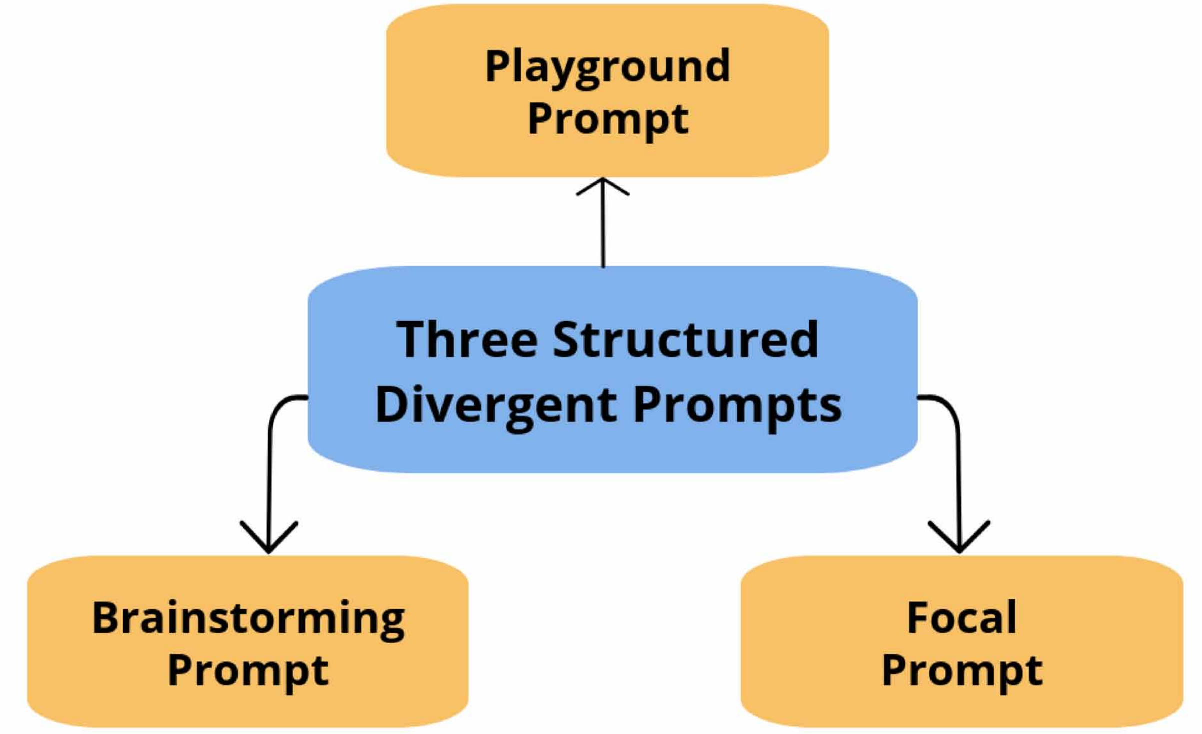
It is important to note that the following models of discourse explored in this section of the chapter apply to online, face-to-face, and hybrid courses. Research studies on discussions in online, blended, and residential courses confirmed that the nature of the discussion questions and prompts has an impact on the type of discussion responses (Howell, LaCour, & McGlawn, 2017; Andrews, 1980).

Howell, LaCour, and McGlawn (2017) examined the impact of **three structured divergent prompts** (playground prompts, brainstorming prompts, and focal prompts) on knowledge generation. The **playground prompt** focused on specific course topics that students must respond to and elaborate on within set parameters. The **brainstorming prompt** entails initiating concepts, ideas, and problem-solving strategies, which prevents them from repeating their peers' posts. The **focal prompt** involves selecting a viewpoint or topic and providing a rationale for their position. These prompts were found to stimulate knowledge construction and critical thinking in discussion forums (Howell et al., 2017).

Howell et al. (2017) researched the use of the three structured divergent prompts to design online discussions. The researchers used an **Interaction Analysis Model (IAM)** to classify student discussion responses based on "five levels of knowledge construction:

1. sharing and comparing information

Figure 2. Three structured divergent prompts



2. identifying areas of disagreement
3. negotiating meaning and co-construction of knowledge
4. evaluation and modification of new schemas that result from co-construction
5. reaching and stating agreement and application of co-constructed knowledge" (Howell et al., 2017, p. 483).

A total of 65 instructional design college graduate students took part in the study. Students were asked to participate in the online discussion forum and demonstrate their knowledge using concept maps. The researchers provided students with examples of good concept maps before they created their concept maps. The results of the study showed that integrating a "prompt design in online discussion board" (Howell et al., 2017, p. 487) was vital. The discussion forum with the focal prompt was "most effective in encouraging knowledge construction" (Howell et al., 2017, p. 487) because it allowed students to tackle a problem with multiple solutions, forcing them to pick a point of view or an approach. The researchers found that using concept maps helped to support students' critical and higher-order learning or thinking. They recommended that instructors use focal prompts, coupled with authentic assessments such as concept maps to stimulate student learning (Howell et al., 2017; Fung, 2004).

Mercer and Wegerif's (1999) **three-part typology of talk** is another early model of discourse which provides insights into how educators can help to further conversations amongst learners. This model focused on the characteristics of "talk" during discourse:

- *Disputation talk* reflects opposing and challenging viewpoints.

- *Cumulative talk* is the co-creation of knowledge based on shared consensus in the discourse and redefined ideas and knowledge.
- *Exploratory talk* involves critical, reflective, and constructive exchanges of information supported by relevant justification within the context of learning and exploration (Mercer & Wegerif, 1999, p. 5).

This model implies that educators can design online discussions when they understand the different types of "talk" that occur among learners. Mercer and Wegerif's model highlighted "modes of social thinking" (p. 5), which support the notion that adult learners' contributions in the discourse serve a specific purpose. These contributions can inhibit, benefit, expand, or change learning experiences.

In contrast, the **Asynchronous Learning Networks Cognitive Discourse Model (ALNCDM)** is informed by communication and social learning theories initially developed by Clark and Brennan in 1991. The model recognized the role of instructor presence and facilitation in online discussions. The adapted model proposed by Wong-Bushy, Hiltz, Passerini, Bieber, and Patten (2005) focused on the duality of "content and process" (p. 586) in which the instructor guides learners as they learn and explore new information (content) and stimulate the cognitive processes involved in creating course deliverables (process). ALNCDM is successful when content and process in online discussions are scaffolded (Wong-Bushby et al., 2005).

In a pilot experimental research conducted with 921 students, Wong-Bushby et al. (2005) examined the effectiveness of content and process scaffold on learning. The researchers found that both types of scaffolding improved learning, which was indicated by improved performances on post-tests. Students who were exposed to content and process scaffolding engaged in higher synthesis and analysis of instructional content (Wong-Bushby et al., 2005). This model stressed the importance of designing OSDs that support self-directed and independent learning to assist adult learners to navigate simple and complex instructional content and learning activities.

Unlike Wong-Bushby et al. 's (2005) adapted **ALNCDM**, which focused on scaffolding discussion forums to help learners become active participants in online strategic discussions, Kantor's **Four-Player Model of Communication** identifies the different roles that discussants assume when engaging in group discourse (Yacavone, 2010). This paradigm shares similarities with Mercer & Wegerif's (1999)

Figure 3. Three-part typology of talk

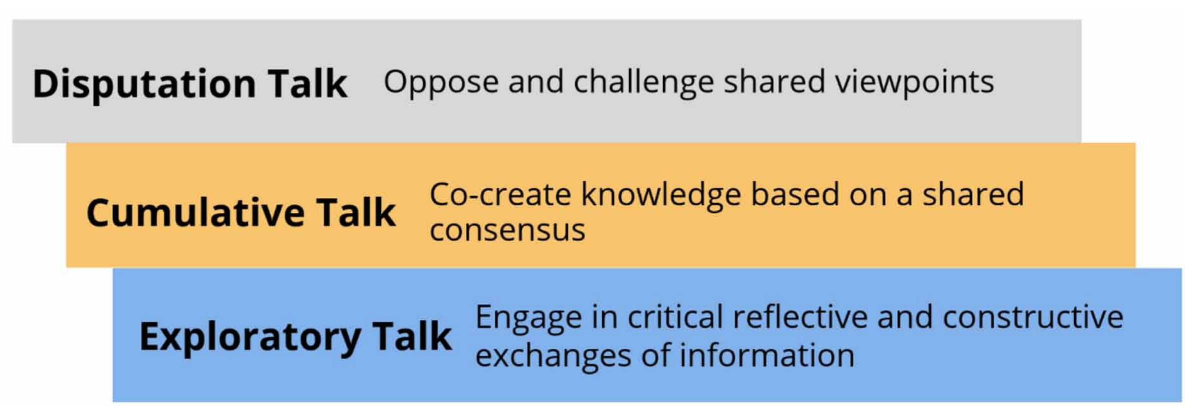
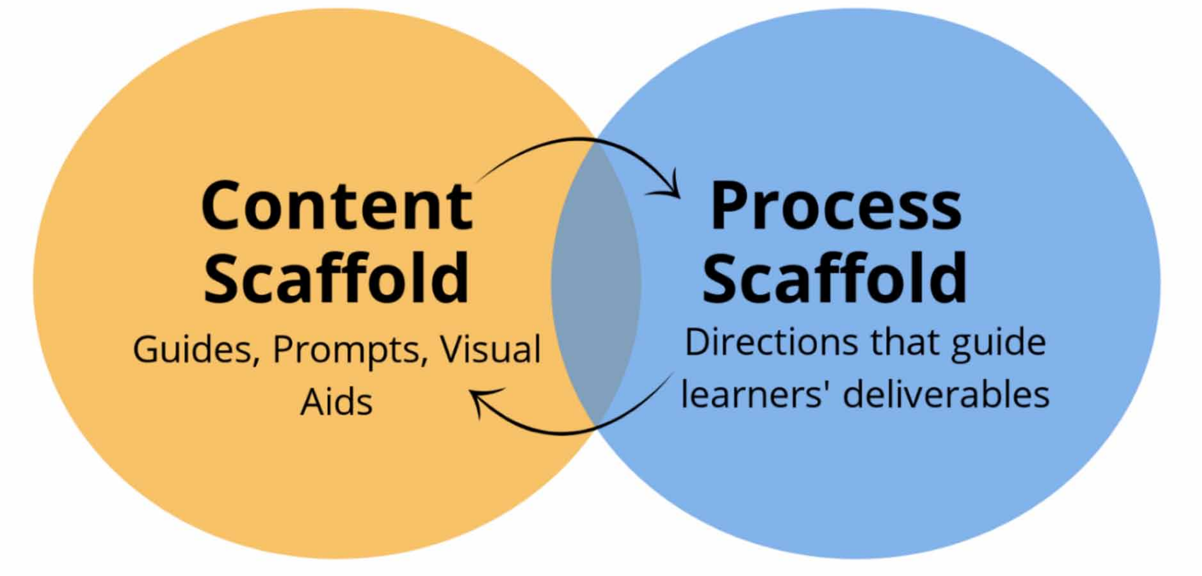


Figure 4. Asynchronous learning networks cognitive discourse model (ALNCDM)

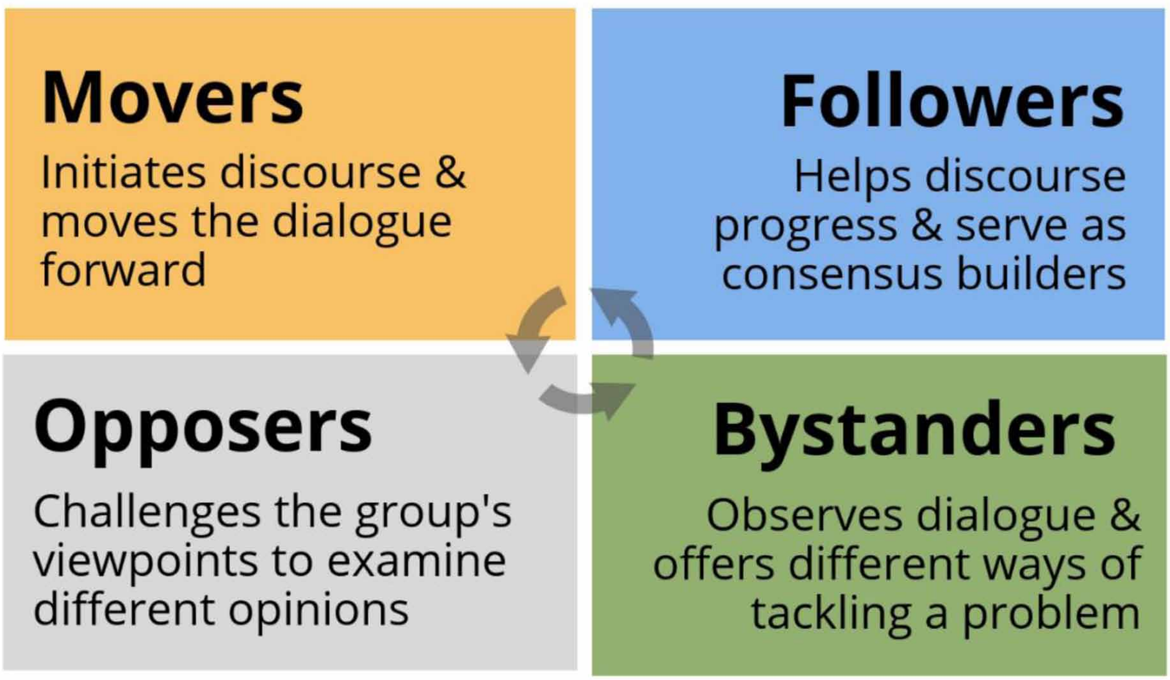


model. Kantor's model aims to understand the nature of group discourse so that facilitators/moderators can foster meaningful discourse in professional (business) and other learning contexts. Kantor proposed that individuals in group communication strategies perform specific actions that can advance, hinder, or alter the outcome of group communication. Kantor's model reflects specific actions:

- *Mover*: The participant who initiates the conversation and continues the dialogue.
- *Follower:* The participant who contributes to the discussion, concedes main points, and helps the discourse to progress.
- *Opposer*: The participant who encourages the group to examine new ideas by challenging the group's ideas or viewpoints.
- *Bystander*: The participant who observes the interactions and offers different opinions or ways of tackling a problem that may alter the group's conceptual thinking.

Kantor suggested that effective teams use the four actions "in balanced and fluid sequences" (Yacavone, 2010, p. 1) as communication strategies. Comprehending how people communicate from an educational viewpoint can help educators become better facilitators. Kantor acknowledged that problems might arise when discussants are not authentic when they engage in conversation. Admittedly, Kantor's conversation model was designed to assist business and industry; his model has implications for online learning. Viewing Kantor's model within a learning context, adult learners engage in self-reflection as they participate in group discussions. For instance, if a group member observes the "follow" action in a team discussion, the individual may "move" to challenge the group status quo to generate new ideas, which can be a powerful means of progressing the conversation. The bystander role is also vital in helping to advance collaborative conversations and the development of new ideas by recommending alternative problem-solving solutions or ways to tackle different topics (Champion & Gunnlaugson, 2018).

Figure 5. Four-player model of communication

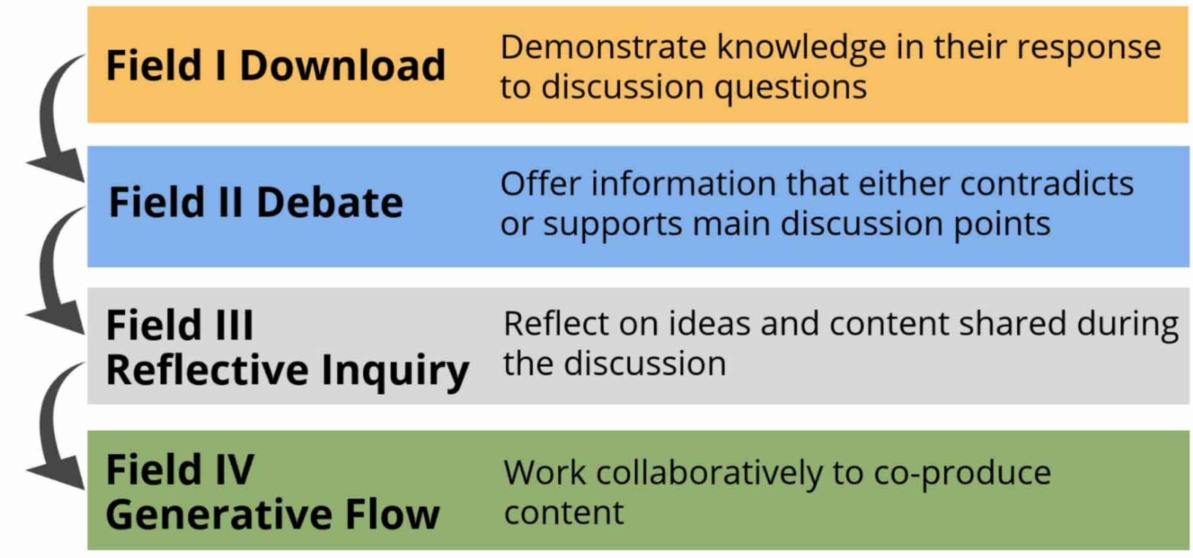


Similarly, Scharmer's (2009) **Four Fields Model** described the role individuals assume when they engage in discussion. Scharmer emphasized the importance of guiding students on how to participate in discussions by modeling practical communication skills as well as providing opportunities to practice newly acquired skills (Champion & Gunnlaugson, 2018). Similar to Kantor's theory, each field in Scharmer's model represents what individuals do in group conversations:

- *Field I Downloading*: Individuals share information they know in response to close-ended questions or prompts.
- *Field II Debate*: Individuals either offer contradictory information in disagreement or support, thus broadening the discourse.
- *Field III Reflective inquiry*: Individuals reflect on the ideas and content shared during the discussion. The discussant may empathize with others or consider others' viewpoints.
- *Field IV Generative flow*: Team members work collaboratively to disseminate co-produced ideas or content.

Champion and Gunnlaugson's (2018) assessment of Scharmer's model suggested that the most significant learning occurs in Fields III and IV, where learners make connections to prior learning, relate instructional content to their personal experiences, and lastly, work cooperatively to cement their understanding and knowledge. Furthermore, the authors draw parallels to Bloom, Englehart, Furst, Hill, and Krathwohl's (1956) Taxonomy, explaining that Scharmer's Field III connects to Bloom et al.'s Apply and Analyze tiers. Likewise, Field IV connects to Bloom et al.'s Evaluate and Create tiers resulting in

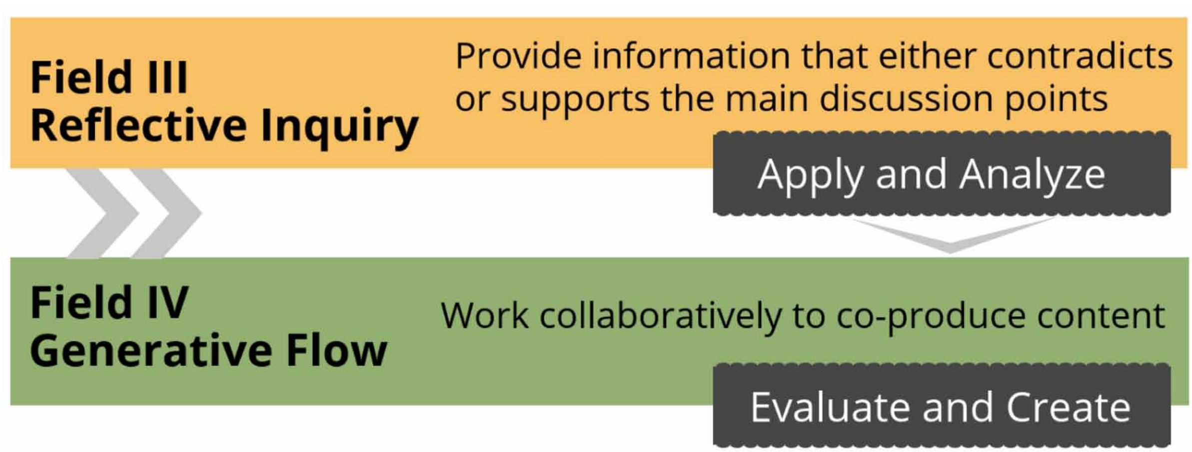
Figure 6. Four-fields model



meaningful informational processing and increased higher-order learning. Figure 7 illustrates Champion and Gunnlaugson's (2018) the comparison of aspects of Scharmer's and Bloom et al.'s models.

Conversely, Salmon's (2016) **Five Stage Model of the Development of Online Learner Engagement** offers a more holistic approach to online strategic discussions by focusing on best practices for designing online instructional content and learning activities. Salmon's model provides essential support to online learners and instructors as they develop their online learning activities. Salmon described the model as steps that educators can use to motivate students to learn and engage with any e-learning activity such as online discussion forums. In agreement with Wong-Bushby et al. (2005) and Scharmer

Figure 7. Integrated four-fields model and Bloom's taxonomy



(2009), Salmon's model is designed to help instructors promote scaffolding learning experiences using five stages of learner engagement:

- *Stage 1 Access and Motivation*: Provide learners with easy access to instructional content using a learning management system and design content to motivate students to spend time interacting with the instructional materials.
- *Stage 2: Online Socialization*: Provide opportunities for students to learn collaboratively to support interdependent learning. Help students develop their personas and identities in the classroom to create a community of learners.
- *Stage 3: Information Exchange*: Encourage students to share information and ideas. Develop and design content that meets learning outcomes, instructional goals, and learner interactions.
- *Stage 4 Knowledge Construction*: Design learning content to support collaborative learning goals and deliverables. Educators should design content, instruction, and learning in a manner that supports deep learning and allows students to contribute and create content. Ensure that students are not consuming information passively but are actively engaged in critical and practical thinking and evaluation, as they apply content.
- *Stage 5 Review:* At this stage, participants are comfortable in the learning environment and with using technology, which enables students to take ownership of their learning. Instructors should promote metacognition and self-awareness and help students to become self-directed learners who can reflect on and critique their learning experiences.

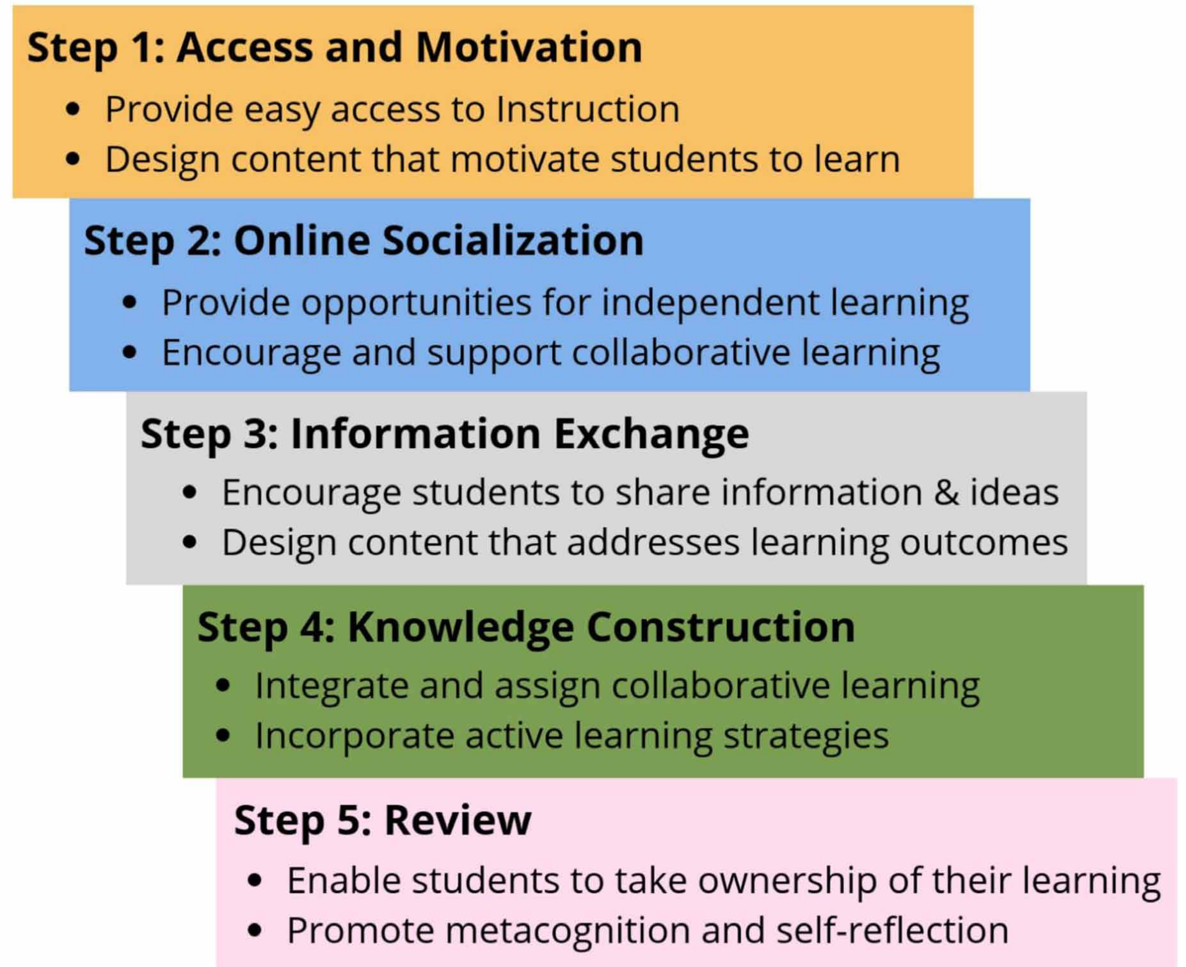
The merit of Salmon's model is that it recognizes and incorporates both instructional design and teaching strategies that can help the online instructor anticipate the needs of adult learners as they navigate each stage of the learning process. Salmon asserted that using the five-stage model can increase learners' contributions, active and peer learning, and student satisfaction. The model also accommodates how adult learners approach their education using self-directed, autonomous, application-based learning strategies.

Another related model, the **Four-Question Discussion Technique**, was developed by Dietz-Uhler and Lanter (2009) to facilitate analysis, reflection, relating, and critical inquiry in online discussions, which are critical aspects of adult learning. The technique includes four questions that help students to accomplish the following:

- *Question 1 Analyze*: Students identify and analyze an idea or concept. (What did you learn?)
- *Question 2 Reflect:* Students ruminate on learning and the newly acquired knowledge. (How and why is the newly acquired information important?)
- *Question 3 Relate:* Students connect learning to academic, professional, and personal experiences. (How does the instructional content relate to you on a professional and personal level?)
- *Question 4 Question:* Students evaluate the stated assumptions and critically evaluate newly acquired knowledge. (What are the muddiest points? What questions are still unanswered?) (Alexander, Commander, Greenberg, & Ward, 2010; Dietz-Ulher & Lanter, 2009).

The four-question discussion technique can transform passive learning activities and cater to diverse learners (Dietz-Ulher & Lanter, 2009). They also argued that "the technique would encourage students to engage with the material on a "cognitive level" (p. 40), regardless of how instructional content is designed and presented. Dietz-Ulher and Lanter's (2009) research demonstrated the efficacy of the four-

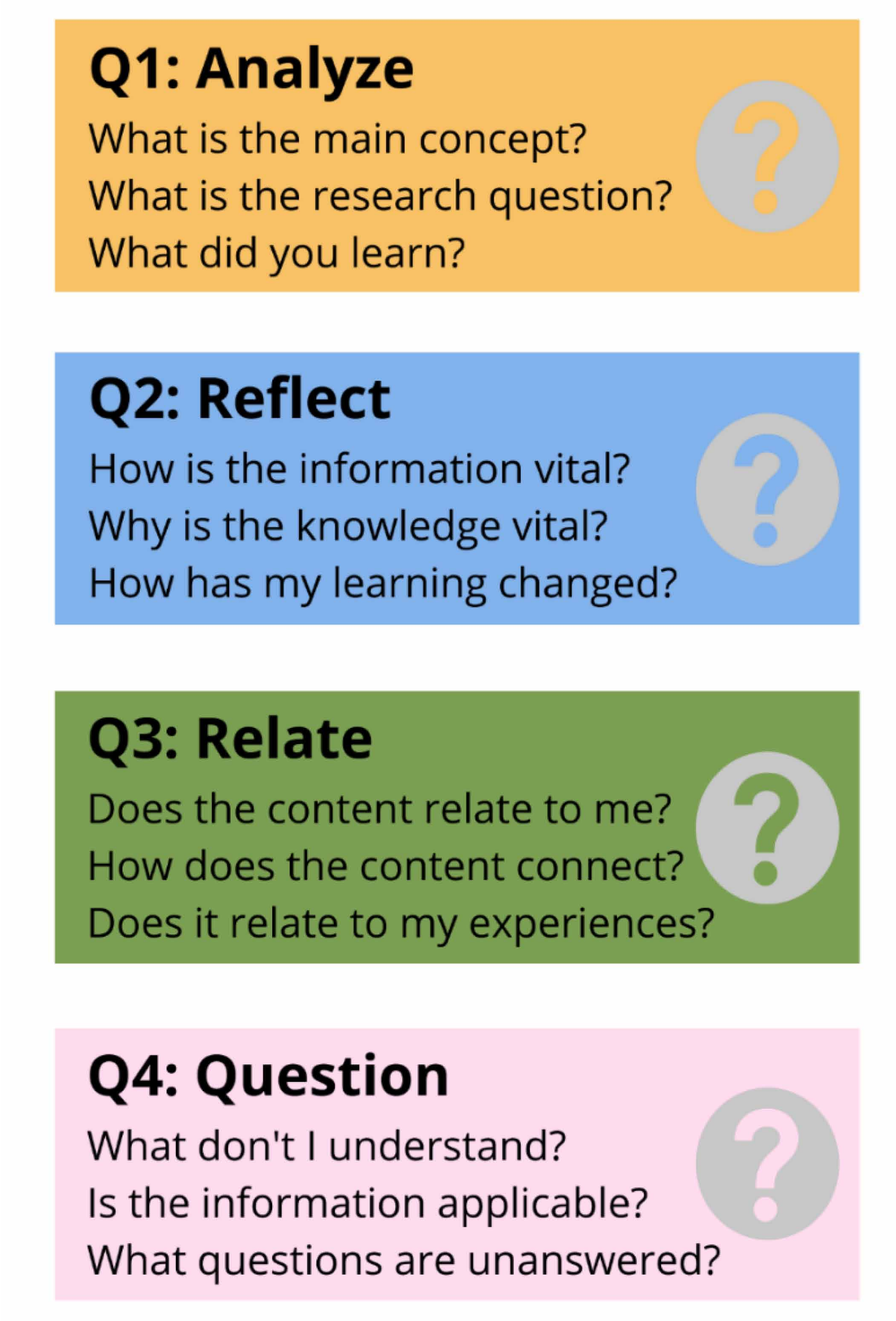
Figure 8. Five stage model



question technique. They examined the effect of the four-question technique on students' performances in an introductory psychology course. A total of 107 students participated in the study. The researchers compared two groups: one group answered the four questions based on the discussion technique before completing a quiz, and the second group did not answer the four questions before taking the quiz. The researchers found that students who completed the four questions performed better on the quiz because they were encouraged to think about instructional content from multiple perspectives (Dietz-Uhler & Lanter, 2009). The questions provided opportunities for students to reflect on their learning. There are notable parallels between the Dietz-Uhler & Lanter's technique and Salmon's (2016) model. The research findings showed that the four-question technique could engage adult learners in critical inquiry and promote independent exploration of instructional content.

In a similar vein, Verenikina, Jones, and Delahunty (2016) emphasized the need to provide clear guidelines and expectations to facilitate productive discourse. The authors proposed designing a "few holistic, theoretically-based-teaching-and-learning approach" (p. 12) with "exemplars that make explicit the communicative language choices" (p. 12) and help educators and learners to engage successfully in

Figure 9. *Four-question discussion technique*



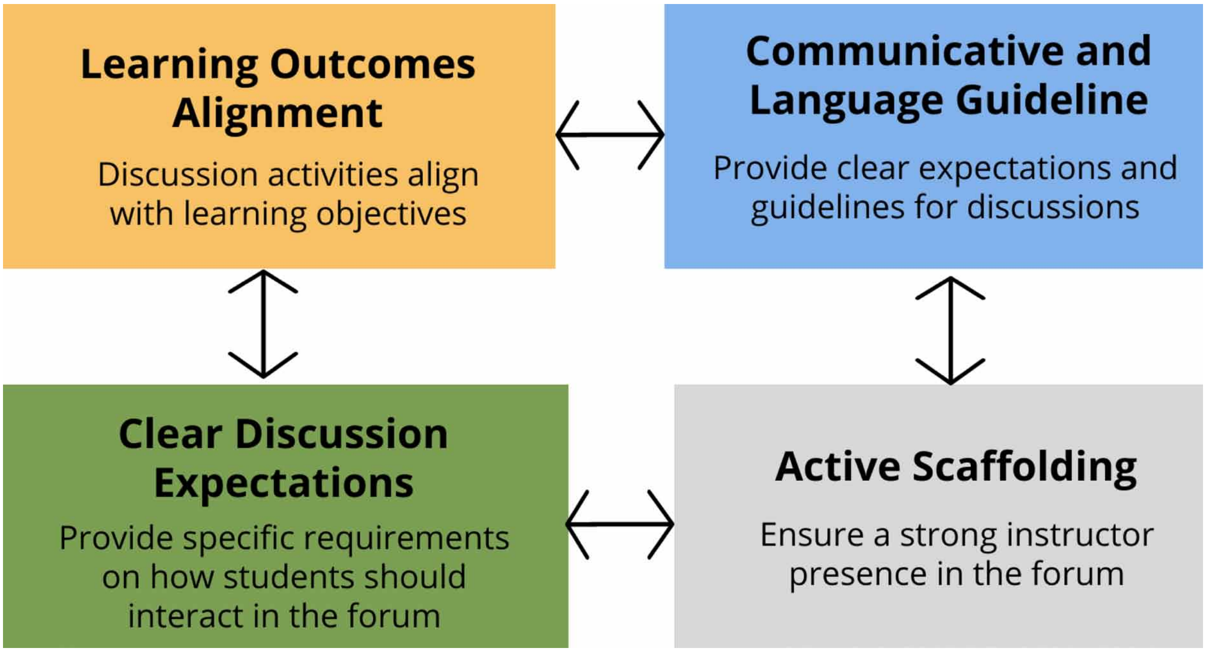
online discussions (Verenikina et al., 2016). Based on this conclusion, the authors developed a guide for "fostering asynchronous online discussion in higher education" (p. 6) for faculty and students. Students' responses to discussion threads and interviews with faculty informed the development of the online discussion guide. The discussion guideline for instructors outlined how faculty should design and moderate effective OSDs. The guide includes the following tips:

- *Learning outcomes alignment*: Closely align discussion activities to learning objectives and outcomes.
- *Communicative and language guideline:* Provide clear expectations and example language of how to communicate in online discussion forums to further and deepen students' comprehension of course content.
- *Active Scaffolding*: Ensure strong instructor presence in the forum through instructor facilitating and moderating forum conversations.
- *Clearly stated discussion expectations:* Provide specific requirements and guidelines on how students should interact in the forum.

Moreover, Verenikina et al. (2016) outlined "communicative strategies" preferred by students in discussions to assist online instructors to engage students in online discussions:

- *Community building*: Make interpersonal connections by using student names, actively responding to students' discussion posts, and expanding on topics and ideas espoused by others.
- *Interdependent comprehension of instructional content:* Synthesize, elaborate, describe, summarize, assess, and ruminate on co-produced ideas. This concept involves perspective-taking and

Figure 10. Guided model for online discussion: instructors



disseminating knowledge or different epistemologies. It also entails correcting misconceptions and misunderstandings.

- *Development of new knowledge***:** Share opposing opinions to generate new ideas and extend the conversation as well as provide a rationale for contrasting views.

Verenikina et al.'s student-centered discussion guide is informed by students' expectations of instructor presence in online discussions and strongly supports the learning preferences of adult learners. The researchers found that the strategies depicted in the guide were amenable to both faculty and students.

The different models of discussion share similar characteristics and some inherent differences. Champion and Gunnlaugson (2018) categorized different models of discussion using the term **generative conversational models (GCM)**. Generative conversational models encourage adult learners to construct new ideas and engage in "conceptual thinking" (p. 705) that can lead to transformative learning experiences. GCMs, incorporate fundamental principles of social cognitive learning theory, making connections between students, instructional content, and the learning environment (Champion & Gunnlaugson, 2018). Taking a closer look at GCMs, the discussion models summarized in the chapter draw on and are informed by Bandura's system of Triarchic Reciprocal Causality. The system highlights the relationships between three key factors: "personal, environmental, and behavioral" (Woolfolk, 2017, p. 415). Personal factors embody "learners' beliefs, expectations, cognitive abilities, attitudes" (Woolfolk, 2017, p. 415). Environmental factors encompass "resources, physical and social settings, consequences of actions, other people, models, teachers, and feedback" (Woolfolk, 2017, p. 415). Lastly, behavioral factors include "individual actions, choices, and statements" (Woolfolk, 2017, p. 415).

This theory reinforces Champion and Gunnlaugson's (2018) thesis that effective online strategic discussion forums encourage adult learners to examine their belief and value systems (personal), share

Figure 11. Guided model for online discussion – communicating with students

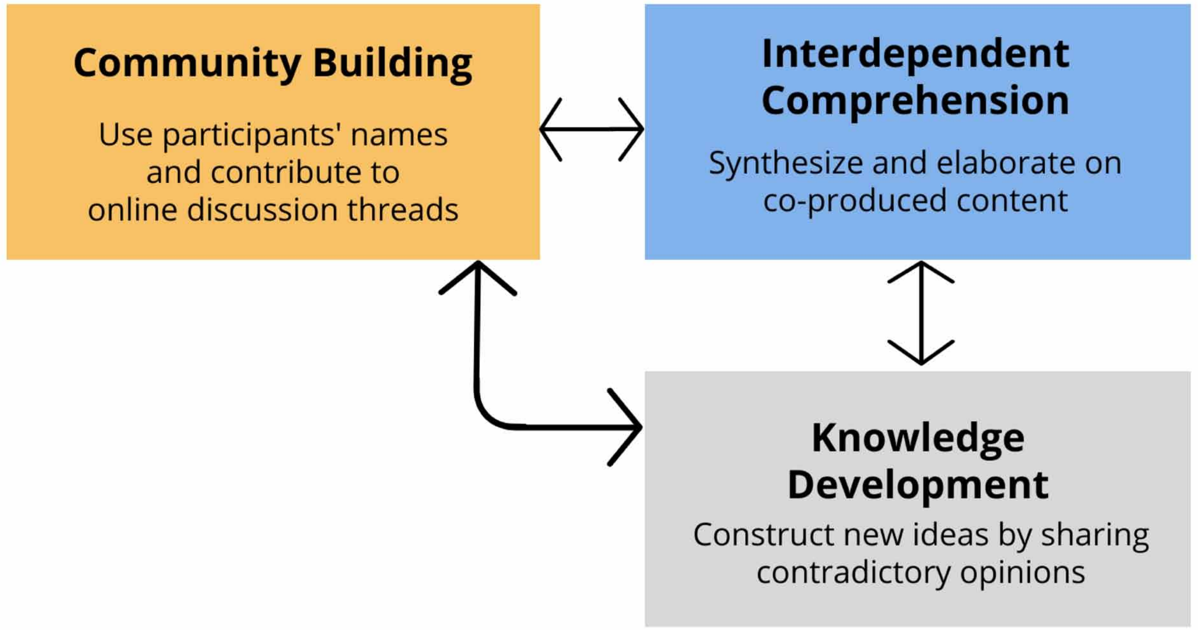
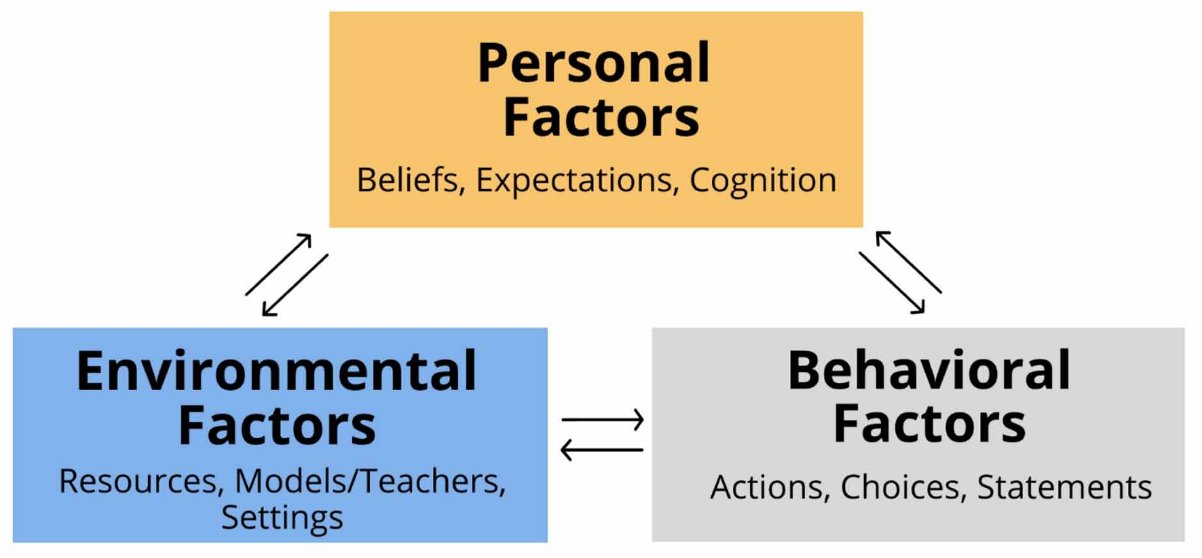


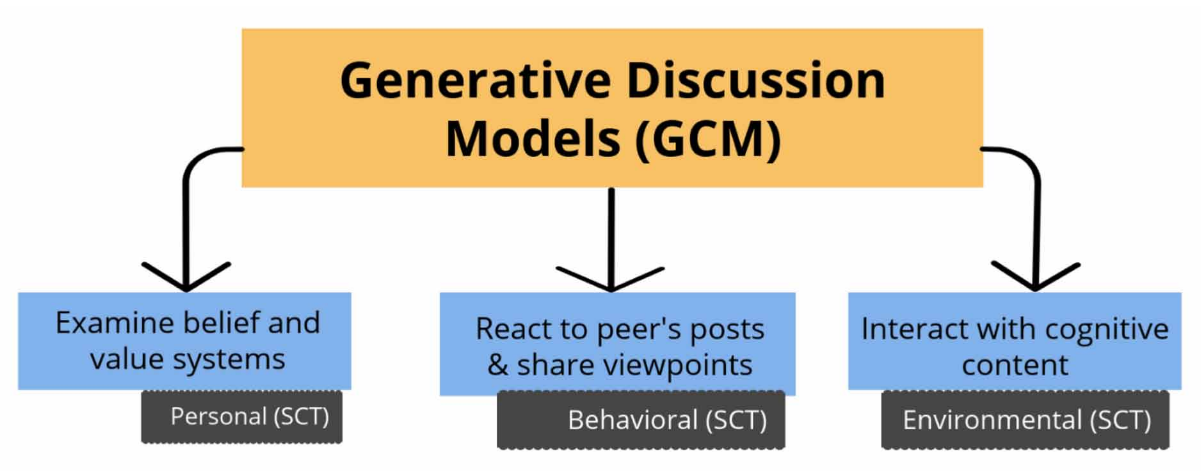
Figure 12. Social cognitive theory: triarchic reciprocal causality



constructive ideas and interact with cognitive content (environmental), and critically examine and respond to their peers' contributions with the aim of expanding their epistemology (behavioral). Each of these components, according to Champion and Gunnlaugson, should be inherent in all discussions or conversation models. In support of Merriam's (2008) postulation that adult learning should be viewed in context, and as such instructional designers and adult learning educators should design OSDs in a manner that integrates the situated and contextual experiences of the adult learner.

In summation, Bandura, Champion and Gunnlaugson stressed that both internal and external factors play a role in pedagogical and andragogical processes, which in turn enable both adult learners and instructors to co-produce content. Where Champion and Gunnlaugson tout the merits of GCM enhancing

Figure 13. Generative discussion models and application of social cognitive theory



the learner's critical and conceptual thinking, Bandura places emphasis on supporting self-efficacy and motivating students to engage in purposeful learning. Generally, GCMs focus on the potential benefits to online students, especially adult learners who participate in OSDs.

Moreover, while social presence is prevalent in distance education literature, Garrison and Cleveland-Innes (2015) maintained that cognitive and instructor presence also play an equally vital role in facilitating deep and higher-order learning. Notably, the authors recommend that online educators and instructional designers use the community of inquiry framework to design OSDs to provide opportunities for students to connect course content to their experiences. These opportunities can aid in developing relationships among students and instructors through "effective knowledge constructing interactions" (Delahunty, 2018, p. 12). From a social cognitive perspective, online instructors should model and scaffold online learning activities and student interactions (Woolfolk, 2017). Discussion models espoused by Mercer (1999), Kantor (2012), and Scharmer (2009) explained that as discussants assume specific roles, they engage in forethought and decision-making that offer "opportunities for negotiating identities (i.e., who we are and what we do) and stances" (Delahunty, 2018, p. 22).

The theoretical framework that guides online discussions also provides insights into the fundamental principles that underpin effective online course design, learning, and discussion. Delahunty (2018) claimed that online discussion should be structured to enable students to navigate different levels of inquiry. Similarly, Dennen and Wieland (2007) proposed that the design of online activities impacts the social negotiation of meaning, especially when various viewpoints are shared. Dennen and Wieland contended that a "narrow or more objectivist focus might not encourage learners to engage in negotiation of meaning" (p. 284). Instead, students should be encouraged to consider the main discussion point or thread and critically assess their understanding before they can offer a credible response. The concept of negotiating meaning necessitates that online discussions are designed to allow students to co-create knowledge and attach meaning through reflection (Dennen & Wieland, 2007). Additionally, online discussions are fruitful when the instructor is present in online forums, leading and guiding knowledge construction.

INTEGRATED MODEL OF STRATEGIC ONLINE DISCUSSION

The integration of online discussion models represents a multidimensional approach to supporting adult learning that includes cognitive processing, context, and strategies that support making meaning, risk-taking, critical thinking, and reflection. Merriam's (2008) examination of pertinent theory and research on adult learning from western and non-western perspectives go beyond "individual, cognitive, and understanding of learning to embody the intersection of the mind, body, spirit, emotions, and society" (p. 97). A similar assertion by Rovai (2002) in Lohr and Haley (2017) proposed that online learning communities embody "four dimensions: spirit, trust, interaction, commonality of expectations, and goals" (p. 13). The scholar's theorization suggested that nurturing successful adult learners involves the holistic instructional design of authentic online learning.

Academic scholars maintain that educators and faculty developers should use an iterative instructional design approach coupled with sound andragogical theory to design and develop active online strategic discussions (Pappas, 2015). Thus, the author of the chapter proposes an **Integrated Model of Strategic Online Discussion (IMSOD)** to support adult learning. The proposed **Integrated Model of Strategic**

Online Discussion incorporates facets of the existing discourse models while emphasizing the interrelated functions of instructional design, facilitation, and participation.

This **design phase** entails selecting an appropriate theoretical paradigm to ensure that learning objectives and outcomes align with instructional content and learning activities (e.g., online discussion forums). The integrated model offers educators and faculty developers flexibility in selecting a theoretical approach that fits the instructor's teaching style and philosophy. The design phase also considers Bandura's triarchic system and Garrison et al.'s (2000) community of inquiry framework by leveraging the interplay of the three Presence, individual, behavior, and environment. The design phase promotes synergistic assignments that encourage students to create and share their deliverables with their peers. Thus, supporting a many-to-many (learner-to-learners) approach to online learning rather than a one-(instructor)-to-many (students) approach to the critical exchange of information. These learning opportunities help inexperienced online students to learn more from their more knowledgeable and experienced counterparts. Instructors are encouraged to design and develop structured OSDs that include triggering events to stimulate cognitive processing, recognize prior knowledge and experiences, as well as encourage affective expression and the sociocultural contexts of adult learning.

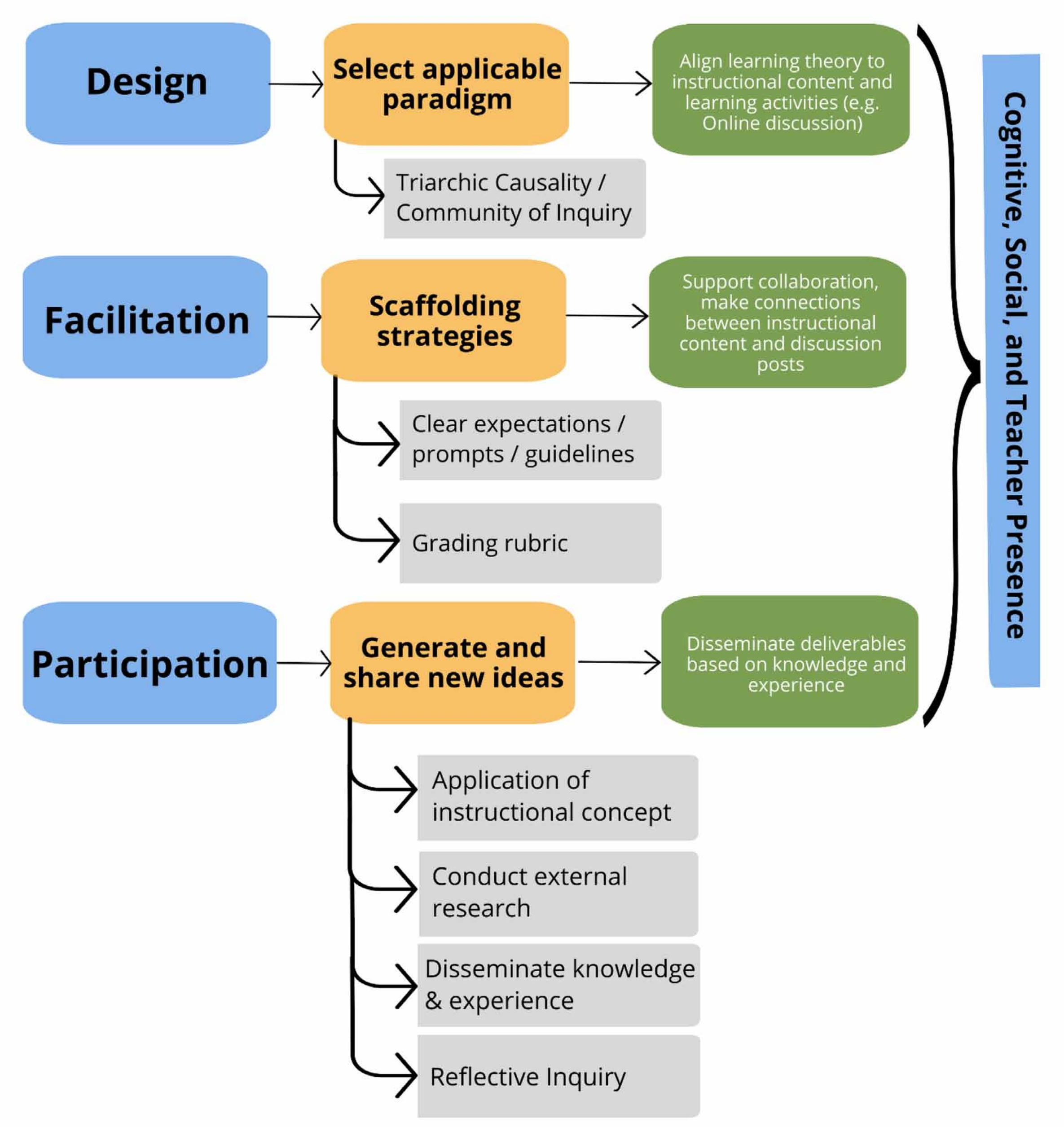
Consequently, teacher, social, and cognitive presence are inherent in the design phase because they inform and guide the **facilitation phase**. During this stage, educators, faculty developers, and instructional designers should integrate scaffolding strategies into the design of online discussions. Scaffolding strategies include providing clear expectations and guidelines that model exemplary discussion posts/responses. Scaffolding online dialogue can promote self-direction in adult learners and stimulate critical thinking, knowledge transfer, and the co-creation of content (Delahunty, 2018; Lohr & Haley, 2017; Wong-Bushby et al., 2005). Scaffolding strategies also encourage students to engage in amicable disagreements or opposing views to spark new ideas (Scharmer, 2009). The instructor facilitates discussion by making cognitive content relatable to students' experiences and drawing connections between students' responses and submissions, as well as addressing any misapprehensions. It is crucial that teacher presence is evident in the form of constructive feedback and comments as another way to facilitate online discourse.

The facilitation process, in turn, impacts the **participation phase** whereby students and instructors are expected to engage actively in the discussion. According to the literature, students and instructors assume specific roles in discussions that can help to enhance and move the conversation forward (Yacavone, 2010). In OSDs, students should be required to generate ideas and content as well as share their deliverables with their peers to support the co-production of knowledge and negotiation of meaning. The participation phase should ensure that adult learners expand their knowledge-base by conducting external research to support their viewpoints and learning deliverables. Requiring students to conduct external research encourages them to examine content from multiple perspectives and to ensure the accuracy of the information being shared. Another critical aspect of the participation phase is meaningful reflective inquiry, which entails the learner assessing the applicability of newly acquired knowledge to their learning and professional experiences, as well as providing constructive feedback to their peers.

The objective of the proposed integrated model of online discussion is to build a community of learners that supports critical inquiry and interdependent knowledge acquisition and application. This model prompts instructors and students to play active roles in the OSD, with the instructor as facilitator and learners engaging in open dialogue. The relationship between instructor and students is symbiotic, requiring both parties to exchange knowledge, experience, and relate them to instructional materials.

Models of online discussions (new and old) embrace Vygotsky and Piaget's theories, which postulate that social interactions are vital to cognitive growth and learning (Ormrod, 2014). These interactions can

Figure 14. An integrated model of online strategic discussion: design and implementation



enrich the learning process and foster social presence in online courses, because "from a sociocultural perspective, learning is intrinsically social, requiring the active involvement of both the more and less experienced when negotiating new concepts" (Delahunty, 2018, p. 13). Vygotsky proposed that knowledge is co-constructed when learners engage in social activities like dialoguing and elaboration, which provides the foundation for learning, especially within the context of online learning (Woolfolk, 2017; Fung, 2004; Vygotsky & Kozulin, 1986). Learning theorists concede that social interaction is vital to facilitating student learning and should extend beyond conversational exchanges between students. Social interactions in online discussions should encourage and support a community of inquiry and participation as well as "lead to negotiation and internalization of knowledge rather than the rote memorization of knowledge" (Dennen & Wieland, 2007, p. 238). The fundamental goal for educators is to attain what Stahl (2006) described as uncommon instances where online discourse generates understanding and meaning that students can analyze, interpret, and assimilate into personal and professional experiences.

Figures 15 and 16 show examples of online strategic discussions that were designed using the proposed Integrated Model of Strategic Online Discussion (IMSOD). The OSD forum (see figure 15) is designed to encourage adult learners to generate ideas and content. Learners are expected to participate in the co-construction of knowledge (brainstorming prompt), conduct research and create content based on specific parameters (playground prompt), and take a position on a topic (focal prompt) incorporating their prior knowledge and experiences. Learners are also required to share their responses and deliverables in the forum to enable their peers to compare, contrast, and evaluate submitted assignments, thus participating in reflective inquiry. Learners also provide constructive feedback to their peers. The instructor's role involves responding quickly to students' posts as well as making connections between students' responses, instructional content, and student learning experiences. The forum was designed to promote a community of inquiry and professional connections among students.

Figure 16 shows another example of an online strategic discussion forum where adult learners are challenged to create and disseminate content based on a specific course topic. Adult learners also reflect on and evaluate their peers' deliverables and identify critical take-aways as well as make suggestions for improvement. The purpose of the forum is to stimulate divergent and creative thinking as students negotiate course topics and meaning. The OSD incorporates playground and focal prompts.

RECOMMENDATION FOR FUTURE RESEARCH

The author recommends researching diverse adult learners across different academic disciplines to examine the efficacy of designing online strategic discussions using the integrated model of online discussions. Future research studies should examine the impact of online course design and strategic discussion forums on students' academic performances in online courses using a scientific research design.

CONCLUSIONS

There are a plethora of theoretical and empirical research studies about different models of online discussions that focus on the characteristics and uses of discussion strategies. The consensus among scholars is that online discussions should be moderated to keep students focused and on task as well as scaffolded with structured prompts to guide productive communication. Moreover, online discussions should include ambiguous topics, questions, or prompts to allow for contrasting viewpoints. The overarching supposition is that online discussions are essential to distance courses and should be integrated into hybrid and face-to-face courses. The rationale is that well-designed, structured online discussions can promote higher-order thinking and the co-construction of knowledge. There is also an agreement in the literature that merely providing a mechanism for social interactions in online courses is insufficient. Rather, educators should design and create online discussions that endorse and foster the interplay of

Figure 15. Sample #1 online strategic discussion: support a community of inquiry

Directions

- Click on Create Thread to respond to all discussion prompts below.
- Your discussion thread and responses should be thorough, thoughtful, and substantive.
- Support your statements with examples, experiences, and/or references where applicable.
- Ensure that you provide a rationale for all your responses.
- Use APA format for in-text citations only.
- Your response is due by Thursday, 1/17 @ 11:30 p.m.
- You must respond to three of your peers' threads by Sunday, 1/20 @ 11:30 p.m.
- A rubric will be used to assess your responses.

Discussion Questions and Prompts:

1. What drew you to the teaching profession?
2. What are the optimal conditions for learning?
3. How do you know when learning has occurred?
4. Which learning theory or theories guide your classroom teaching?
5. Conduct research about information processing, memory, and retrieval. Provide one concrete example (from your teaching/coaching experiences) of each meaningful strategy listed below that you use to help students process and recall information:
    - Elaboration - embellishing on new information.
    - Organization - connecting various pieces of information.
    - Visual imagery - forming a mental picture of content.
6. Feel free to be creative in your responses if you wish.

cognitive, teacher, and social presence. In doing so, educators and students can negotiate meaning, a sense of belonging, and meaningful peer learning.

The review of literature also showed that online discussions might be ineffective because educators do not understand how to incorporate or recognize critical thinking activities. This issue can be resolved by ensuring that the quality of discussion threads reflect higher levels of Bloom's taxonomy (evaluation, synthesis, and analysis) and that students demonstrate evidence of comprehension or mastery of course topics. Additionally, research studies showed that educators and students are not always equipped to communicate effectively in online discussions. To address this problem, scholars recommend that instructors use evidenced-based strategies to design their online discussions. Fulfilling this recommendation requires designing a well-structured and organized online courses with clear guidelines that facilitate students' active participation in online discussions. Lastly, the synthesis of literature showed that quality online course design is essential to addressing the gap between instructional content and student learning by stimulating a community of inquiry. The exploration of literature on online discussions provided helpful insights into different approaches to online discussion models and helped to develop the proposed integrated model of strategic online discussion. The application of the integrated model can be used to design

Figure 16. Sample #2 online strategic discussion: promoting creativity and divergent thinking

Directions:

- Click on Create Thread to respond to all discussion prompts below.
- Your discussion thread and responses should be thorough, thoughtful and substantive.
- Support your statements with examples, experiences, and/or references where applicable.
- Ensure that you provide a rationale for all your responses.
- Use APA format for in-text citations only.
- Your response is due by Thursday, 1/24 @ 11:30 p.m.
- You must respond to three of your peers' threads by Sunday, 1/27 @ 11:30 p.m.
- A rubric will be used to assess your responses.

Discussion prompt #1: Infographic

1. Read chapters 3 (p. 41 to 49) and 9.
2. Use one of the following tools, Piktochart, Canva, Prezi, Adobe Spark to create an infographic that addresses the following topics:
   a. **Three examples** that describe how **you apply cognitive theoretical concepts** in your teaching.
   b. **Three challenges** to applying cognitive teaching strategies and how you might address them.
3. Note: For this prompt, you can work with a partner if you wish.
4. Attach the infographic to this discussion forum for your team members (See lisT) to review and comment on.
5. **Peer Review:** Read your assigned colleagues' infographics and especially the challenges and suggest possible strategies and solutions that may help your partner.

online discussions to support online learning experiences of adult learners by supporting self-directed and autonomous learning, active participation, as well as build relationships and community of inquiry.

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KEYWORDS AND DEFINITIONS

Active Learning: An instructional approach that educators use to foster and promote active student engagement in any learning environment. Instructors can use a variety of strategies to promote active learning, such as meaningful discussion activities, team assignments, or project- or problem-based learning.

Adult Learner: An adult learner is defined "by using chronological age and additional factors such as delayed postsecondary enrollment, part-time attendance, full-time work while enrolled, financial independence, single parenthood, military service, and lack of a standard high school diploma" (Schreyer Institute for Teaching Excellence, 2007, p. 1).

Cognitive Presence: is represented by instructional content that helps students make and negotiate meaning based on their interpretation, understanding, and application of instructional materials. Cognitive presence focuses on knowledge construction, reflection, and co-production of content.

Community of Inquiry Framework: A knowledge acquisition process that requires educators and students to engage in inquiry through collaboration, discourse, and reflection. This framework embodies three types of presence: social, cognitive, and instructor.

Conventional/Traditional Online Discussion: Discussions that typically involve students responding to instructor questions and prompts, as well as one or two of their peers. The interactions tend to rely on a student-to-instructor format with intermittent student-to-student interactions.

Meaningful Learning: The learner's ability to connect newly acquired knowledge to their prior knowledge and experiences as well as apply and relate new information to professional real-world situations.

Negotiation of Meaning: A process that both the instructor and learners undertake to clarify their understanding of course topics, typically through discourse and collaborative learning. The process requires applying, analyzing, synthesizing, evaluating, and creating course content.

Online Discussion Forum: A feature of a learning management system that supports course-related online discourse among students engaged in online learning. Online discussion forums can be implemented using a variety of platforms such as instant chat, video conferencing, and social media. A forum enables students to integrate different types of media to support their viewpoints.

Online Learning: A form of distance learning that occurs over the internet. It is sometimes referred to as e-learning. Online learning takes place in a non-traditional setting, allowing students to participate in learning regardless of the limitations of distance and time.

Social Presence: The instructor's ability to develop a sense of community among learners by engaging them in meaningful and active discussions about the applications of instructional content..

Strategic/Application Online Discussion: A type of discussion forum that requires students to respond to instructor questions and their peers' posts. OSD is designed to scaffold learning, enrich interactions, and encourage the generation and dissemination of new ideas, thoughts, and strategies.

Teacher Presence: The instructor's ability to design, structure, implement, and facilitate cognitive content, which informs various learning activities and assessments. Teacher presence also involves the online instructor providing constructive feedback and being present in all OSDs by helping online learners make connections between discussion posts and cognitive content.

APPENDIX

Application Activities:

Activity for Instructional Designers:

1. Review the integrated model of strategic online discussion forums. Evaluate and discuss the merits and deficiencies of the model.
2. Work with a faculty member or subject matter expert to develop a strategic discussion forum for a course you are currently designing. As you design the discussion forum, ensure that the discussion forum accomplishes the following:
   a. supports a community of inquiry
   b. scaffolds content and student responses
   c. incorporates the facilitation of students' qualitative discourse
   d. provides opportunities for students to share assignments or course deliverables, which will be assessed by their peers to promote critical and higher-order thinking.
3. Consider the phrase "negotiation of meaning." What does it mean to you? How will you incorporate this concept as you design online discussions?
4. Consider the distinctions made between conventional and strategic online discussion forums? Discuss your thoughts regarding this distinction? Provide a rationale for your viewpoint.

Application Activity for Students -Instructor Use

[Note to the instructor: Consider providing students with sample lesson content to enable them to design content)

Faculty can assign the following tasks to students.

1. **Scenario #1:** You are working with a manufacturing management faculty member who wants students to work in teams to create and share content that the other teams will critique.
   a. What recommendations would you make to the faculty?
   b. How will you design the learning activity?
   c.
2. **Scenario #2:** You are working with an education faculty member to design and develop a module/lesson in an online graduate education course. As you design the content in the learning management system of your choice, consider the following:
   a. How will you approach working with the faculty/subject matter expert? Describe the first design kick-off meeting with the instructor?
   b. How will you structure and present the content? (Consider creating a course map).
   c. What multimedia (graphics, video, audio, interactive content) will you use to enhance, reinforce, and promote learning? You may need to consult with a multimedia specialist. Note: if you are unable to consult with a multimedia specialist, consider using Piktochart, Adobe Spark, or Canva to create simple graphics and H5P to build interactive content.
   d. What learning activities will you use to assess students' knowledge acquisition and experience?

Table 2. Characteristics of effective online strategic discussion forum

Instructional Design & Structure	Teacher Presence	Cognitive Presence	Social Presence
Responsible Parties: Instructor, ID, & Faculty Developers	**Responsible Parties:** Instructor	**Responsible Parties:** Instructor & Students	**Responsible Parties:** Instructor & Students
Align discussion activities with clear learning objectives	Create a sense of belonging	Promote a community of inquiry	Promote meaningful social interactions
Well-structured and systematic discussion content	Connect students' ideas and responses	Support critical thinking/high order learning	Provide opportunities for students to disseminate content
Meaningful /purposeful moderated discourse	Distinguish between similar and dissimilar responses	Support reflective inquiry	Encourage peer review and evaluation
Create a welcoming, active, and engaging learning environment	Support the co-production of knowledge	Relate instructional materials to online learning activities (e.g. discussion prompts)	Utilize prior knowledge and experiences
Hold student accountable (E.g., using grades)	Provide meaningful and immediate constructive commentary on student contributions	Scaffold instructions and prompts	Provide evidence to support viewpoints and expand stated ideas
Promote collaborative learning	Connect students' ideas and responses to instructional content	Foster the practical application of instructional content	Build a community of learners
Diversify discussion prompts	Build a community of participation	Encourage the creation of ideas, content, experiences, and strategies	Demonstrate the application and implementation of instructional content

Chapter 13
Alchemy of Teaching:
Experience, Leadership, and the Science and Art of Education

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ABSTRACT

This chapter examines how second-career teachers' prior experience impacts student success. Through a review of research literature, this chapter explores second-career teachers' ability to draw from their accumulated knowledge, experience, and wisdom to enrich classroom instruction, and the impact such experience has on students' success. This chapter also examines the relevance of transformative learning theory, constructivist learning theory, and Maslow's Hierarchy of Needs theory to a second-career teacher experiential approach to teaching and the impact such experience has on the students' success. The author compares the teaching approaches of the initial-career teacher and the second-career teacher.

INTRODUCTION

Teachers are at the core of learning. This chapter will deal with the alchemy—the chemistry or science and art of teaching and learning and the potential impact a second-career teacher has on student success.

Alchemy enables one's experiences to be reflected upon and applied to the transformation of the self (Mayes, 2003). The chapter identifies elements that will help provide a foundation for success for the second-career teacher. The author explores the second-career teacher's experience in comparison to that of the initial-career teacher, and highlights ways in which the second-career teacher may have a greater impact on student and classroom success.

Mastery of pedagogical knowledge of content is determined by the degree awarded. However, this chapter delves into the importance of the relationship between the teacher and student—and the impact of intended positive results on the student. It does so through the exploration of variables—variables such as effective teaching behaviors, teacher self-efficacy, the classroom environment, and teacher-

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student relationships—that set the stage for optimal learning to occur. An examination and comparison of initial-career teachers and second-career teachers is made.

The ultimate goal of effective education is the creation of a well-run organization in which students achieve at optimal levels (Senge et al., 1994). Success, as defined by the Merriam-Webster Dictionary (2019), is achieving a favorable or desired outcome. Student success is defined as achieving a desired outcome based on those goals set by the organization all of which will benefit internal and external stakeholders, especially students.

As previously stated, when an educator earns a certification, it is expected to be verification of content mastery and content-level expertise. Hammond (1998) refers to this content mastery as vital to student success, "First, teachers need to understand subject matter deeply and flexibly, so that they can help students create useful cognitive maps, relate ideas to one another, and address misconceptions." A second-career teacher has the capability to bring history, knowledge and experience to the scenario. This kind of understanding provides a foundation for pedagogical content knowledge (Shulman, 1987) and sets the stage for the opportunity for the second-career teacher to merge pedagogical knowledge with classroom teaching experience.

The power of an effective teacher is something that most students experience during their formal K–12 career. As adults reflect on their exceptional experiences, the passion and caring attitude of the teacher surfaces as the key to success. Stronge (2018) discusses the impact a caring teacher has as "beloved masters of their craft who inspire a student to excel." The author continues to describe an effective teacher as one who "can be seen, heard, and sensed." This sense of effectiveness is aptly stated as being impactful to student achievement (success) (Sergiovalli, 2005).

It is about the teachers who are passionate about teaching and interacting with students in a meaningful manner who make a difference. Tucker and Stronge (2005) discuss the transformative power an effective teacher has on enriching the daily lives of children and making a lifelong impact on their future careers and life choices. In Table 1, the authors list key qualities identified as being characteristic of effective teachers.

While not exhaustive, the list's primary focus is on the pedagogy of teaching; and only one component (Quality 4: "caring, fair, and respectful") alludes to the impact that a teacher's personal or relationship-building effort has on the student learner.

The often-missing component in students' success is the teacher's actual relationships and interactions with students. While each degree program requires an internship, the experience does not allow enough time to delve into the relationship side of teaching—as internships deal primarily with pedagogy (Darling-Hammond, 1998).

A review of the research on teacher-student relationships indicates that positive relationships can help students academically and in their personal lives. Open, caring, respectful relationships between learners and teachers are essential to developing and supporting social and psychological engagement in learning as described by Dunleavy & Milton (2009). Additionally, positive student relationships, as discussed by Hamre & Pianta (2012), indicate a mutual understanding, warmth, closeness, trust, respect, care, and cooperation—which have the potential to cultivate feelings of confidence and connectedness for all students.

Pianta and Stuhlman (2004) explain a positive teacher-student relationship as one that has an open communication with emotional and academic support that exists between students and teachers. It is a place where students feel free and open to learn. The classroom described encourages relationship building amongst students and with the teacher. The foundation for characteristics of this sort of rela-

Table 1. Key qualities of effective teachers

Quality 1	Have formal teacher preparation training.
Quality 2	Hold certification of some kind (standard, alternative, or provisional) and are certified within their fields.
Quality 3	Have taught for at least three years.
Quality 4	Are caring, fair, and respectful.
Quality 5	Hold high expectations for themselves and their students.
Quality 6	Dedicate extra time to instructional preparation and reflection.
Quality 7	Maximize instructional time via effective classroom management and organization.
Quality 8	Enhance instruction by varying instructional strategies, activities, and assignments.
Quality 9	Present content to students in a meaningful way that fosters understanding.
Quality 10	Monitor students' learning by utilizing pre- and post-assessments, providing timely and informative feedback, and re-teaching material to students who did not achieve mastery.
Quality 11	Demonstrate effectiveness with the full range of student abilities in their classrooms, regardless of the academic diversity of the students.

Source: (Tucker & Stronge, 2005)

tionship is a combination of mutual acceptance, understanding, warmth, closeness, trust, respect, care, and cooperation (Leitão & Waugh, 2007). Thus, the classroom described becomes a haven—more than a place to learn but a place to make meaning of learning.

Organizational success in schools is based on the complexity of teaching and learning. Success, according to Merriam-Webster Dictionary (2019), has been defined as achieving a favorable or a desired outcome. In the case of classroom success, success would then be defined as achieving a desired outcome based on the identified goals that will benefit the students, based on the teacher's impact.

Specifically, the objectives found in this chapter include the following:

- **Identify** key components that result in success for a second-career teacher.
- **Define** ways in which a second-career teacher can apply learning strategies—ones based on transformative theory, Constructivist Learning Theory, and Maslow's Hierarchy of Needs—that may result in student success.
- **Apply** theoretical principles to the study of teaching and learning.
- **Explain** the impact of job and life experience has on classroom teaching and learning.
- **Discuss** the value of establishing a safe, secure and trusting environment as a second-career teacher in the classroom.
- **Explain** the role a second-career teacher has in developing relationships with students and how these relationships can impact learning and student success.
- **Analyze** what good teaching looks like and determine how to incorporate the experience of a second-career teacher to classroom teaching by comparing qualified teaching and effective teaching.

BACKGROUND

Providing a Foundation for Learning

Transformative Learning Theory provides a foundation for the second-career teacher to apply a more in-depth frame of reference to applied teaching and learning in the classroom. Transformative Learning Theory is based on both the humanist and constructivist approach to learning. Taylor & Cranton (2013) fittingly state, "From a psychological perspective, humanism presupposes that human nature is intrinsically good and that humans are free and autonomous beings. The emphasis is on the self: the self has the potential for growth, development, and self-actualization." The authors continue discussing constructivism: "Constructivism describes learning as a process of creating meaning from experience."

Taylor & Cranton (2013) continue to reference the variety of strands that make up the constructivist approach by distinguishing between individual and social construction. The authors conclude by referencing individual construction, as being "focused on learners' development of perspectives that help them adapt to and understand experience" and social construction as being "based on dialogue from which people learn the culturally shared ways of understanding the world."

The constructivist approach is one strategy which the second-career teacher can implement on a daily basis to help the students construct knowledge from their own points of view, encouraging each student to attach the new knowledge to previous knowledge. Resnick (1989), refers to constructivist learning as follows: "The general sense of constructivism is that it is a theory of learning or meaning making in which individuals create their own new understandings on the basis of an interaction between what they already know and believe and ideas and knowledge with which they come into contact." This allows the student to begin to base learning from their own frame of reference with a foundation created by the second-career teacher.

The second-career teacher is often able to individualize instruction readily, and can reference prior knowledge and experience, in order to facilitate the students' construction of meaning. Hunter-Johnson's (2015) study reveals that second-career teachers are intrinsically motivated to teach. Hunter-Johnson aptly discusses the platform from which second-career teachers base their instruction: "These second-career teachers are not only qualified academically, but are equipped with practical real-world experience, which would enhance the learning experience while filling the void for the need for teachers in the educational system." In summary, second-career teachers can rely upon their prior experiences in the classroom to help students construct meaning and allow for a depth of learning.

Garnstom & Wellmon (1994) discuss this strategy as follows: "Constructivist Learning Theory also places importance on the learner's point of view." The authors continue to discuss the importance of taking into consideration audience input in the design process and summarize this as follows: "the payback in engagement and learning is always well worth our efforts." Based on this thought process, second-career teachers can recall past experiences and wisdom for applying the strategy of audience input by engaging with students in order to encourage them to develop a personal point of view for making connections in learning. This individualized strategy based on constructivist learning allows for in-depth learning to occur and provides students with the opportunity to make meaning.

In order for a further depth of learning to occur, the students and the teacher must develop a mutual trust that is grounded on a safe and nurturing environment. Taylor (2000b) discusses transformative learning and relationships and noted that transformative learning does not occur without relationships built on trust. The concept of establishing positive relationships with students based on trust may seem like something that will occur naturally when one becomes a certified teacher—when, in fact, it varies between teachers based on many variables.

Frymier & Houser (2009) discuss the value of establishing interpersonal relationships with students in order to develop respect and trust. The author's aptly state, "When trust develops, it is much easier to ask 'stupid questions' or ask for feedback and clarification. All teachers know that such questions can make the difference between confusion and enlightenment in students." This scenario solidifies the value of a safe classroom—one in which students know they are safe and free to ask questions in order to make meaning more personal. The authors continue, "When a trusting and caring relationship develops between teachers and students, a safe learning environment is created. While the lower levels of learning such as recall and comprehension can occur quite easily without the benefit human interaction (i.e., learning by reading a book or by listening to a lecture), achieving higher levels of learning such as analysis, synthesis, and evaluation may require interaction between teacher and student."

This author believes that the second-career teacher who can rely on a prior knowledge base and comfort level to establish such an environment in the classroom. While the research is limited, there is evidence that previous work experiences such as those of a second-career teacher "may have a greater understanding of human behavior due to their wider range of life experiences, and this may facilitate the development of relationships in their new setting (Merseth, 1986). Additionally, Novak & Knowles (1992) suggest, "quite obviously, that second-career teachers may draw upon the skills and knowledge acquired in previous careers to assist them in their new career of teaching."

The basic levels of Maslow's Hierarchy of Needs provide a foundation from which this trust is based—psychological needs, safety, and love and belonging (Maslow, 1943; Sadri & Bowen, 2011). While Maslow's work is on the individual, it is important to identify the impact a leader, in this case, a teacher, has on the success of the organization and ultimately, the student. Individual competency relates to organizational success (Senge, 1996). Once the basic needs are met within the organization, real growth and learning can begin.

Transformative Learning Theory and Experience

Educational debates and reform efforts have been ongoing for decades (Croft, Roberts, & Stenhouse, 2015). One successful component that has been identified is that of life and work experience in relation to student success can be impactful. Second-career teachers who choose a career change or different education degree bring life experience that a rookie teacher cannot (Stronge, 2002).

Second-career teachers have acquired informal life lessons, providing a frame of reference and experience allowing a perspective from a holistic lens. This process is known as transformative learning and is defined as the process of effecting change within a given frame of reference (Mezirow, 1991, 1995, 1996; Cranton, 1994, 1996). Second-career teachers can do more in less time by an immediate recall of strategies, communication, and constructivist approaches to learning. Transformative educators can rely on the content, experience, and "stories" of their past experiences. This experience base sets the stage for increased student achievement in the school setting.

Mezirow (1997) discusses four processes of learning:

One process is to elaborate an existing point of view—we can seek further evidence to support our initial bias regarding a group and expand the range or intensity of our point of view.

A second way we learn is to establish new points of view. We can encounter a new group and create new negative meaning schemes for them by focusing on their perceived shortcomings, as dictated by our propensity for ethnocentricity.

A third way we learn is to transform our point of view. We can have an experience in another culture that results in our critically reflecting on our misconceptions of this particular group. The result may be a change in point of view toward the group involved. As a result, we may become more tolerant or more accepting of members of that group. If this happens over and over again with a number of different groups, it can lead to a transformation by accretion in our governing habit of mind.

Finally, we may transfer our ethnocentric habit of mind by becoming aware and critically reflective of our generalized bias in the way we view groups other than our own. Such epochal transformations are less common and more difficult. We do not make transformative changes in the way we learn as long as what we learn fits comfortable in our existing frames of reference (p.7).

It is evident that second-career teachers have a broader experience from which to draw a point of view and apply it to a learning situation daily. It is a natural experience to apply past knowledge to present scenarios. Second-career teachers have the ability to reference past experience, recognize the needs of students, and apply strategies that will enable the student to learn at a deeper level.

Mezirow (1997) summarizes transformative learning as "not being merely an add-on. It is the essence of adult education … it becomes clear that the goal of adult education is implied by the nature of adult learning and communication: to help the individual become a more autonomous thinker by learning to negotiate his or her own values, meanings, and purposes rather than to uncritically act on those of other." When this occurs, the likelihood of a natural transference with the second-career teacher is greater, thus resulting in a depth of learning and personalization for students in the classroom. In other words, if the second-career teacher can develop lessons based on a rich frame of reference, students have a greater opportunity to benefit from the experiential base.

Policy and Law Support for Education

As previously stated, when a teacher earns a certification, it is expected—based on the certifying university awarding the diploma and on state certification—the teacher is a content knowledge expert. As outlined in this section, there is extensive research and collaboration with the United States federal and local government and businesses to ensure students are provided with an optimal educational experience, resulting in highly qualified status as a teacher.

Since January 8, 2002, the No Child Left Behind Act (NCLB) increased reporting of accountability for school districts by outlining the federal government's framework to increase student achievement and learning by raising national standards and benchmarks. The priorities of the NCLB, referred to as the Four Pillars of NCLB, focused on ensuring stronger results-based accountability; providing more freedom for states and communities; relying on proven education methods; and providing more choices for parents. The Act introduced concepts of "adequate yearly progress" based on testing and "highly qualified" status achievements based on teacher credentials (U.S. House Document 107-34).

The National Association of State Boards of Education (1999) states, "Schools have an important role to play in addressing the needs of students by helping them succeed academically and by supporting the growth that will enable them to lead successful, productive adult lives." The State Boards of Education imply that students have a variety of needs—but do not distinguish between academic and personal ones.

As stated in a project directed by a study group of the National Association of State Boards of Education (1999) the following recommendations for public school systems were set forth by requiring them to:

Set standards for creating positive school environments that foster academic achievement and support the development of children and youth …Take a leadership role in creating a shared vision and sense of responsibility with others for helping children and youth to succeed academically in school and to become productive members of society … Work collaboratively with other policymakers in the development and implementation of early childhood and prekindergarten programs … Work with school and others to combine and coordinate resources across agencies and public/private sectors in support of children's success.

A collaborative effort among people in business, industry, and education set forth the vision and necessary skills for education for public school students to achieve for success in the 21st century workforce (National Alliance of Business, 2000). These skills continue to be the driving force that sets accountability for students and school systems across the nation. Local control is given to school districts as to how they will maintain these established standards and methods of accountability.

All of these efforts are aimed at creating an ideal environment and opportunity for favorable learning to occur. However, there is never a certification or stamp of approval on assuring that a teacher is effective. In the words of Tucker & Stronge (2005),

Teacher effectiveness is characterized by a far more complex set of qualities than one's professional preparation. It includes dispositions and an array of planning, organizational, instructional, and assessment skills. Effective teachers are able to envision instructional goals for their students, then draw upon their knowledge and training to help students achieve success. A "highly qualified" teacher is certainly a good starting point, but most of us would want our child to have a highly effective teacher whose teaching effort yields high rates of student learning.

Human Development, Learning, and Second-Career Teachers

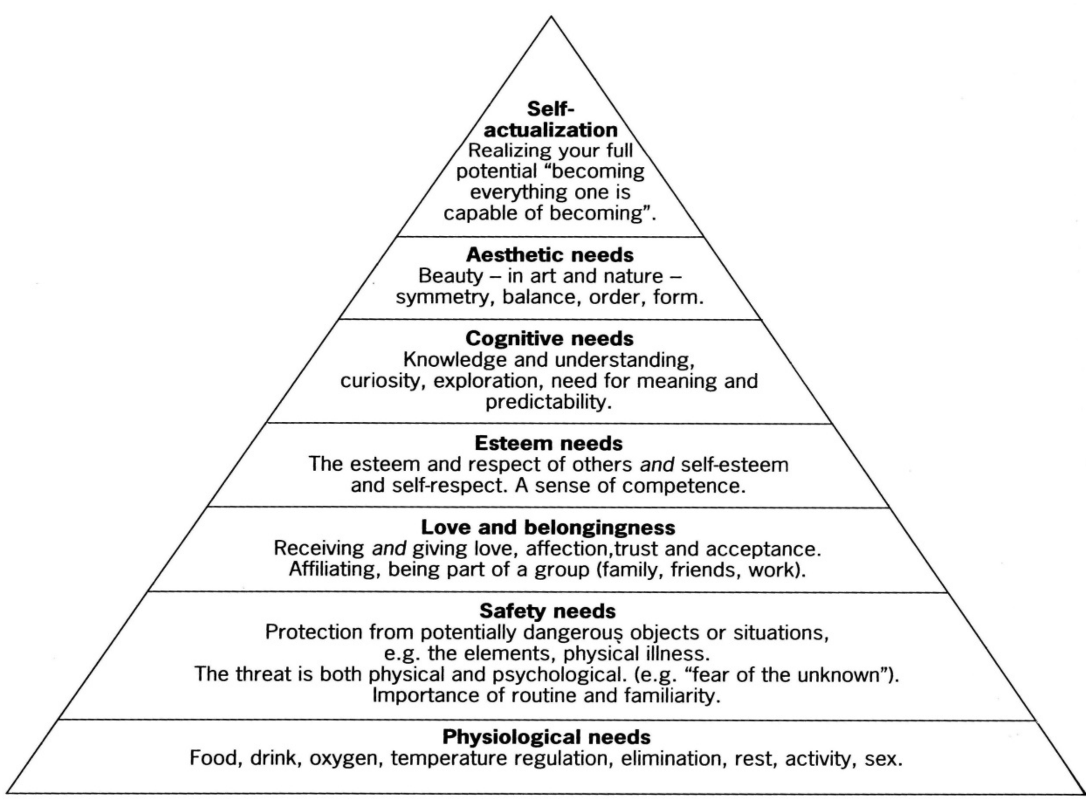
Teams are an important part of building and sustaining a positive organizational culture. A successful leader is one who will pursue building positive internal and external stakeholder relationships, and create a shared vision resulting in improved organizational culture and performance (Senge, 1996). A team in a classroom consists of the teacher and students. This is a process, and one in which a second-career teacher can rely on experiential learning to enhance the process. A shared vision is also a result of how the leader leads, sets expectations, and develops trust. In this case, it is how the second-career teacher interacts with stakeholders and leads the classroom of individual students to success through a shared vision, with a foundation of safety and acceptance. It is vital for the individual leader to seamlessly layer individual knowledge and experience on to organizational knowledge, thus moving the organizations from the vision of the leader to a shared organizational vision. Creating a shared vision based on a trusting relationship will result in the development of a highly successful organization (Senge et al., 1994).

It is important that a relationship with students—a sense of safety and trust—be developed. This humanistic approach—as developed by Abraham Maslow (1943), a well-known and respected scientist—identified levels of needs and discussed the necessity of mastering each level before having the capacity to move on to the next level. Each level, as indicated in Figure 1, is smaller as you progress to the top, indicating that fewer actually reach and maintain each level. Maslow identified five levels of needs, from lowest to highest: physiological needs, safety and security, love and belonging, self-esteem, and self-actualization, as is described in Figure 1. Maslow contends that one cannot advance until needs at each level are satisfied.

The theory provides an understanding of human development and of how individuals react in different situations. Individuals may move up and down the hierarchy throughout life (Maslow, 1943).

As the second-career teacher relies on previous experiences, one must also rely on the knowledge of human development. It is the responsibility of the teacher to be in tune with each student. It is important for the teacher to maintain a sensitivity to the needs of students and to establish an environment of safety, belonging, and respect in order for optimal learning to occur. Burelson & Thoron (2017) reiterate the importance of this sensitivity and awareness and connect it to the classroom teaching and strategy by suggesting that teachers design lessons and apply teaching strategies that will assist students in discovering their potential in order to guide them towards self-actualization. This, of course, is based on a classroom built around trust.

Figure 1. Maslow's hierarchy of needs
Source: (Hunter-Johnson, 2015)



Individuality of Stakeholders

Typically, cultures do not change without individuals collectively changing (Harris, 1994). In an organization, bringing about change for organizational improvement and increased student achievement is a very delicate process—one in which the individual must have a full awareness of stakeholder's perceptions, including those based on the culture of the school (Odhiambo & Hii, 2012). Internal and external relationships and leadership styles conducive to establishing a positive relationship are important to the overall relationships in the organization (Leithwood & Riehl, 2003). Success may be hindered as a result of distrust and a lack of effective relationships. Interpersonal skills become very important to the organizational culture and performance of a school. Cultures—specifically, a classroom—cannot develop a shared vision if both the teacher and the student do not forge effective relationships. An important component to the success of a second-career teacher is to review the individuality one brings to the classroom and to determine the best fit and alignment. Simmons (2016) discusses the importance tacit knowledge can bring to the classroom as:

For second-career teachers, their interactions with others during their first career have allowed them to build and develop skills that were unique to their first career. This allows them to bring different perspectives to the classroom, which is often difficult or impossible to replicate. Individuals can unwittingly develop certain skills through interactions in their first career that ultimately lead them to a place where they know more than they can actually convey. It is possible for certain competencies to become such a part of one's life that a person is unable to recognize the presence of the skills and actions are performed almost automatically and without thought (p. 38-39).

Each student is treated as an individual, based on the foundation of trust and a positive relationship with the second-career teacher.

MAIN FOCUS OF THE CHAPTER

Issues, Controversies, and Problems

The author explores several issues, controversies, and problems that surfaced as a result of the analysis of the background literature review. These issues include the value of teacher-student relationships, the behaviors of effective teaching, and fostering transformative learning in the second-career teacher. This chapter's focus in on the impact on student learning a second-career teacher may demonstrate. Therefore, the author recognizes the individuality each second-career teacher brings to the classroom and how a personal view of efficacy impacts student success. This is explored further, since individual difference impacts success.

Student-Teacher Relationships and the Learning Environment

A meta-analysis review of a study between learning and teacher student relationships has been ongoing for decades with mixed results (Roorda et.al., 2011). The authors' meta-analytic research review resulted in support of both positive and negative aspects of the teacher-student relationship. The authors aptly state, in reference to the positive aspects, "associations with TSRs (teacher-student relationships) with engagement and achievement were substantial …TSRs remained important, or were even *more* influential, for older students, even into late adolescence." The authors conclude, "Overall, TSRs were more important for children who were academically at risk, in particular for children from disadvantaged economic backgrounds and children with learning difficulties." There is an obvious data gap in reference to various ages of students and those who are not academically at risk or disadvantaged.

The authors report no specific details on results differing for male or female students or various teacher characteristics. However, the authors concluded that teacher (male) gender influenced associations with engagement, but not achievement. Additionally, the authors noted that teachers with more experience had a significant influence on the association between positive relationships and achievement only and conclude that teacher-student relationships are important but are not significant enough to improve student learning behaviors (Roorda et al., 2011). Ultimately, several teaching factors play a role in student success.

The learning environment is another variable of importance discussed by Stronge et al. (2011): "A productive and positive classroom is the result of the teacher's considering students' academic as well as social and personal needs." As established by Maslow (1943), one must meet psychological, safety, love and belongingness, and esteem needs before moving forward with higher levels of learning, ultimately striving to become self-actualized. Tschannen-Moran, 2000 references classroom management as very

important to overall success. The authors state, "Classroom management is based on respect, fairness, and trust, wherein a positive climate is cultivated and maintained." The personal qualities of a teacher are vital

to student success, further supporting the basic levels of Maslow's Hierarchy of Needs (Maslow, 1943) and Transformative Learning Theory (Mezirow, 1991). The ability of teachers to relate to students becomes stronger with experience (Brown, McIntyre, & McAlpine, 1988), thus linking Transformative Learning Theory and the humanistic approach to student success. The question remains—posing a common thread throughout the controversy, issues, and problems section of this chapter—is: "Can a first-career novice teacher, based on personal qualities alone, provide the same learning environment as a second-career novice teacher?

Those individuals who are second-career teachers—teachers who are entering into a career in teaching after having worked in a prior career—are the focus of a variety of research discussions. Many believe that second-career teachers enhance the learning experience for students based on qualities of maturity, life experience, motivation, and transferable work knowledge from previous careers (Richardson & Gough, 2001; Skilbeck & Connell, 2004).

Furthermore, Chambers (2002) supports the value of a second-career teacher as being one can "express the value of connecting the classroom to the outside world. They are able to draw on their previous training and work experience to bring a less traditional perspective on schools, students, and classroom work. They see themselves as adopting alternative pedagogies and engaging in educational reform."

The dispositions and personalities of students are factors that also pose another dimension of students' success. Stronge et al. (2012) discuss the fact that teachers who may do well one year may struggle the next year based on the dispositions and personalities of the students in the class. They also state that although there is "certainly a possibility that student dispositions and personalities are variables related to student success (as it has been recognized as being)—we doubt that the differences in students are wholly responsible for the differences in teachers." It is evident that teachers greatly impact student success.

The experience and life wisdom that a second-career teacher possesses by the mere fact of having accrued more experience may give the second-career teacher a better chance of managing the classroom effectively—thus decreasing the impact of the changes in student dispositions and varying personalities. Tigchelaar, Brouwerb & Korthagenc (2008) completed two studies, one of which investigated second-career teachers and how their specific backgrounds helped them in making the transition to teaching. The authors state, “Because of their varied backgrounds, the career changers brought a wealth of ‘knowledge about people’ with them, which benefitted them in their transition to teaching and their functioning in the school organization.”

These second-career teachers indicated that managing adolescents placed new demands on them, but also indicated that management came easier based on past experience of learned skills in working with a team in a prior position. The second- career teachers who were surveyed mentioned “being able to empathize with different individuals while working with a whole group; being able to distinguish between pupils; making eye contact deliberately; dealing with lively or sometimes malicious behavior; and using humor in interaction deliberately.”

However, all respondents reported feelings based on caring attitudes toward the students. For instance, one reported: “It touches me personally. It evokes my feelings of care. I feel responsibility for their development. It absorbs all my energy and I feel vulnerable. Sometimes it is scary. I have the feeling of being disarmed. Their outspokenness makes me feel good.” This depth of reflection results in the second-career teachers apply prior knowledge and skills to anxiety triggers. A different respondent other than the one being quoted earlier in the paragraph refers to this, “Working with people at the age of adolescents triggers different problems. Teaching people something, I have gone through that, but at a very different level. Now, I feel much closer to them, as compared to my former clients in business.”

To further solidify the importance of second-career teacher’s effectiveness (based on Transformative Learning Theory and Maslow’s Hierarchy), student input—while limited—provides support. Brown, McIntyre, and McAlpine (1988) asked students to reflect, based on their previous two years of school. A pattern of effective teacher traits—from the students’ perspective—was identified from the responses and reported by Brown, McIntyre, and McAlpine (1988) as follows (in Table 2).

Furthermore, Leitão & Waugh’s (2007) study on teacher-student relationships—based on the student’s point of view—resulted in the following valid inferences:

Table 2. Student reflections on teachers

Questions Posed to Students	Student Responses
Please tell us about the three teachers whose teaching you thought was best. Probably there were different things you like about each of these teachers. Please say what each teacher did in his or her teaching that you thought was good.	• Creation of a relaxed and enjoyable classroom atmosphere, • Retention of control in the classroom, • Presentation of the work in a way which interests and motivates pupils, • Providing conditions so pupils understand the work, • Making clear what pupils are to do or to achieve. • Judging what can be expected of a pupil, • Helping pupils with their difficulties, • Encouraging pupils to raise their expectations of themselves, • Developing personal and mature relationships with pupils (rather than treating them as small children), and • Teachers’ personal talents.

Source: (Brown, McIntyre, & McAlpine, 1988)

- Students found it easier to wish an occurrence rather than think about the actual behavior.
- Students found it very easy to wish that they could get along well with their teacher.
- Students found it moderately easy to wish that they and their teacher care about each other.
- Students found it moderately hard to say that their teacher actually listens to them.
- Students found it very hard to say that their teacher could be approached for help when the teacher was busy.

While the student view of effective teacher traits research is limited, especially research in regard to a second-career teacher, an examination would be warranted of the various research on student perspective on teacher effectiveness and the value that effective teacher behaviors, especially second-career teachers, can bring to the students' perception of learning; and ultimately, in support of their success.

Effective Teacher Behaviors

It is vitally important to review the individual characteristics of second-career teachers. The author has established that second-career teachers bring a history of knowledge and experience with them to the classroom. The vast difference in the knowledge base and experience varies, and therefore, impacts student success. Additionally, each second-career teacher—while they bring a history of knowledge and experience to the classroom—chooses to teach using a variety of strategies and techniques and interact with the students based on personality and style. Age aside, a good teacher exhibits certain traits; and the author recognizes second- career teachers will enter the classroom with skills, which most certainly impact learning.

For decades, the topic of teacher effectiveness has been studied. Witty (1947) conducted a study based on the opinions of students by analyzing 12,000 student letters ranging from second to twelfth grade. A pattern developed with twelve items, identified in the following table.

Throughout time teachers across our world work to create an optimal environment for learning; and this topic continues to be researched. Nussbaum (1992) referenced over 1,000 studies in 30 journals of teacher behavior studies. A current Google search referenced 3,320,000 results, indicating that the topic is a highly studied area of research. The question remains: "What do effective teachers do that result in effective teaching?" Varying personalities and levels of commitment certainly impact effective teaching.

Table 3. Order of traits mentioned in 12,000 letters

Order of Frequency	Traits of Effective Teachers	Order of Frequency	Traits of Effective Teachers
1	Cooperative, democratic attitude	7	Sense of humor
2	Kindliness and consideration for the individual	8	Good disposition and consistent behavior
3	Patience	9	Interest in pupils' problems
4	Wide interests	10	Flexibility
5	Personal appearance and pleasing manner	11	Use of recognition and praise
6	Fairness and impartiality	12	Unusual proficiency in teaching a particular subject

Source: (Witty, 1947)

Nussbaum(1992) concludes: "Research conducted on effective teacher behavior over the past few years provides further evidence that instructional processes make a difference in the classroom. Many of the behaviors that differentiate effective from in effective teachers are no longer a mystery."

Friedmann (1991) developed a list entitled "Laws of Good Teaching." Upon examination of Friedmann's list, referenced traits similar to the list that Witty (1947) created fifty years earlier can be identified. Friedmann referenced items such as the following:

- Never laugh at your students but laugh with them; never make fun of your students, unless you wish them to make fun of you;
- Never assume that students silence means understanding on their part: They may be confused;
- The prime challenge of teaching is to retain the students' enthusiasm in spite of their growing knowledge: A good teacher fosters creativity in the face of information;
- Every discipline speaks its own language; good teaching teaches language, not just words;
- Always praise your students for their accomplishments; never damn them for their failings.

A review of the list in its entirety demonstrates the need to create a safe, nurturing environment that is free of ridicule; shame; etc. This aligns with Maslow's Hierarchy of Needs (Maslow, 1947) but does not discriminate between the ages of a teacher.

Further study of Maslow's Hierarchy of Needs in relation to effective teaching behavior yields suggestions for the application of the theory in the classroom (see Figure 1). Maslow's Hierarchy of Needs suggests ways that the hierarchy can be applied in the classroom. Both the initial-career teacher and the second-career teacher have the ability to create a classroom that incorporates Maslow's Hierarchy of Needs; the latter, however, can sometimes have a comparatively deeper understanding when it comes to managing people (Hunter-Johnson, 2015).

Teacher Self-Efficacy

Bandura (1977, 1982, 2006) derived the concept of self-efficacy from research on the social-cognitive theory of behavioral change. When applied to the field of education, a teacher's self-efficacy is a concept related to a teacher's self-belief in personal capabilities; then, when the belief is positive, the result of achieving such capabilities will be realized. Bandura (1994), defines self-efficacy as, "Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave" (p. 1).

Studies in education and teacher self-efficacy investigate possible correlations between teacher self-efficacy and student success (Ashton & Webb, 1986; Bandura, 1997; Heneman, Kimball, & Milanowski, 2006).

It has been established that the support provided by government and businesses in support of the mission of growing quality, effective teachers has been established to be significantly effective in growing quality teachers. U.S. House Document 107-34; National Association of State Boards of Education, 1999; National Alliance of Business, 2000). How does a teacher's self-efficacy tie in? In other words, if a teacher believes he/she is successful, does that impact his/her effectiveness? This strand of thinking is very important to developing a safe, nurturing classroom and relationships with students. Ashton

(1984) defines teacher efficacy as "the extent to which teachers believe that they have the capacity to affect student performance."

Ashton et al. (1983) completed a study on basic skills of teachers and their perception of self-efficacy. The authors learned that a school's culture and its leadership greatly impact the will to maintain a strong sense of self-efficacy by identifying variables such as isolation, difficulty assessing teacher effectiveness, lack of collegial or administrative support, and the sense of powerlessness from limited input or opportunities for ownership based on decision-making. Additionally, a teacher's attitudes greatly impact self-efficacy; a teacher's awareness and commitment to the belief of self-efficacy influence behavior (Weiner, 1980).

The following dimensions distinguish high-efficacy teachers from low-efficacy ones (Ashton et al, 1983):

- A sense of personal accomplishment,
- Positive expectations for student behavior and achievement,
- Personal responsibility for student learning,
- Strategies for achieving objectives,
- Positive affect,
- Sense of control,
- Sense of coordinated teacher-student goals,
- Democratic decision-making

Studies suggest various factors related to student and school success—and of these, the teacher is identified as having the most powerful influence on students' achievements (Marzano & Marzano, 2003).

Djigić et al. (2013) discuss self-efficacy as "an individual's belief that he can successfully perform necessary actions. These beliefs of an individual's own capabilities will initiate behavior directed to outcomes. If an individual does not believe in his own efficacy, needed behavior will not be initiated and success will fail." With this in mind, the authors explored the concept of the self-efficacy of teachers. The theory of self-efficacy theory emphasizes the interaction between personal (cognitive) factors, the individual's behavior, and environmental conditions (Bandura, 1982; Skaalvik & Skaalvik, 2007).

It is assumed that a teacher with high self-efficacy produces positive results. Skaalvik & Skaalvik (2007, 2010) further developed the concept of teachers' self-efficacy with an analysis of teachers' roles derived from an actual Norwegian educational curriculum's alignment with teachers' roles in a modern educational system. The authors distinguish six dimensions within teachers' self-efficacy: "These dimensions are: Instruction, Adapting instruction to individual students' needs, Motivating students, Maintaining discipline, Cooperating with colleagues and parents, Coping with challenges." It is the individual belief of the teacher that will determine self-efficacy. Self-efficacy does not mean the performed behavior will produce certain outcomes (Bandura, 1977, 1982).

A closer examination of self-efficacy and the success of the second-career teacher establishes a correlation between self-efficacy and career performance (Gibbs, 2002; Gibson & Dembo, 1984, Penrose, Perry & Ball, 2007), thus providing a possible advantage to the second-career teacher. Anderson (2018) completed a study on second-career teachers and self-efficacy in relation to effects on students. The author's findings indicate second-career teachers demonstrated an overall strong sense of self-efficacy.

Can Transformative Learning be Fostered in the Second-career teacher?

The analysis of the literature review leads the author to consider ways in which transformative learning can be fostered in the second-career teacher in a manner in which it would enable classroom success. As previously discussed, the transformative learning process is defined as of effecting change in a frame of reference (Mezirow, 1991,1995,1996; Cranton, 1994,1996).

Furthermore, Taylor & Cranton (2012) completed a content analysis in which they studied the nature of transformative learning theory—its purpose, core elements, and essential practices. The authors state,

A concept that is most central to transformative learning and adult learning in general is experience. It is experience, particularly prior experience (that happened in one's past), that is the primary medium of a transformation, and it is the revision of the meaning of experience that is the essence of learning (p. 35).

This concept hints at a shift in thinking from straight lecture style delivery of material to more of a humanistic story-telling approach to learning aligns both with the importance of relationships between teacher and student and creating an environment conducive to optimal learning, Maslow's Hierarchy of Needs, and Constructivist Learning Theory. Transformational learning moves toward a learning perspective in which students construct the knowledge based on connections from prior learning and experiences.

Baumgartner (2001) further discusses the importance of fostering transformative learning and validates the importance of establishing a safe and nurturing environment. The author fittingly references transformative learning "as being a meaning-making process … It is not *what* we know but *how* we know that is important" in regard to teachers and how their students learn. A second-career teacher has the ability to foster meaning-making through the wisdom, experience, and knowledge base from a prior career (and from life in general) to assist students with meaning-making.

Brown, McIntyre, & McAlpine (1988) reviewed things that occur in experienced teachers' classroom. The authors examined various teachers and various lessons and determined the existence of a repeated pattern in classroom activity characterized by

- A good and easy-going relationship between the teacher and pupils in the classroom;
- Pupils understanding what the teacher is asking them to do;
- Pupils who (for whatever reason) are reluctant to work;
- Pupils are actually working;
- All pupils are applying themselves well to the work; and
- Pupils are thinking about, and understanding, what they are doing—rather than just doing what they are told.

The authors make no distinction as to how the teacher becomes experienced—that is through life experience, years in any job, or years in a teaching job (Brown, McIntyre, & McAlpine, 1988). Stronge et al. (2011) completed a deeper review of what makes effective teachers by looking at variables such as instructional delivery, student assessment, learning environment, and personal qualities. The authors report that the "conclusion regarding effective teachers is abundantly clear: The common denominator in school improvement and student success *is* the teacher."

While the teacher is the common denominator, Stronge et al. (2011), do not directly reference Transformative Learning Theory. However, the authors hint at the value of experience and meaning-making supported by Transformative Learning Theory based on the variable of instructional delivery as follows: "Effective teachers recognize the complexities of the subject matter and focus on the meaningful conceptualization of knowledge rather than on isolated facts." For example, whereas an initial-career teacher may be able to construct meaning, based on the premise of Transformative Learning Theory, the second-career teacher is more able to do so based on having gained a greater breadth and depth of experiential knowledge and wisdom.

SUGGESTED SOLUTIONS AND RECOMMENDATIONS

This study has investigated how having become teachers as a second career as an adult learner has an impact on student success. This chapter reviews the importance of transformational learning theory (Mezirow, 1991, 1195, 1996; Cravevhnton, 1994, 1996) based on the adult learner and effective teaching strategies that impact student learning, resulting in student and organization success.

A former United States Secretary of Education, Richard Riley (1988), aptly references the value an effective teacher has on student success: "the most critical investment we can make in [classrooms] is in well-qualified, caring, and committed teachers. Without good teachers to implement [reforms], no educational reforms will succeed at helping all students learn to their full potential."

A solution to determine whether the hiring of a second-career teacher results in increased student success would be to analyze and compare initial-career teachers and second-career teachers on variables such as test scores, teacher-student interactions, self-efficacy, the application of effective teaching strategies, and other identified variables in order to determine the success of second-career teachers based on Transformative Learning Theory, Constructivist Learning Theory, and Maslow's Hierarchy of Needs.

FUTURE RESEARCH DIRECTIONS

In the 1950s, a college degree (for the most part) would—for the majority—guarantee a 40-year career. Fast forward to 2019, and it is far less common—almost unheard of—for a college graduate to stay in the same job, let alone the same career field. Recent research suggests current college students will change jobs far more often than their parents. As stated by Rubens, et.al. (2017),

Generation X'ers who graduated college from 1986 to 1990 averaged two job changes in their first 10 years' post-graduation. Conversely, Millennials will change jobs at least 4 times before the decade post-graduation (Long, 2016). Where only a few years ago it was estimated that the typical worker would have seven careers in a lifetime, it is now predicted that this number will be closer to twenty (Bialik, 2010). According to Davos, events such as economic downturns and increases in automation (e.g., artificial intelligence, robots, etc.) will result in the net loss of 5.1 million jobs over the next five years in fifteen leading countries (these countries account for approximately 65% of total workforce) (p. 4).

Four areas for future research are identified:

- **Firstly,** in previous research, effective teacher behaviors, teaching strategies, and classroom environment have been heavily researched. However, a trend appears to be that of adults returning to the college classroom to become certified for another career—one such career being that of becoming a teacher. This area would be one to consider for future research, as a search resulted in very limited empirical studies.

- **Secondly,** another area identified for research is a comparison between an initial-career novice teacher and a second-career novice teacher. The chapter identified the necessary traits for a teacher to demonstrate and believe in. However, are these traits inherently found in a teacher—or does age and life experience have an impact?
- **Thirdly,** another area of research would be to determine whether second-career teachers' experience and life history have an impact on their self-efficacy. The chapter identified common blocks that inhibit self-efficacy. It also identified traits that a teacher who exhibits high self-efficacy demonstrates. However, does the second-career teacher have an 'edge' (a competitive advantage) based on prior life and work experiences?
- **Fourthly,** a study of emerging trends in teacher preparation, student learning, and adult learning in about student success could yield results that further explore the impact of second-career teachers.

CONCLUSION

The focus of this chapter was on the alchemy—the chemistry or science and art of—teaching and learning and the potential impact a second-career teacher has with regard to student success. In an analysis of relevant research literature, the author explored whether a second-career teacher—as a result of experiential knowledge and wisdom—would have a greater impact on students' success than an initial-career teacher would. The analysis supports the goals of the chapter in that overall, a second-career teacher has a greater impact on both student success.

With this in mind, one must ponder the questions "What does this mean for the second-career teacher?" and "What can a second-career teacher do to capitalize on past experience and wisdom?" The underlying question is: "Does a second-career teacher have a measurable impact on student success—in comparison to a novice teacher who is just beginning a career as a current college graduate?"

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KEY TERMS AND DEFINITIONS

Constructivist Learning Theory: A learning theory that implies learning is based on meaning-making and building new knowledge on prior knowledge.

Individuality: The individual nature of both the teacher and the student based on personality, social, and intellectual differences.

Learning Environment: This refers to the classroom where the teacher and students interact.

Maslow's Hierarchy of Needs: A humanistic theory that establishes the value of meeting basic needs in order that higher needs, such as self-actualization, can be met.

Novice Teacher: A first-career teacher who is beginning to develop a teaching philosophy, personal teaching style, and classroom management in the classroom.

Organizational Success: An organization that attains established goals based on the needs of the internal and external stakeholders.

Second-Career Teacher: An adult who has had a previous career with a depth of experience and returns to college to secure a teacher certification to begin an additional career.

Student Success: Students' ability to attain established goals based on the goals set forth by individual school districts.

Transformative Learning Theory: The work and life experience a second-career teacher can apply to current situations, which results in a profound depth of learning.

APPENDIX

Application Activities

Scenario #1

Ms. Lindenberger, a middle school science teacher, was conducting a lab experiment. Prior to the experiment, the class, who was typically chatty, earned the reward of the extra lab to further enhance learning. Ms. Lindenberger reviewed the rules and expectations for both safety and learning. Marcus, a student with emotional issues and identified with an IEP, began interrupting the class with attention getting behaviors. Ms. Lindenberger followed the expectations and rules set and after three warnings, the student was sent to the "Refocus Room". Ms. Lindenberger and her students had a successful laboratory experience. Later that afternoon, the principal visited Ms. Lindenberger to let her know Marcus's parent contacted her and accused Ms. Lindenberger of singling out Marcus and used discrimination and harassment in her complaint about Ms. Lindenberger. A teacher – parent – principal meeting has been scheduled.

Question

Based on your understanding of the possible differences between a first-career teacher and a second-career teacher presented in this chapter, how might these differences be played out in this scenario for each teacher? Provide a rationale for your explanation of each teacher.

Scenario #2

Mr. Rizzo, 24 years old and a high school Math teacher and coach, was working through a formula on the board, with his back to the class. Mr. Rizzo continued to teach the class, which he felt, was quite successful. After class, a female student asked to see Mr. Rizzo and indicated a young man in the class had touched her inappropriately while another young man video-taped the incident. These students all sit in the back row of the class and therefore, no other students witness the event. It should be noted that both of the male students are on the football team that Mr. Rizzo coaches. The female student has a record of disciplinary issues and for making unbiased complaints. Mr. Rizzo informed the student there is nothing he can do since he nor any students witnessed the event.

Question

Based on your knowledge of the research presented on second-career teachers, how might a second-career teacher approach this differently? Re-work the scenario from the beginning to discuss what a second-career teacher might do from the beginning. Provide a rationale for your explanation.

Scenario #3

Mr. Iacobucci, a 1st year teacher who is eager to teach and change the lives of his students, sets the stage on the first day of school with the rules that are to be followed every day. The rules are very finite, for example, raise hand if you have a question, no one to use restroom during class unless emergency, no cell phones as per school policy and no eating or drinking, no talking in class. By the third day of school, Mr. Iacobucci notices that students are violating the rules in minor ways and he chooses to ignore each incident. Within a week, the students are eating in class, getting out of their seats, talking during class, and the latest incident involves a cell phone. When Mr. Iacobucci witnessed a student using a cell phone, he reached his limit, took the cell phone and placed it on his desk. Mr. Iacobucci continued to teach and after class when he went to secure the phone to return it to the student, it was missing. Mr. Iacobucci questioned students, and no one witnessed anyone taking the phone. Mr. Iacobucci informed the student, that it was tough luck and that he should not have been using the phone. Later in the day, the principal visited Mr. Iacobucci to inquire about the incident as the student's parent called to demand Mr. Iacobucci pay for the phone, which the principal indicated he would be required to do.

Question

Based on your knowledge of the research presented in this chapter on experiential knowledge and longitudinal wisdom, how might a second-career teacher manage this situation differently? Compare the differences between a first-career teacher and a second-career teacher. Provide a rationale for your explanation.

Chapter 14
Revising Approaches to ELL:
The Urgent Need to Update University ELL Education

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ABSTRACT

This chapter explores how current approaches to English Language Learner Education frequently suffers from the erroneous assumption that students are somehow academically deficient, leading to institutional neglect and relegation of English Language Learner issues to the peripheries of US universities. By examining and discussing existing approaches, this chapter highlights specific shortcomings and offers more effective solutions to better reflect and understand English Language Learners. The goal is to provide a more effective English Language Learner education.

INTRODUCTION

Just as increased globalization has brought new awareness of different cultures, histories, languages, customs, and literatures into the classrooms of US universities, so too has globalization extensively changed student demographics. While the enduring American history of immigration has undoubtedly meant that students from myriad cultural and linguistic backgrounds have always been present within institutions of post-secondary education, US universities could, until recently, confidently assume that their students spoke English either as their first language or with near-native-like proficiency (Matsuda, 2006). This assumption has allowed for the perspective of English as a Second Language (ESL) as a luxury discipline which, while a nice support service with which to attract international students, is not a necessary component to a university education. However, as increased globalization has drawn previously distant parts of the world into increasing proximity, this assumption is no longer true. Growing attention has focused on the increased number of US university students for whom English is not their first language, an increase of such magnitude that Preto-Bay and Hansen claim student demographics are either upon or past the tipping point, where it is now imperative for universities to address the linguistic

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challenges and issues faced by English Language Learner (ELL) students in order to remain relevant and effective (2006).

International student enrollment in US universities continues to increase rapidly. In the 2000/01 academic year, there were 547,867 international students enrolled in US post-secondary institutions, and by the 2017/18 academic year, there were now 1,094,792 international students, comprising 5.5% of total US enrollment (Institute of International Education [IIE], 2018a). 762,311 of those current students were enrolled in doctorate-granting universities (Institute of International Education [IIE], 2018b). This growth is not accidental; while many students from international backgrounds seek acceptance in US universities for their personal education, US universities also actively seek to attract international students as well for their own gain. Many universities see international student enrollment as a means to offset declining domestic student numbers with students who, typically, pay full tuition (Hegarty, 2014). International students also provide valuable alternative perspectives to academic content and "enrich the cultural diversity of campuses with their home culture and ethnic experiences" (Wu, Garza, & Guzman, 2015, p.2). An increase in international student enrollment "both enhances a program and provides much needed funding" (Hegarty, 2014, p.227). Therefore, it is reasonable to expect international student enrollment to continue to rise.

Within this student population, the majority of students are ELL students who have enrolled in American universities to study a variety of topics and fields. ELL students thus represent an important portion of overall university populations, and as such "influence all domains of the university – not only academics, but also finance, administration, athletics, human resources, housing, and community involvement" (Knoblock & Gorman, 2018, p.277). International student numbers also do not take into account students who applied and matriculated domestically, as US citizens or residents, for whom English is not their first language, meaning that the impact of ELL students on US universities is even greater than international student enrollment numbers represent. Furthermore, "Challenges related to English language proficiency remain central to the difficulties experienced by international students... [and many] struggle to achieve their academic goals" (Knoblock & Gorman, 2018, p.277). Thus, it is clear that ELL education is not an optional luxury, but a critically important piece of an effective 21st century university education, with the potential to benefit virtually every part of the university.

Nonetheless, it is unfortunate that ELL support and education remain neglected at many US universities, due to outdated, assumptive, or otherwise insufficient approaches to ELL. As the presence of ELL students in US universities increases, evaluation and revision of institutional approaches to ELL education are needed. This chapter will divide these approaches into three categories: historic, composition, and the linguistic. The purpose of this division is not to provide an exhaustive account of every ELL program at every US university, but rather to create a general theoretical framework through which the present state of ELL education and its roots within US university education may be broadly examined. After establishing this foundational framework of three basic approaches to ELL, discussion of the detrimental assumptions and weaknesses within these approaches will be made, followed by potential solutions. Within the literature, the terms ESL and ELL are frequently overlapped and interchanged, but for this chapter, when possible, preference will be given to the term ELL.

Given the inherently political nature of education for students with either indirect or direct international and multicultural backgrounds (see Casanave, 2003), it is important to acknowledge that successful and beneficial revision of ELL education will require "ideological as well as pedagogical changes" (Shuck, 2006, p.74). As a result, the problems and corresponding solutions presented in this chapter will primarily take a broader, institution-level perspective, hoping that a more accurate and considerate approach to ELL education—one which sees ELL students as valid and valued members of higher education communities—will precipitate more scholarship on their challenges and more effective solutions to those challenges. Without an approach to ELL education which is rooted in the reality of today's ELL students and the issues with which they grapple, ELL education will continue to struggle to adequately meet the needs of its students.

BACKGROUND

The Historical Approach

In order to better understand the current state of ELL education in US universities, it is important to understand the origins of the field, hereafter termed the historical approach. Unfortunately, little research has been conducted on the history of ELL education in the US from a pedagogical perspective. Nevertheless, the brief summary given here yields useful insights and information on the field's origins. Due to the multicultural and multilingual background of the United States, English has been taught and learned in some capacity by adult learners since the first British colonization of North America. However, due in large part to social restrictions of access to higher education, universities were able to operate well into the nineteenth century under "the assumption of the native-English-speaker norm" (Matsuda, 2006, p.643). Even as international students entered US universities in the second half of the nineteenth century, "language preparation was generally considered to be the responsibility of individual students or their sponsoring governments" (Matsuda, 2006, p.644). In the event that a student's English proficiency was lacking, they were expected to attend a U.S. preparatory school in order to improve their English to a satisfactory degree (Matsuda, 2006). Already, at this early point in time, the standard practice within US universities had been cemented as "the exclusion of language differences" (Matsuda, 2006, p.643). Students were expected to command uniform language abilities without variation.

While this standard may have been acceptable at first, increasing globalization in the 20th century has challenged it. In 1930, there were reportedly 9,961 international students in US colleges and universities, almost three times the number present in 1910 (Matsuda, 2006). This rapid rise in ELL students began to challenge previous assumptions of the native-English-speaker norm. And while some university instructors recognized these shifts in student demographics, their solution was not to adjust pedagogical approaches, "but to contain issues of linguistic and cultural differences by providing additional instruction" (Matsuda, 2006, p.645). This was carried out in the form of the first targeted ELL courses "'for backward students'" (Matsuda, 2006, p.645). This policy of containment and separation formed a tacit, but foundational, perspective regarding ELL students in US universities: a lack of native-like English proficiency is somehow deficient or evidence of intellectual shortcoming.

This policy of separation and containment flourished as the twentieth century progressed. By 1969, 150 universities offered ELL programs for ELL students, many of them "on a noncredit basis as preparation for a regular English requirement" (Matsuda, 2006, p. 647). While these programs acknowledged the challenges facing ELL students, the fact that students did not receive university credit for their work still enforced the view that such students were deficient. In addition to the noncredit status of these programs, it is also important to note their positioning as preparatory for required courses. Matsuda is highly critical of this positioning, stating that the overall purpose of the historical approach was to keep non-standard language varieties from ever rearing their heads in mainstream American university classrooms (2006).

The Composition Approach

Concomitant with the historical approach to ELL, and indeed conceptually tied to it, was the rise of composition courses and programs in US universities. As will be explained, these programs have become a primary departmental location of ELL support for many ELL students within US universities.

The connection between the historical approach and the composition approach is clear. One might even claim that the composition approach is the clear response to the historical approach's negative view of language differences and variation. While academic language use has always been a core subject of university education, specific composition courses, particularly the first-year composition course, which remain a staple in US universities and colleges, began to appear in the late nineteenth century (Matsuda, 2006). Composition studies, as the name suggests, were and are preponderantly concerned with the act of writing and written texts, usually within the academic context. Matsuda directly accuses compositional studies as a thinly-veiled attempt at "'containing' language differences and sealing them off from the rest of U.S. higher education" (2006, p.638). Initially, this attempt at containment was directed towards students who were native speakers of non-dominant or unprivileged versions of English, as well as non-native English speakers, and was significantly influenced by racist attitudes within American society (Matsuda, 2006). Given that the roots of this approach are traced to the nineteenth century, it is impossible to ignore that this policy was intentionally meant to exclude African-American and other racial minority students from US higher education, meaning the containment was "ethnic as well as linguistic" (Matsuda, 2006, p.643).

However, as the numbers of ELL students increased in the United States, linguistic differences gradually became the primary focus of this policy of containment; the use of composition courses as university gatekeepers was naturally extended to the linguistic containment of ELL students as non-native English speakers (Matsuda, 2006). While ELL students are not necessarily always ethnic minorities in US universities, they are, by definition, linguistic minorities. This extension to international and general ELL student populations may not have been a conscious or intentional process in every case, but must nonetheless be considered within the context of American racism.

Over time, the specific process of this containment became more precise through the creation of specific ELL composition courses and programs. This took the form of either separate ELL composition courses and sequences that parallel "mainstream" (read, native speaker) composition courses, or ELL composition courses which must be completed before ELL students can enter "mainstream" composition courses (Matsuda, 2006, p.642). Thus, even within composition, a field arguably designed for the purpose of linguistic containment, a second layer of linguistic containment for ELL students was created. This double layer of containment, behind which ELL students and their linguistic variations are placed, codifies a "widespread tendency to separate second language composition from "regular" composition" (Shuck, 2006, p.61).

Clearly, the composition and the historical approaches overlap significantly. One could say that the theoretical attitudes which developed through and out of the historical approach have been practically applied and enforced through the composition approach. It was precisely because of the historical approach's attitude towards language use and prestige that ELL education was relegated to a sub-field of composition studies. The policy of linguistic containment becomes even more pronounced when one realizes that composition programs, within which ELL programs are often nested, are often themselves contained within English departments, as described by Shuck (2006), rather than global language or linguistics departments. This localization confirms that the goal of the composition approach is to isolate linguistic variation, not to simply "help students become 'better writers'" (Matsuda, 2006, p.640). Furthermore, this isolation is most pronounced for ELL students.

The Linguistic Approach

The third and final approach to be examined in this chapter is the linguistic approach, which is rooted in the linguistic study of language form and function. While linguistics is a wide and varied area of study, its connection to ELL is through the fields of Second Language Acquisition (SLA) and Applied Linguistics. US attention to ELL and second language (L2) writing topics increased within linguistics alongside the development of composition studies in the second half of the twentieth century (Silva & Leki, 2004), as result of the already discussed increase in ELL students in US universities. However, where the composition approach looks at written language use from a more prescriptivist perspective, applied linguistics addresses L2 writing from a more descriptive perspective; where "Applied linguistics' ontology has been primarily realist…Composition studies' ontology is predominantly relativist" (Silva & Leki, 2004, p.7). In other words, the linguistic approach to ELL is concerned more with describing how writing in English is accomplished by ELL students, and what processes and patterns can be observed therein, with the aim of "fact finding" (Silva & Leki, 2004, p.7). This descriptivist perspective is also possible because "Applied linguistics is international and multicultural in scope" (Silva & Leki, 2004, p.7). This in turn leads to its practitioners forming "a slightly more diverse population" (Silva & Leki, 2004, p.7). The various ways in which this perspective is applied in the classroom focus on helping ELL students recognize the differences and similarities between their L1 rhetorical processes, both cultural and linguistic, and those of English (Silva & Leki, 2004).

Ultimately, the division of ELL education into these three approaches, historical, composition, and linguistic, is not meant to be an exhaustive array into which every method of teaching ELL will fit perfectly. The pedagogical methods of every instructor are inherently individual and regardless of where ELL is programmatically situated within a university, it is likely that aspects of all three approaches have been implemented and incorporated. However, the author of this chapter believes that identifying these three general approaches to ELL education presents a beneficial and productive method for discussing and evaluating the strengths and weaknesses of the current state of ELL as a whole within US university-level education. All three approaches present unique challenges which must be considered as the globalizing trends of the twenty-first century change the nature of university classrooms and student populations.

DISCUSSION OF THE WEAKNESSES OF THE THREE APPROACHES

Each of the three approaches contains important lessons for anyone seeking to teach ELL at the university level in the US, but none is without problems. This section of the chapter will identify the usable lessons from each approach, as well as the places and areas where each approach is problematic, inaccurate, or otherwise detrimental.

Assumptions of Language Use

Beginning with the historical approach, the priority this approach places upon English as the language of instruction in US universities could be viewed as a necessary pedagogical choice, given that students and instructors must be able to communicate effectively with one another. Instructors necessarily create generalized views of their students in order to teach. However, as Matsuda clearly delineates, “An image of students becomes problematic when it inaccurately represents the actual student population in the classroom to the extent that it inhibits the teacher’s ability to recognize and address the presence of differences” (2006, p.639). The problematic image here is “the assumption that students are by default native speakers of a privileged variety of English from the United States” (Matsuda, 2006, p.639). This simply is not true. Even among native English-speaking students from the US, a variety of English is spoken.

The problems within the perspective of the historical approach are further evidenced within the composition approach’s common implementation of the historical approach’s erroneous perspective. Language issues, such as variation between varieties of English, are infrequently mentioned, and often “language issues beyond simple ‘grammar’ correction are not addressed extensively” (Matsuda, 2006, p.640). Silva notes that despite clear evidence that ELL writers faced significant struggles in both areas, ELL research is “more focused on rhetorical (discourse level) than on linguistic (sentence level and below) features” (Silva, 1993, p.659, 668). Again, these pedagogical implementations presume an already existing knowledge of English, especially within the academic register of language use, with error correction receiving primary focus, rather than initial language instruction.

These implementations also presume an already existing knowledge of American academic standards and expectations, which can be dramatically different from those ELL students are familiar with. For example, it has been observed that students from East Asian countries, such as Japan, China, and Korea, often display a reluctance to speak in class, which can negatively impact their success in American university classrooms, where verbal participation, discussion, and question-asking frequently forms a critical part of instruction (Lee, 2011; Hegarty, 2014). Such students instead tend to respond to an instructor’s questions nonverbally, as speaking up could cause potential embarrassment for the student or be construed as a challenge to the authority of the instructor, which would violate cultural standards of classroom behavior for these students (Lee, 2011). Of course, other individual factors also come to bear in student participation, but different cultural expectations still exert a powerful influence on the success of students from other backgrounds in US universities (Shao & Gao, 2016). However, under the historical approach, these issues were ignored and dismissed under the blanket assumption of international students being familiar with both the English language and American instructional expectations. And while the once relatively small presence of ELL students in US universities allowed that perspective to endure in the nineteenth century, the significant increase of ELL students enrolled in higher education within the past two decades means the underlying assumption of this approach must be readdressed.

Non-International ELL Students

The assumption of uniform student English use is further challenged by the growing presence of ELL students who are not international students, but rather American citizens or residents. It was noted in 2006 that “The foreign-born population in the United States tripled over the past thirty years” (Preto-Bay & Hansen, 2006, p.39). This immigration boom has impacted potential student demographics. To illustrate, Preto-Bay and Hansen quote a study on US residents aged five to twenty-four, which found that “between 1979 and 1999, the number who spoke a language other than English at home increased... by 118%” (2006, p.38). Matsuda estimates that between 150,000 to 225,000 ELL students graduate from US high schools every year, but notes these numbers “do not include an overwhelmingly large number of functional bilinguals” (2006, p.641). In their 2010 survey of post-secondary instructors, Johnson and

Parrish found that in Minnesota alone, "nearly 60% of the survey respondents... reported that at least 25% of their students were ESL students" (p.619). This study not only surveyed college and university instructors, but also Adult Basic Education (ABE) instructors operating at the post-secondary level (Johnson & Parrish, 2010). The implication here is that, particularly at the ABE level, many of those identified ELL students would be US residents, not international students. At Boise State University, in Idaho, an area of the US often similarly assumed to be primarily monolingual, Shuck estimates that:

approximately 7.5% of the student population...consider a language other than English to be their native language. About three hundred are traditional, student-visa-holding international students. The other thousand-plus are immigrants, refugees, and other nonnative English-Speaking residents and citizens (2006, p.60).

These differences in background within ELL student populations clash with old assumptions of uniformity in ways that must be acknowledged and given proper attention by US universities. Because, "traditionally, international students have been defined as students attending classes on a student or exchange visa" (Preto-Bay & Hansen, 2006, p.38), students who already reside within the US and do not come to university on a visa are not visible to those institutions in the same way. Many even attended primary or secondary school in the US (Preto-Bay & Hansen, 2006), which only further obfuscates their ELL status as incoming students. At the institutional level, many universities do not even collect data or track these students, making them "anonymous on the college and university campus" (Ortmeier-Hooper, 2008, p.390).

To wholly attribute this anonymity to institutional oversight would be inaccurate, though. Many of these students actively avoid or even reject being labelled ELL for their own reasons. As a descriptor, the terms ESL and ELL imply that a student is "a novice in the English language" (Ortmeier-Hooper, 2008, p.390). But given a population containing many students who have been in the US for years, attending school, possibly working, and otherwise using English on a regular basis, this designation is not accurate. Some of these students even find it offensive, as they believe it ignores their identities as long-term English users (Ortmeier-Hooper, 2008). The result is a growing population of students within existing ELL populations who challenge both US universities' efforts to contain the linguistic variation of these students and the underlying "monolingualist view of a linguistic and social order" (Shuck, 2006, p.59).

Assumptions of Academic Literacy

While data on the scope of the demographic differences within ELL students as a whole may be lacking, there is emerging research on the specific differences. An important one is academic background and educational experience, i.e., academic literacy. This term encompasses questions of how much education or schooling the student has experienced, to what degree, and in what cultural setting. The historical approach's traditionalist view of an ELL visa-bearing student is someone "who is thoroughly familiar with academic literacy practices in his or her native culture and who identifies primarily with his or her country of origin" (Shuck, 2006, p.60). The presumption is that this student knows how to be a good student and only simply needs to improve his/her grasp of English in order to apply those same academic literacies successfully in the United States.

This assumption of background does not apply to many students within this population. Instead, these students often come from backgrounds of limited or partial education, a variety of socioeconomic situations, and usually their lives have been marked by war and destruction, forcing them to become refugees (Preto-Bay & Hansen, 2008). What is more likely is that such students have a range of educational and linguistic experiences. For example, Ortmeier-Hooper details the situation of a Serbian student who began attending school as a child in Croatia, spoke Serbo-Croatian at home, and began learning English at age ten, but the 1990s Balkan conflict eventually forced him to flee to Serbia, before coming to the US as a refugee at the age of seventeen, where he completed high school (Ortmeier-Hooper, 2008). This case study perfectly illustrates the range of educational and linguistic experiences present in this population of ELL students who are not traditional international students.

These personal experiences inform students' perceptions of the role, value, and organization of pedagogical relationships, leading to expectations and individual approaches to learning which may or may not align with those they actually encounter. Just as a lack of academic literacy can be an obstacle to learning, so too can different academic literacies impede student achievement and success. In the case of the aforementioned Serbian student, he found the revision of and reflection on previously completed work, which his composition course assignments frequently required him to perform, "pointless" (Ortmeier-Hooper, 2008, p.400). Being more used to "an academic tradition that was more of straight transmission of knowledge" (Ortmeier-Hooper, 2008, p.401), the revision process seemed to only highlight his failures and shortcomings, causing him to be "increasingly indifferent to his writing" (Ortmeier-Hooper, 2008, p.400). After interviewing him, Ortmeier-Hooper observes that he "seemed to equate revision with a sense of embarrassment and powerlessness...[and] his experiences with the war" (2008, p.401). While little elaboration on that equation is given, this student's case still presents valuable insights into how a student's background and experiences can profoundly affect their academic performance.

This student's case is contrasted within the same study with that of a student from Russia who, while both students refused to identify themselves as ELL, was much more successful in the same course than his Serbian peer (Ortmeier-Hooper, 2008). The salient difference seems to be that the Russian student emigrated to the US at a much younger age and completed primary and secondary education within the US educational system, causing him to be "more aware of the rhetorical situation" of his university composition course (Ortmeier-Hooper, 2008, p.403, 405). In other words, where his different academic literacies and experiences caused the Serbian student to struggle, greater experience with US educational formats and literacies helped the Russian student to succeed. Neither student, however, considered himself an ELL student or in need of specific ELL support. Both rejected the "outsider image" associated with an ELL-marked institutional identity (Ortmeier-Hooper, 2008, p.392-393).

Given the intensely personal and individual factors which students bring with them into the classroom, it is imperative that instructors take these backgrounds into consideration. While perhaps in the early days of the historical approach, assuming monocultural backgrounds was more or less reasonable, today this is no longer true. The evidence is overwhelming that increasing numbers of ELL students come to university from a wide variety of linguistic, cultural, and academic backgrounds with a corresponding diversity of language-related needs. It is likewise becoming increasingly untenable to hold the dated perspective that "L2 writers' language differences are expected to disappear after they complete the ESL courses" (Shuck, 2006, p.63). The mounting challenges faced by universities to properly identify the types of students within their ELL populations, and in turn their educational needs, are directly reflected in the formulation of ELL programs to address and serve those needs and students. Through examining the historical and composition approaches to ELL, crucial problems and shortcomings of the programs generated by these approaches become clear.

Linguistic Segregation

As previously described, established approaches to ELL have often placed ELL courses and support within specific ELL courses and sequences located as preparatory coursework to be completed before being mainstreamed into courses with native English speakers. However, the placement of such programs and courses outside of the regular coursework sequences reinforces the negative view of ELL students as outsiders and intellectually deficient, through the construction of an asymmetric binary between "'remedial'...[and] legitimate academic work" (Shuck, 2006, p.62). The implication of academic deficiency is not surreptitious either, and is often keenly recognized by a population that is already cognizant of the cultural, linguistic, and social divides between themselves and native English speakers. Another student in Ortmeier-Hooper's case study described ELL programs as "'very isolating', [and] she was very aware of the liability that was involved with that label" (2008, p.408). LaBelle's 2007 case study also details how ethnic prejudice, based upon accent and language proficiency, impacted the social and language-learning experiences of several ELL participants who well-understood that they were "an easy target for discrimination and finger pointing" (Labelle, 2007, p.16). A more recent study showed, in a clear extension of the racist trends established by the historical approach, that native-English-speaking, American students still view heavily accented English as a sign of lower intelligence, whereas they view ELL students with "mild accents as more intelligent, more educated, and even expressed more interest in engaging in social interactions with [them]" (Wang, Ahn, Kim, & Lin-Siegler, 2017, p.569). Whether intentional or not, the effective segregation of ELL students into separate courses and classrooms could be accused of discriminating against non-native English speakers in the US.

This discrimination has obvious consequences for the success of ELL students at US universities. ELL students identify this prejudice as one of the leading obstacles to their communication with domestic students (Wang et al., 2017). It also negatively affects "belongingness", used here to refer to "students' sense of connection with their college, degree of social support, and experience of academic challenge and support" (Glass & Westmont, 2014, p.108). Belongingness serves as a predictor of academic success for both domestic and international students, as well as a "protective factor" which can offset the effects of negative social and academic experiences in university (Glass & Westmont, 2014, p.115). Glass and Westmont found that "the perception that their institution honored diversity had the largest effect on sense of belongingness for both domestic and international students" (2014, p.116). This echoes prior findings in which ELL students self-identified their university's willingness to accept them as an influential factor in their educational achievement (Sherry, Thomas, & Chui, 2010). Therefore, by segregating ELL students from domestic students and relegating them to separate courses, universities potentially devalue the inherent diversity of ELL students', in turn damaging their sense of belongingness and undermining their academic success.

Still, it is an oversimplification to purely dismiss the creation of specific, targeted ELL courses and sequences as segregationist and unnecessary. While their origins may be caught up in exclusionary policies of linguistic containment, they nonetheless perform a necessary and vital task by supporting ELL students in their pursuit of higher education. It cannot be ignored that for both successfully completing a university education and successfully competing in the professional job market in the US, "adequate English skills are essential" (Mathews-Aydinli, 2008, p.199). For any student, regardless of linguistic experience or background, meeting the expectations and challenges of higher education requires "further support in academic English and in their transition and adaptation to postsecondary academic culture" (Preto-Bay & Hansen, 2006, p.49).

To state it simply, ELL education fills a very real need. Knoblock and Gorman succinctly characterize the position of ELL research on sheltered placement, the creation and use of classes specifically designated only for ELL students, as "almost unanimously considered beneficial" (2018, p.278). The sheltered placement model gives instructors the ability to focus upon the specific challenges faced by ELL students in an environment which fosters "higher engagement and motivation" (Knoblock & Gorman, 2018, p.278). In contrast, the mainstreaming model causes significant and detrimental setbacks for ELL students, resulting in lower scores and higher withdrawal rates (Knoblock & Gorman, 2018). In this light, the issue appears not to be acknowledging that ELL language issues are unique, but in the unfounded view that the learning and instruction required to respond to those issues is illegitimate and non-academic, which unfortunately often accompanies such acknowledgement.

Further issues with the creation of separate ELL programs arise in examining how such coursework is accredited and represented on the transcripts of ELL students. Some universities already do offer credit to ELL students for completing ELL course, such as the program described by Shuck in 2006, and Matsuda is careful to note that credit-bearing courses have been instituted in various universities since 1954 (2006). By making ELL course credit-bearing, the asymmetrical treatment of ELL courses is addressed by at least recognizing them as legitimate acts of learning and education at the university level. Unfortunately, this is not the case within every US university, and often ELL classes do not award any credit to students upon successful completion (Matsuda, 2006). By not recognizing the successful completion of these classes, universities abet the perception that such coursework is illegitimate or even non-academic.

Institutional Neglect of ELL Programs and Faculty

Nonetheless, the separation and placement of ELL programs outside of mainstream coursework and programs means weighty repercussions for how those programs are formulated and taught from a faculty standpoint. A policy of linguistic containment and isolation towards ELL students often similarly isolates and neglects the instructors who teach them. Silva and Leki observe that composition instructors:

must often struggle for recognition and resources [as they battle] administrative duties in massive first-year writing programs, in writing centers, in ESL support programs, and in writing across the curriculum initiatives, all of which require large amounts of time and effort and can have adverse effects on composition faculty member's teaching and research. (2004, p.9)

They further extend this burden to those instructing under the linguistic approach to ELL, stating that instructors in both approaches "spend much of their time and effort, in one way or another, supporting the work of the dominant faculty group in their academic unit" (Silva & Leki, 2004, p.10). This represents an enormous strain upon the time and ability of these instructors to devote time and attention to their students. As a result, in order for the necessary pedagogical work to be performed, universities often further neglect such programs by relying too much on instructors who are "undertrained and transient" (Preto-Bay & Hansen, 2006, p.41). This results in instructors who "may, consequently, have an even greater lack of knowledge of how to address issues of linguistic and cultural diversity in their classrooms" (Preto-Bay & Hansen, 2006, p.45).

While these overall accusations of institutional relegation and neglect can be broadly applied to composition and applied linguistics faculty in general, they are just as applicable to the faculty of ELL programs. Moreover, the effects of this relegation and neglect are only more acute for those ELL faculty teaching in sub-programs contained within composition and linguistics programs, who must suffer from that further subordination. Shuck provides an emblematic example of a composition department with "'one overworked, underpaid adjunct' (as my department chair describes her) who had been teaching the entire ESL sequence" (2006, p.63). More than a decade later, Knoblock and Gorman lament that often ELL "instructors receive merely sporadic, isolated training a few weeks before the semester starts" (2018, p.279). Clearly, this is a persistent problem.

The consequences of instructors with limited multilingual and multicultural understanding, experience, or training in an ELL setting are obvious. Evidence for the consequential diminished ability of such instructors to effectively teach ELL students is found in an Australian case study of 31 ELL teachers, examining perceptions and knowledge of linguistic factors between multilingual and monolingual teachers regarding their pedagogical approaches to ELL (Ellis, 2004). This study found that even with ELL teaching experience, monolingual teachers had "only limited personal experience of their own [language] learning strategies, and had very little experience of successful application of [language] learning strategies" (Ellis, 2004, p.101). Monolingual teachers also struggled to view features of English vis-a-vis other languages (Ellis, 2004), the perspective through which all their students undoubtedly approached English. Furthermore, monolingual teachers held "apparent beliefs that language learning is difficult and traumatic…[leading them] to over-emphasize the difficulties and underplay the prospect of success" (Ellis, 2004, p.104). Ultimately, Ellis concludes that ELL possesses "the paradox that some teachers are preparing students for multilinguality without having a very clear idea of what it is and what it might be like to achieve it" (2004, p.104). Even more alarming, "This is at present, not treated as a concern in the profession...Nor is this paradox given much consideration in the ELT literature" (Ellis, 2004, p.105). This paradox is not unique to Australian universities, but can similarly applied to US universities, where the composition programs which often house ELL programs are similarly monolingual (Silva & Leki, 2004; Preto-Bay & Hansen, 2006). Clearly, little has been done to address this dangerous and dismissive trend. This in turn dramatically erodes the quality of the education which ELL students receive. By treating ELL students and their linguistic challenges as "deficient" and "illegitimate", the programs and instructors intended to address those linguistic challenges fall prey to being viewed as likewise "illegitimate".

Given such issues within the classroom, it should be no surprise that ELL students must sometimes venture beyond the classroom for support. Support options often include writing centers, which provide focused tutoring services in various writing skills in support of coursework and assignments (Shuck, 2006; Knoblock & Gorman, 2018). Knoblock and Gorman recognize the efforts of their university's Writing Center, saying that "Writing Centers' staff have been at the forefront of promoting greater acceptance of multilingualism" (2018, p.279). The usual one-on-one nature of the help offered by such programs can indeed offer its practitioners more detailed perspectives on the challenges facing ELL students and be of great use in resisting policies of linguistic containment. Such tutoring services are only designed to work in support of course instruction, however, and cannot be expected to shoulder the primary responsibility of addressing ELL issues at university-wide levels. Furthermore, such tutoring programs often rely upon student tutors, as is the case at the author of this chapter's university, which limits the support these programs can offer, assuming ELL students use them in the first place. Unfortunately, the availability of support resources often depends on ELL students' preexisting language ability, and they cannot effectively access these resources "Unless these students were nearly native-like in their English proficiency, were highly capable of navigating the system, or both" (Shuck, 2006, p.65). Issues of language proficiency, cultural and academic expectations and awareness, and other personal factors often prevent ELL students from taking advantage of such available support, “in some cases because the student does not know such services exist” (Knoblock & Gorman, 2018, p.279). As a result, while the existence of ELL support services outside the classroom is important, reliance upon it in any capacity other than as secondary support of instructed coursework is impossible.

Lack of Focus on Linguistic Issues

To further examine the linguistic approach, one finds that while it tends to avoid the “error analysis” focus of the composition approach, and instead utilizes a perspective on ELL education which “centers on contrastive rhetoric – that is, on the notion that writers’ different cultural and linguistic backgrounds influence the structure of arrangement of their L2 texts” (Silva & Leki, 2004, p.5), it still suffers from a lack of coordinated scholarship and application efforts. The linguistic approach has an inherently more multicultural and multilingual view, which might lend itself to avoiding viewing ELL students and issues as “deficient.” But the breadth of this perspective is also a limitation, as in order to make research and study of such a large field doable, practitioners of the linguistic approach are forced to “focus on miniscule features of L2 writing...[resulting in] a microscopic view in great detail but without a clear sense of how this view fits into the broader fabric of L2 writing issues” (Silva & Leki, 2004, p.7). In an earlier publication, Silva touches upon this issue, noting that “There exists, at present, no coherent, comprehensive theory of L2 writing” (Silva, 1993, p.668). Without guiding overall theories to situate specific scholarship and pedagogical efforts, the potential benefits of the linguistic approach on ELL education may be limited.

These limitations both of past research and future applications within the linguistic approach may also be due, at least in part, to the issues of institutional neglect which also plague the composition approach. As previously mentioned, applied linguists, as well as composition instructors, are often subordinated beneath the efforts of “the dominant faculty group in their academic unit” (Silva & Leki, 2004, p.10). This subordination often takes the form of time- and labor-intensive administrative duties and teaching loads (Silva & Leki, 2004). Shuck details the situation at her own institution, in which the single adjunct who taught all ELL courses was also saddled with intense assessment responsibilities for incoming ELL students (2006). This treatment of the practitioners of the linguistic and composition approaches can be summed up as making both groups “victims of marginalization, neglect, and exploitation within the academy” (Silva & Leki, 2004, p.9). This treatment negatively affects the ability of instructors to teach effectively and further the research of their fields, further limiting the efficacy of the linguistic and composition approaches.

SOLUTIONS AND RECOMMENDATIONS

At this point, it is clear that traditional and current approaches to ELL education in US universities are in desperate need of revision. With increasing ELL students in US universities, these institutions, their administrations, and their faculty must address the inconsistencies between what ELL students are expected to accomplish and the systematic neglect of their needs and challenges. Of the three approaches identified in this chapter, each suffers from either problematic origins or inadequate and poorly executed implementation, or both. While the development of a wholly new approach to ELL, pragmatically rooted in the needs of ELL students and purposefully and attentively implemented would be the optimal solution, to expect such broad and sweeping changes is unrealistic, given the size and inertia of US academia. Nonetheless, the author believes it is productive to consider what such an approach would look like and, by doing so, generate a theoretical model and set of guiding priorities for the future structuring and implementation of ELL education, in order to resolve, at least in part, the already identified problems within the current approaches to ELL.

ELL as "Non-Deficient"

First and foremost, it is of paramount importance to change the view of ELL issues and ELL students as deficient. In its place, the new perspective must be enforced "that while L2 writers are different, they are not deficient" (Knoblock & Gorman, 2018, p.279). The distinction between "different" and "deficient" is crucial. To ignore the challenges faced by ELL students studying, working, and living in an English-dominant environment would be to further neglect and ignore them. These challenges must be acknowledged and addressed. Facing these challenges, however, does not mean ELL students are less intelligent, less capable, or less able to succeed at university. The learning and academic success of ELL students is directly impeded by the assumption that ELL students are "not educated because they could not speak English without an accent" (LaBelle, 2007, p.16). If the goal of universities is to facilitate education, such assumptions must be dispelled. The goal of ELL should not be to contain or remove linguistic differences, but instead to enable students to overcome any obstacles those differences might pose to their learning. Universities ought not to view ELL education as a luxury or supplement to other academic pursuits, but rather as necessary and vital to an important portion of their students taking part in those academic pursuits. Only through this revision of perspective can ELL issues and ELL education be approached from an accurate and productive perspective.

This revision of perspective inherently requires the abandonment of monolingualism as a desirable goal. Building proficiency with English language skills remains of crucial importance, but in the context of an ELL university classroom, monolingualism is impossible, as ELL students are inherently multilingual; otherwise they would not be present in an ELL class. The historic approach's tacit goal of erasing linguistic differences within student populations also implies a necessary erasure of the identities and backgrounds of those students. Instead, ELL education and instructors should enhance the multilingualism of ELL students by improving and developing their English abilities. The difference in perspective may seem subtle here, but taking this additive approach, as opposed to the former subtractive approach, is a crucial step in revising institutional approaches to ELL at the most basic level. True progress requires a foundational reevaluation of the philosophic lens through which ELL education is viewed, in order to "foster a culture in which multilingualism is not perceived as a deficit" (Shuck, 2006, p.68).

Identifying ELL Students

While assumptions of monolingual and monocultural students may have once been accurate in US universities, increasing globalization makes multilingualism a distinct advantage for students, instead of a deficiency requiring containment as it was once considered. This broader, critical clash between outdated views of what a university student is or should be and the reality of today's students is duplicated within the microcosm of ELL education. Preto-Bay and Hansen assert the need to acknowledge these shifting demographics, stating "we must now turn our attention to the needs of a broader population of linguistically and culturally diverse students" (2006, p.38). ELL practitioners must consider the growing population of ELL students from more varied backgrounds, including immigrants and refugees, who have equally varied experiences with English and education.

To this end, some have considered whether or not new descriptors are needed for this unique and diverse population of students. The labels ESL and ELL, while obviously descriptive of the linguistic challenges faced by students to whom these labels are applied, often prove problematic for them, being "fraught with all kinds of complications" (Ortmeier-Hooper, 2008, p.390). At the author of this chapter's university, the term "New Americans" is sometimes used to describe this student population, referring to their status as US citizens or residents. An advantage of this is that it positively implies belonging, which makes it a more inclusive term. However, "New Americans" implies some familiarity with US educational environments and expectations, and even the English language, which may or may not be accurate in every case; "new" is still an overly broad adjective. Some scholars also note that the term "multicultural" has been used for some time "to describe United States-born students of non-Caucasian background who have received their formal education in the K-12 public education system in this country" (Preto-Bay & Hansen, 2006, p.38). This descriptor could conceivably be extended to New American populations, since it accounts for their different cultural backgrounds, as well as their frequent experiences with US pre-tertiary education. However, the "multicultural" descriptor does not necessarily reflect the variations in linguistic background or experience with US academic environments and customs, two crucial variables in ELL student backgrounds. Ortmeier-Hooper discusses the term "Generation 1.5" as a potential descriptor for this population, in reference to their partial experience with US pre-tertiary education (2008, p.390). This term also connects with common descriptors of immigrants and their families as "first", "second", and "third" generation, according to how recently their family arrived in the US, which could reflect some aspects of student's identity more or less accurately. Still, the allusion to generational differences could be confused with belonging to a specific, preexisting generation of US society. Given the diverse and intensely unique nature of ELL student backgrounds, finding a term to encompass the important aspects of their identities is a difficult task.

Some might question the importance of recognizing and acknowledging student identities at all. In response, one must remember that, between writers and audiences, "the very act of writing...[is] a political act of representation" (Casanave, 2003, p.96). Particularly in the university education, "written artifacts are political documents in the sense that they are produced in power-infused settings such as classrooms… and are used to further political as well as intellectual and instructional agendas" (Casanave, 2003, p.87). On top of the basic power dynamic between student and instructor, within ELL classrooms one must also account for "the language power play [which inherently] tilts in favor of the native speaker" (LaBelle, 2007, p.16). In this case, this is usually the ELL instructor. Classroom performance, especially in the context of communication and writing is a way for students to "define and often 'perform' themselves within the context of the university and their peers" (Ortmeier-Hooper, 2008, p.392). This becomes especially crucial for ELL students who bring complex and unique social, cultural, and linguistic identities to the classroom. As a result, ELL instructors have a tremendous responsibility to be mindful of their position of social, linguistic, intellectual, and even political power, especially in either negating or validating the representations of identity created by their students. How an instructor wields this power can significantly affect (positively or negatively) the motivation, achievement, and success of their students (Ortmeier-Hooper, 2008). Intrinsic to this responsibility is acknowledgement that labels and descriptors are "inherently social,…[but] also insidiously political in that the recipients of labeled identities tend to be the less powerful interactants" (Casanave, 2003, p.89). This is particularly true for ELL students. Whether attending university in the US on student visas or as recent immigrants to the US, the politics of that attendance and their status as ELL students is often quite clear, and instructors should equally be cognizant of identity politics, which is inextricably fundamental to the nature of ELL education.

To that end, this chapter summarily proposes using the term "multilingual students" to refer to ELL students. This term has advantages and limitations vis-à-vis others. However, by proposing this term, the author of this chapter merely intends to contribute positively to the label debate and still prompt further ongoing discussion. Firstly, "multilingual" highlights the linguistic nature of ELL student identity, acknowledging positively that these students have some proficiency with more than one language. Where bilingual limits the proficiency to only two languages, which is often accurate, multilingual extends its application to students with a knowledge of more than two languages, which is also often accurate. Here, multilingual has the advantage over ESL, as English may in fact be a student's third, fourth, or even fifth language. Furthermore, multilingual acknowledges a student's linguistic identity without focusing exclusively on their limited English proficiency, thereby avoiding the remedial or deficient connotations of ESL. It also suggests the different cultural backgrounds of these students, albeit not as closely as the term "multicultural", while still avoiding the limitations of "multicultural". Similarly, "multilingual" implies prior learning, at least partially, in other languages. While it does not reflect the variations in academic and sociopolitical backgrounds as closely as "New Americans", the implication of prior learning can allude to education within other countries and cultural settings. This in turn further implies that students to whom the term is applied possess full intellectual and educational capabilities. Overall, "multilingual" better emphasizes the positive aspects of ELL student identities, while still focusing on their challenges. Ultimately creating a more accurate and inclusive descriptor for ELL students will support the revision of perspective away from monolinguist containment towards the desirable view of multilingualism.

Improving Curricular Approaches to ELL

Once this new perspective has been established, a much more pragmatic approach to ELL is possible, one which can even be used to critique and improve university composition and communication education in general and ELL education in particular. In addition to revising labels and instructors' pedagogical philosophies, ELL course and curriculum design must be revised. It is the opinion of the author of this chapter that these needs outweigh the problematic origins and use of such separate education in pursuit of goals of linguistic containment. Revisions of institutional and instructor perspectives will help remedy those problems, even within sheltered classes and programs. Nonetheless, more can be done to address these issues even within sheltered placement ELL education.

Towards further improvement of ELL courses and curriculum, this chapter proposes the addition of multicultural and multilingual courses alongside sheltered courses, in which ELL students and native English-speaking students learn, work, and interact alongside one another. Shuck terms this "cross-cultural", which highlights the combination of student backgrounds within such courses and will be used in this chapter (2006, p.69).

The benefits of such courses for improving ELL education are many. To begin with, they directly challenge linguistic containment policy by bringing different languages and multiple versions of English into contact with one another. As already well-established, such linguistic diversity is already present in US universities. Therefore, in order to change the monolingual perspective frequently also present in US universities, the existing linguistic diversity should be highlighted within the classroom. Because of the cross-cultural courses' explicit acknowledgement of the linguistic differences within the classroom, hopefully they would provide for ELL students "a nonthreatening environment" (Shuck, 2006, p.69). The presence of native English-speaking students would also provide ELL students with increased opportunities to encounter English in academic settings, providing valuable linguistic input in all aspects of academic language use.

In addition to benefiting ELL students, these courses would also benefit native English-speaking students. The recognition of linguistic diversity can potentially benefit speakers of non-standard English dialects by validating, at least in part, their presence in US universities. Cross-cultural courses would also provide "important opportunities for native English speakers to learn about members of other linguistic and cultural backgrounds" (Shuck, 2006, p.69). At its most basic, this constitutes a valuable opportunity to promote greater awareness and inspection by native English speakers of how they themselves use language, as well as to build necessary "intercultural competences [that] are far more than matters surrounding grammar, vocabulary" (Wang et al., 2017, p.570).

Cross-cultural courses could also be powerful means of combating prejudice against non-native speakers of English within universities at a broader level. Initially, they would contribute to the revision of ELL approaches which view ELL students as deficient by "challenging the 'remedial' image [of ELL students]" (Shuck, 2006, p.69). Such courses can correct this view by uniting ELL students with the rest of the student population. This unification can directly combat any implication of intellectual deficiency by validating the status of ELL students as equal participants in the pursuit of a university education. Socially, this in turn could help build a stronger sense of belongingness at university for ELL students, which has been proven to be a predictor of academic success for university students (Glass & Westmont, 2014). Furthermore, "fostering a strong sense of university identity may reduce prejudice against international students for all domestic students, not just those who are most likely to hold negative attitudes" (Quinton, 2019, p.167). Clearly, cross-cultural courses could hold significant benefits for addressing discrimination within university student populations.

The simplest place to create such cross-cultural courses is in the field of composition. Given that the expressed goal of composition is the study of communication, primarily written, usually within an academic context, it follows quite logically that examination and discussion of intercultural and interlinguistic contact and communication comports well. Furthermore, given the increasing likelihood of such future contact and communication in the twenty-first century, this educational focus might even be welcome. This combined focus improves how students conceptually view communication by making their theoretical approaches "more inclusive, more sensitive, and ultimately, more valid" (Silva, 1993, p.669). Preto-Bay and Hansen even argue it should be mandatory, claiming that "Composition teaching focusing on linguistic and cultural acquisition issues...must now become an integral part of all composition teaching" (Preto-Bay & Hansen, 2006, p.50). What better way to address these burgeoning educational needs than with cross-cultural classes which facilitate linguistic and cultural acquisition through their very existence? Similarly, one could see the educational potential for global languages, intercultural studies, sociology, linguistics, business and marketing, or even anthropology departments and programs to host cross-cultural courses, albeit for more specific and field-related aims. Regardless of the area of knowledge in which they are couched, however, cross-cultural courses could provide significant benefits for all students, especially ELL students. By recognizing and valuing different linguistic backgrounds, substantial progress can be made towards revising past approaches to ELL.

In order for such cross-cultural courses, and indeed all ELL courses, to make significant headway in challenging the deficient view of ELL education, however, these courses must still receive validation and recognition from their institutions by being accepted as credit-bearing and even degree requirement-fulfilling, as both Shuck and Silva recommend in separate publications (Shuck, 2006; Silva, 1993). Without such recognition, the implication is that ELL education is somehow unnecessary or outside the purview of serious academic focus, abetting outdated perspectives of ELL issues as remedial. Conversely, allowing ELL courses to earn credits for ELL students reinforces the perspective that ELL issues are legitimate and worth attention. In short, ELL studies should "receive the same kind of university credit that the study of a foreign language receives" (Shuck, 2006, p.69). This may seem like an obvious statement, but it is beneficial to make this explicit.

Interdisciplinary Approach to ELL

In the same vein, revisions should be made in how university faculty view ELL topics, with a decreased focus on the composition approach and an increased focus on the linguistic approach. As the primary ELL issue is language use and proficiency, albeit in specific academic contexts and environments, more attention must be given to the linguistic aspects of that issue. Composition, specifically the act of academic writing, while obviously connected to the difficulties these students confront in university, is not actually the specific primary challenge facing ELL students; rather, it is knowledge and command of the English language. It is therefore not enough to rely upon, as instructors, "the ranks of English BAs and MAs who have spent most of their academic lives studying literature and literary theory" (Preto-Bay & Hansen, 2006, p.52). A more interdisciplinary approach is required. In order to properly prepare and train instructors to effectively teach ELL, there is a substantial need for "Significant levels of cooperation and collaboration between...composition studies and those in second language studies" (Silva, 1993, p.670). In addition to a comprehensive understanding of composition studies and topics, they must also have a substantial knowledge of linguistic topics, such as "grammar, sociolinguistics, discourse strategies, and language awareness, [adopting]...more knowledge and practices from applied linguistics" (Preto-Bay & Hansen, 2006, p.52). In short, linguistic challenges must be met with linguistic knowledge and solutions. This recommendation is not meant to disparage ELL instructors from compositional or literary backgrounds, but rather to vindicate the Sisyphean task they face as a result of problematic monolingual approaches to ELL. To expect such instructors to effectively help ELL students without an in-depth knowledge of how languages are learned is impossible.

This imperative inclusion of a widened linguistic approach to ELL education brings with it a question of mounting importance: "when enrollments tilt more in the L2 direction, will English departments continue to be the best home for writing programs?" (Preto-Bay & Hansen, 2006, p.52). This question is posed in an examination of composition as a whole, but the concerns raised are even more pressing for ELL education and programing. If writing programs might require relocation of their institutional homes due to the presence of ELL students, then should not the programs designed specifically for ELL students also require the same movement, possibly even more urgently? Perhaps it is time for all US universities to adopt this approach by creating or expanding dedicated ELL departments and programs to give this vital field the prominence and attention it requires.

However, while this approach would free ELL education from the auspices of other fields to be treated as the unique discipline it is, care must be taken to avoid reverting to the old habitual approach of linguistic containment. Close collaboration and connection to other programs, departments, and faculty will be necessary to maintain the "different but not deficient" perspective of ELL students. Cross-cultural courses, which perhaps are even cross-listed between disciplines, departments, and course sequences, could also help maintain those goals. This cooperation and collaboration must extend past intra-institutional efforts, though. Rather than an assortment of campus-specific efforts to address ELL student needs, efforts to build and grow the larger academic community of ELL professionals and scholars must be encouraged, just as cooperation and collaboration within that community must be encouraged.

FUTURE RESEARCH DIRECTIONS

By this point, the need for significant future research on ELL education should be clear. Previous scholarship has recommended that "it might be best for L2 writing to think of itself as a discipline in its own right" (Silva & Leki, 2004, p.10). But, to that end, it has also been previously noted that "There exists, at present, no coherent, comprehensive theory of L2 writing" (Silva, 1993, p.668). Both of these statements can be extended to ELL education as a whole; ELL ought to think of itself of a discipline in its own right, and thus it needs a comprehensive theory for itself. This requires widespread efforts to determine what the scope of university ELL education should be. What common goals are shared across universities, departments, programs, and instructors? What higher level goals are beneficial and productive and which ones are not?

Naturally, the goals of education ought to directly reflect the needs of students. To that end, significant further research must be carried out on university ELL student demographics and backgrounds. Who are ELL students? What specific challenges and issues do they face in pursuing post-secondary education? Where do they come from? What knowledge and experiences do they bring with them? What broad trends can be identified in ELL student demographics? What needs to be done and what can be done to better serve this population? As previously discussed, there is a surprising paucity of information on these areas, especially when it comes to ELL students who are not traditional international students, a growing presence in US university classrooms. More research must be done on this population, particularly regarding how they learn in the post-secondary environment.

Furthermore, this chapter has focused on the myriad individual factors which affect an ELL student's success and performance in university education. Given the diverse and unique nature of such factors, it may be difficult for large scale, quantitative research to accurately collect information on how specifically these factors influence ELL education. This chapter has made use of several case studies highlighting these factors, an approach which should be encouraged for future research. Such qualitative, individualistic, and close-scale studies are particularly able to facilitate identification of such factors. Hopefully, once such factors have been identified, larger-scale research will be more feasible, to determine how applicable such findings are to bigger university ELL populations. By using this two-step process to analyze student demographics, it will be possible to create a detailed, comprehensive, and accurate picture of ELL student needs and issues, based not upon assumptions of background and experience, but the reality of studying at a US university as an ELL student today.

CONCLUSION

If ELL student enrollment trends continue to increase in US universities, the need for effective ELL education will continue to increase as well. Current approaches to ELL, as outlined and discussed in this chapter, suffer from several, broad-level, issues of perspective, which must be revised in order to serve the academic needs of ELL students. Tacit, monolingual policies of linguistic containment, and their implied view of ELL students as academically deficient, must be dispensed with immediately. Instead, universities and their instructors must approach ELL education from a perspective which validates and acknowledges the complex backgrounds and identities of ELL students. Further research and study are also needed to better understand these backgrounds and identities, and how they come to bear in the university classroom. As globalization requires universities and their students to compete on a global stage, these revisions are no longer a question of voluntary optimization but are now imperative.

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KEY TERMS AND DEFINITIONS

Academic Literacy: A person's experience or familiarity with an educational system's standards, expectations, and processes; the ability to "read" an academic situation accurately

Cross-Cultural: Combining or connecting more than one culture with another culture or cultures

Descriptivist: Seeking to describe how language is used realistically

Linguistic Containment: A prescriptivist educational policy which attempts to remove linguistic variation by separating speakers of non-standard language varieties into isolated courses or educational spaces

Monocultural: Related to only one culture

Native Speaker: A speaker of a language, for whom that language is their first or primary language (L1)

Non-Native Speaker: A speaker of a language, for whom that language is not their L1; sometimes called an L2 speaker

Prescriptivist: Seeking to prescribe or dictate a proper form of language or language use

APPENDIX

Application Activities

Discussion Question

Despite entering university as a declared native speaker of a language other than English, with low reading and writing English proficiencies, and being advised to take a specifically-designated ESL Academic Writing course, an ELL student vehemently refuses to enroll in the course. Instead, the student demands to be enrolled in what they call a "regular" Academic Writing course.
Question: Discuss what factors, both in the student's personal background and in the university's course offerings, could be motivating this student's course enrollment demands?

Discussion Question

A university in the US has tasked you with helping create a brand new ESL program to serve the language needs of a growing ELL student population within the school. Previously, the only ELL support offered was through the Writing Tutoring Center on-campus, which is staffed by student volunteers from the English department, under the supervision of a professor who teaches general freshmen composition courses.
Question: How can you utilize the pre-existing resources at this university to help support the generation of your new program? What further resources will need to be created?

Discussion Question

You are an ELL instructor at a US university which possesses a well-established ESL program, through which every incoming international student must take at least two courses on English use in academic settings. However, several professors from various departments in your university have noted the presence of non-native English-speaking students in their upper level classes who struggle to understand and produce the English required by their coursework. These students uniformly claim to have attended high school in the US and are not international students.
Question: Discuss strategies to address this particular population of ELL students and how to adjust the existing ESL program to better serve them. Also, what further information will you need to obtain?

Discussion Question

You are part of a search committee tasked with hiring a new faculty member to teach within your university's ESL program.
Question: What experience and areas of research or study will you look for in potential candidates? What backgrounds will you prioritize in your search?

Discussion Question

You are a newly-hired ELL instructor, with a graduate degree in English literature. In graduate school, you tutored and worked extensively with ELL students, but beyond that have little experience with ELL topics **Question:** What information should you seek out about the ELL populations you will be working with in your new position? What background about the program and its approach to ESL education do you need to know? What areas of study, beyond English literature, would it be helpful for you to acquaint yourself with before you begin teaching?

Chapter 15

Simulation in Adult Learning:
Across the Disciplines of Engineering, Business, and Healthcare

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ABSTRACT

This chapter discusses the use of simulation in higher education, particularly in the engineering, business, and health care disciplines. The authors have identified three simulation types in terms of learning outcomes: single skill building, role play or skill building in a simple context, and comprehensive scenario-based simulation. The history and the application of simulation to build a single skill, for role play, and for comprehensive skills learning and practice is explored. It is observed that simulation is beneficial to student learning in all disciplines. However, business and health care appear to use simulation more extensively, especially scenario-based. Both business and health care employ simulation for behavioral training. In conclusion, simulation tends to appeal to students of the new generation Z, who value the experience of doing.

INTRODUCTION

Simulation is the imitation of a situation or process (Definition of simulation, 2019). The question of "why use simulation pedagogy" in higher education is based on the characteristics of today's student body and two education models. Students in higher education today or in the near future are either mil-

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lennials or Gen Z, who in nature are in favor of learning through simulation, as will be discussed in the next few paragraphs. The first education model is the development of the Learning Pyramid below in Figure 1 (Center for Excellence in Teaching Learning and Assessment, 2015) which shows the retention rate of each teaching style. The second education model is the modified Bloom's taxonomy (Letrud & Hernes, 2016), which defines six levels of education objectives. The benefit of simulation is stated later in the framework of those two education models.

Millennials are those born between 1980 and 1996. Generation Z are those born in 1992 or later. An easy frame of reference is that if these students do not remember 9-11, they are Gen Z. Generation Z are beginning to dominate college classes in the decade of 2012. Students in this generation want to laugh and have fun, learn something new and escape from everyday life. Generation Z does not have a fascination for technology, they expect it. Z's begin using tablets and cell phones in their strollers. Compared to millennials, they are more hands on and want to be involved in making a better world. They are more global and more diverse. They value experiences more than material things. Given their desire to be involved overall, traditional pedagogy of lecture is not appropriate nor embraced. Simulations, especially scenarios in which they can be involved in making decisions and experiencing the outcomes are likely to be successful with Gen Z.

The Learning pyramid, as illustrated in Figure 1, shows that passive learning (i.e. lecture, reading, audio visual, and even demonstration) has lower knowledge retention rate. More active learning has significantly higher knowledge retention rate which is illustrated in the three pedagogies in the lower part of the pyramid (doing a dramatic presentation, simulating the real experience, and doing the real thing). Learning through simulation, as will be discussed later in each different discipline, targets mostly the active learning zone, or the higher-retention-rate categories in the passive learning zone.

Taking the generational discussion one step further, it is important to remember that the student body of today is different from that of 30 years ago. Professors have an average age of over 50, attending college thirty years earlier than their students. Table 1 below notes some significant differences in the profiles of the student body of 1970 as compared to that of 1999. A large proportion of the student body today are non-traditional, attending college part time, and having dependents. Eighty percent of the student body is employed and nearly 40% are over 25. Simulation, as a nontraditional pedagogy, appeals to the student body of today.

The modified Bloom's taxonomy (see the left side of Figure 2) defines six levels of education objectives in the order of low to high: remember, understand, apply, analyze, evaluate, create. Generally speaking, higher levels objectives are more challenging for students, and require that lower level objectives are achieved first. Simulation, as will be discussed later in each different discipline, allows students to move from the lower level objective of remembering facts to the higher level objective of evaluation or creation.

Why simulation is beneficial to learning can be further illustrated by Figure 2. We identified the linkages between the two pyramids by matching the education objective that each teaching/learning style can achieve effectively. In the left side of the diagram, the objective level moves from *remember* at the bottom to *creation* at the top. As shown in the inverted Learning Pyramid on the right side of Figure 2, the teaching style that has lower retention rate is likely to target lower level of education objectives. Simulation in general form, targets all levels of education objectives, and is further categorized as *single skill building*, *role-play simulations*, and *comprehensive simulations* as shown in Figure 2. *Single skill* is defined as "a task-specific skill;" *role-play* is defined as "the experience in a predefined scenario;" and *comprehensive skill* is defined as "the capability to finish a task requiring multiple skills." Those three categories target different education objectives, and matching the corresponding styles shown in

Figure 1. The learning pyramid

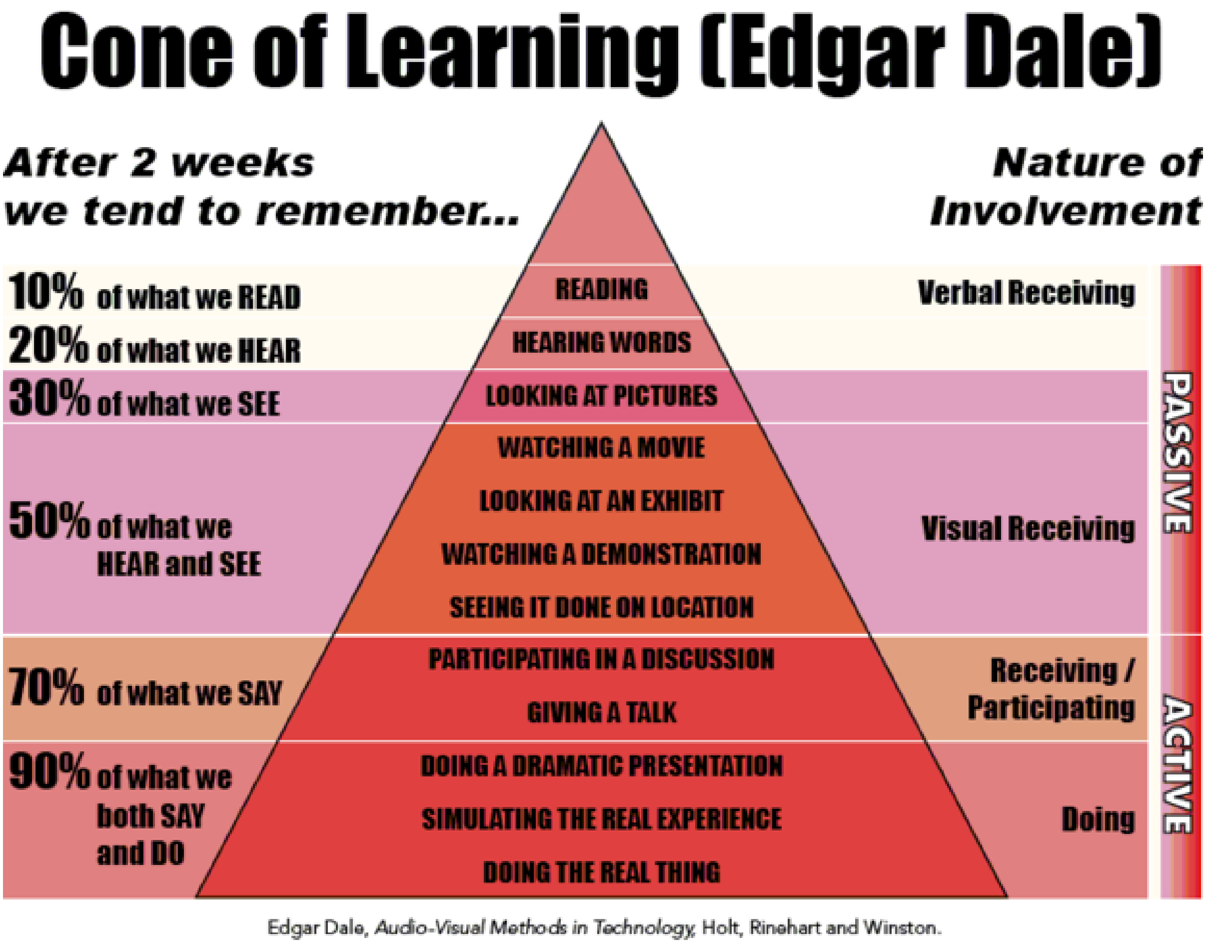
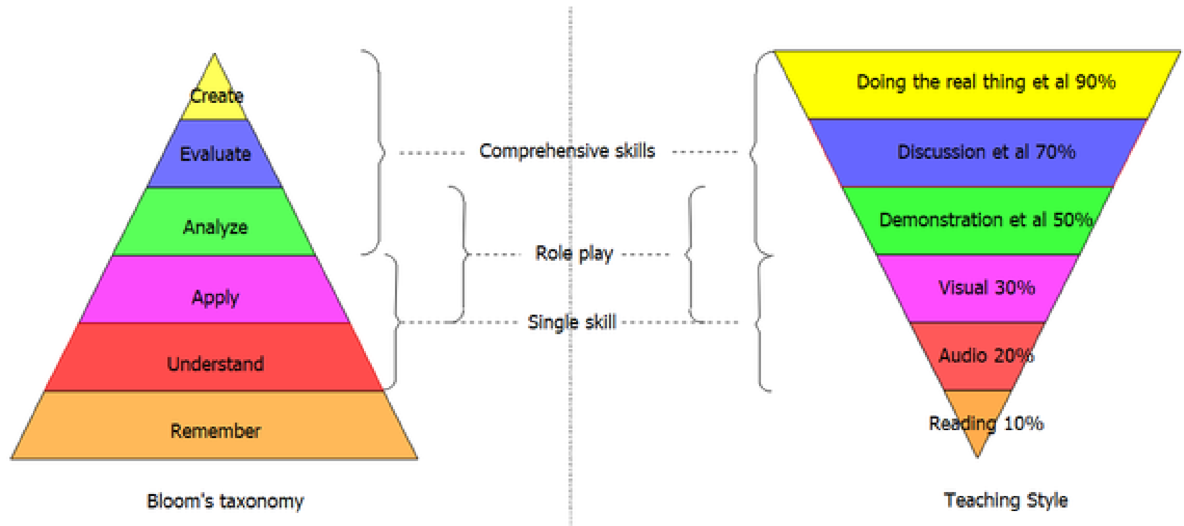


Table 1. Student data in 1970 and 1999 (Oblinger, 2003, p. 1)

	1970	1999
Enrollment	7.2 million	12.7 million
Two-year enrollment	31%	44%
Attend part-time	28%	39%
Women	42%	56%
Older than age twenty-five	28%	39%
Nontraditional	N/A	73%
Have dependents	N/A	27%
Employed	N/A	80%

Figure 2. Relation of Bloom's taxonomy (skill level) and teaching/learning style



the inverted learning pyramid. The sequence of those three categories also follow the natural progression of learning as shown in Figure 3 that people acquire single skill first, then practice or experience in a defined context, and eventually practice or learn multiple skills in a more complicated scenario that requires decision-making plus multiple skills learned previously.

While a sample of convenience of engineering, healthcare, and business is selected, these three areas have historically used simulation pedagogy in higher education. In the following sections, salient aspects of simulation will be discussed and compared.

SHORT HISTORY

Short History of Simulation in Engineering

The use of simulation as a tool to solve a particular problem can be traced to about 1940 when control engineering started to emerge as a discipline and simulation has played an integral part of its theoretical development and application since then (Atherton, 2004). In the early days, engineering simulation is done with mechanical devices, but with the development of electronics come the analogue computer, which further developed into the analogue with some digital logic and then the hybrid computer, before

Figure 3. Progression of learning

digital simulation took over. Today, the majority of engineering simulation is implemented with digital computers.

The use of simulation to build comprehensive skills can be traced to 1947 when in-flight simulators were implemented for the development of new aircraft, research of flying qualities and flight-control systems, and training of pilots and engineers in these areas (Weingarten, 2005). More recently, simulation is used for learners to actually experience a scenario with many of its embedded intricacies and complexities to facilitate learning at an increased rate (Arnold & Wade, 2017).

Short History of Simulation Tool in Business

The history of games for education begin in China about 3000 B.C. (Carr, 2017). The early Chinese games revolve around war games. Business simulation for skill-building and associated exercises are a result of war games, operations research typically for optimization, and role playing (Greenlaw, Herron, & Rawdon, 1962). Rand Corporation (Jackson, 1959) facilitated the transition from war games to business games through the development of an inventory game for the Air Force.

Association to Advance Collegiate Schools of Business (AACSB), i.e. the premier accrediting body for business schools, encourages the use of simulation as a capstone experience before 1990. While there is a component of randomness in a simulation, instructors have greater control of the concepts to be learned than, say, an internship in a firm. The use of cases is popular in business schools, although cases are perceived as a static rather than an active pedagogy. Students are analyzing what already happened with no control or interactive nature of the learning.

Most business simulations are used for business training, education or analysis. Learning objectives include strategic thinking, decision making, problem solving, financial analysis, market analysis, operations, teamwork and leadership (Australian Government Office for Learning and Teaching, 2015).

The business gaming community seems to have adopted the term business simulation game instead of just gaming or just simulation (Australian Government Office for Learning and Teaching, 2015). The word simulation is sometimes considered too mechanistic for educational purposes. Simulation also refers to activities where an optimum for some problem is searched for, while this is not usually the aim of an educational game. On the other hand, the word game can imply time wasting, not taking things too seriously and engaging in an exercise designed purely for fun. The concept of simulation gaming seems to offer the right combination and balance between the two (Lainema, 2014). Simulation gaming is also the term that the educational gaming community has adopted (Greenblat, 1988).

Business simulation can be model-based (i.e. numerical) (Bowersox & Closs, 1989) and scenario based. The use of simulation in logistics is primarily for modeling. Simulation methodology may be classified as analytic or heuristic. The latter enables the modeling of situations through the application of stochastics and a more realistic scenario. For example, simulation can be used to replicate trucks delivering or picking up supplies. Replications are made, for example, based on probabilities of delivery times. Modeling a supply chain including optimization is another common use of simulation in business (van der Vorst, Tromp, & van der Zee, 2009). Scenario-based business simulations were introduced in the early 1960's. There are also role-play simulations and they tend to be non-computer-based. Note that simulations can be computer or non-computer based. Actively participating in a role play in a classroom can be considered simulation. It can be scenario-based or numeric-based.

Short History of Simulation Tool in Health Care

Healthcare education, and education in general, as we know it is changing at a phenomenal pace. The history of simulation in healthcare stretches over a span of 1500 years, however, recent changes and the rapid growth of technology in healthcare have overwhelmed the traditional training system which is in place for healthcare professionals (Owen, 2016). Simulation plays a vital role in bridging the education to practice gap for healthcare professionals. Healthcare simulation has come a long way since the introduction of the first commercial mannequin based simulation in 1911 (Maxworthy, 2017). Today healthcare incorporates various types of simulation into its educational curriculum. Examples include full bodied mannequins, virtual reality, three dimensional static models, audio simulations, task specific simulators, standardized patients, animal models, human cadavers, video-based simulations, role playing, computer based clinical simulations, and written or paper simulations. A variety of healthcare disciplines can benefit from simulation as part of their educational curriculum. The major factor driving the increase in healthcare simulation is the ongoing need for quality improvements and safety (Seaton et al., 2019). Simulation allows participants to practice skills in a risk-free environment and receive feedback in a timely fashion. Additionally, simulation allows the educator or facilitator the opportunity to deliberately structure or control the environment to maximize learning outcomes. Simulation is a valuable learning tool that has been used for generations. It also represents a valuable learning tool that can be used to enhance learning for today's modern day adult learners.

In the next section, more detail of the simulations used for single skill building will be discussed.

SINGLE SKILL-BASED SIMULATION

Engineering Simulation for Single Skill Building

The birth of engineering as a defined discipline is largely attributed to industrial revolution between 18th century and 19th century. Three schools in the United States (U.S. Military Academy, ancestor of Norwich University, and Rensselaer Polytechnic Institute), are the first to offer an engineering education in the early 19th century. Because of its relatively young history as compared to business and health care, many engineering concepts and methods are not common sense. Rather they are based on abstract physical relations and are expressed in abstract mathematical expressions. Those abstract features are challenging for students, who in general are visual learners (Felder & Silverman, 1988). Computer simulations and animations, that offer visualizations of a particular physical phenomenon can help students develop deeper understanding of the theoretical concepts, promote creativity and motivation to learn (Magana & de Jong, 2018). As a result, computer simulation have been successfully implemented to help student understand those abstract concepts, such as particle kinetics in undergraduate dynamics course (Fang & Guo, 2016) and the theoretical bases of mechanisms in mechanical engineering curriculum (Ying, Soh Khim, & Nee, 2018). Other computer simulations, with additional interactive features and problem-solving activities, have been successfully used in engineering curriculum for students to practice their problem-solving skills (i.e. apply level in the Bloom's taxonomy). A few such simulations can be found to teach microelectronic circuit (Dickerson & Clark, 2018) in electrical/computer engineering undergraduate curriculum; to teach process control (D. Cooper & Dougherty, 2001) in chemical engineering curriculum; to teach control and missile guidance theory (Zhongyuan, Wanchun, Xiaoming, & Chuang, 2018) in aerospace engineering curriculum, to teach physics (Ceberio, Almudi, & Franco, 2016; Dickerson & Clark, 2018) in general college curriculum; to teach building services (Sundararaj, 2016) in civil/architecture education; to teach microprocessors (Papazoglou, 2018), and to teach the physiological systems (Cardoso, Teixeira, Henriques, & Dourado, 2016) in biomedical engineering curriculum. Because of those benefits, computer simulation, is an essential part of an e-learning curriculum in engineering and science, and is one key contributor to its success and growth.

Numerical simulation, as one particular single skill, is discussed in the next few paragraphs due to its importance to engineering practice of today. Numerical methods are required to study the behaviors of system in engineering and science field where the traditional analytical or graphical techniques become very complex or impossible to obtain, as in most nonlinear systems. The development of computers in the last two decades made the associated computational cost with those numerical methods affordable and accessible to large scale systems. Nowadays, the commercial and customized software built on those numerical methods is the standard practice in industry and research to study such systems. The numerical results in the simulated scenario not only provides verification of basic theory and application of logical analysis to solve real world problems (Dahiya, 2015), but also allows the optimization of design and process parameters before they actually are put into practice (Khan & Sheikh, 2016), thus significantly reducing the cost and risk. For example, numerical simulation based on finite element method has been widely used in construction industry in order to avoid unsafe or highly conservative design (Abambres & Arruda, 2016), to study large structure with complex geometries (Lorenzon, Antonello, & Berto, 2018), and to improve the durability and sustainability of concrete (Sfikas, Ingham, & Baber, 2018). Numerical simulation based on finite volume methods has been widely used in the automobile industry for body design (Xu & Zhou, 2018) and aerospace industry for aircraft design (Ciliberti, Della Vecchia, Nicolosi, & De Marco, 2017). Numerical simulation is also an important validation and optimization tool, in electrical vehicle design to verify and optimize HVAC system design (Zhang et al., 2015), to minimize the total energy consumption for the optimal operation of railway systems (Miyatake & Ko, 2010), to validate battery management system (Feng, Weng, Ouyang, & Sun, 2016), to validate the electromechanical actuators of military aircraft (Setlak & Ruda, 2017); to study multi-disciplinary systems such as the electrical motor and the internal combustion engine (Canto Michelotti & da Silva, 2016); and to study large-scale system such as the smart power grid (Mei & Chen, 2013).

For complex systems with significant uncertainty in inputs and systems with a large number of coupled degrees of freedom, one subset of numerical simulation, i.e. statistical simulation, is necessary. For example, statistical simulation based on the Monte Carlo method can be found in sensitivity analysis of operational research (Borgonovo & Plischke, 2016), in statistical signal processing (Doucet & Wang, 2005; Martino, 2018), in risk management of large construction project (Wu, Wang, & Cheng, 2015), in the reliability evaluation of power system (Almutairi, Ahmed, & Salama, 2015), and in the reliable design for wood-based products (Kandler, Fussl, & Eberhardsteiner, 2015).

For study in the microscale or nanoscale, another subset of numerical simulation, i.e. atomistic simulation methods, have proven to be suitable for modeling the inherent information such as geometry, velocities, and forces between atoms that is not easily accessible using other techniques, thereby providing support to a wide range of engineering problems. Atomistic simulation based on molecular dynamics (MD) has been implemented in manufacturing to improve the nanoscale machining of silicon (Abdulkadir et al., 2018). Biomolecular simulation and the subsequent data analysis has been used to replace the time-consuming and labor-intensive screening processes in their role of designing functional DNA, RNA, and protein elements (Childers & Daggett, 2017; Presnell & Alper, 2018).

Business Simulation for Single Skill Building

Single skill simulations revolve around the functions of business such as supply chain, marketing, finance, or human resources to name a few. The most famous supply chain game is the Beer Game. This game teaches inventory management and began as a manual classroom game. The initial game is a classroom exercise played with pen and paper (Snyder, 2018). It has advanced to a computerized and an online version. The objective is the same – to teach inventory management.

Single skill simulations are also present in marketing. They are frequently used in introduction to marketing classes where the skills taught involve forecasting and the connection of production planning. Marketing simulations appear in the 1950s.

Financial modeling or simulation is typically used to forecast financial positions, to evaluate projects or investments, or to develop financials for leveraged buyouts. It is often used with excel to teach various financial concepts. These sorts of simulation tend to be more mechanistic, deterministic, and definitely skill building in terms of creating models.

Human resource management, specifically managing resources in a department, may be accomplished with HRManagement,™ a human resource classroom simulation. Well-known simulation authors, Jarald Smith and Peggy Golden developed this specific-skill simulation which puts students in the role of HR Director of a growing organization (Smith & Golden, 2001). This simulation focuses on day-to-day activities. Other single skill simulations are also widely used in business.

Healthcare Simulation for Single Skill Building

Today's healthcare setting requires professionals to acquire a variety of unique skills. Simulation is used in healthcare to teach single skills to a variety of learners in various disciplines. For physical therapy students, simulation has been found to be an effective means to incorporate prior learning and enhance the students understanding of the acute care setting (Silberman, Panzarella, & Melzer, 2013). Simulation can be used to help teach physical therapy or nursing students how to ambulate patients with different physical deficits.

For nursing, simulation is used immensely as part of the undergraduate and graduate curriculum, as well as part of a continuing education program. It has become common for nursing schools to include simulation in all of their undergraduate coursework. Single skill-based learning can be used to teach students to differentiate between the different types of lung sounds when they are listening to a mannequin. It can also be used to teach single skills such as bathing or taking vital signs. The types of single skills which simulation can be used to teach and enhance can vary from beginner, intermediate or advanced. An example of an advanced skill would be the surgeon practicing inserting stitches. Simulation is used frequently as part of the skills building process in healthcare disciplines. It has been found that nursing programs which supplement part of the clinical experience with simulation have higher levels of satisfaction and perceived competence for their newly licensed nurses (Woda, Dreifuerst, & Garnier-Villarreal, 2019). Often times various single skills can be practiced at one time in a simulation lab or by implementing a skills day where students can practice and enhance their skills.

Simulation can impact different domains of learning including cognitive where knowledge is gained and utilized, the kinetic domain where students put the skills they learned into action, and the affective domain where students can explore their thoughts and feelings as well as assess group dynamics and how participants interacted. During simulation, students are able to practice in a low risk high reward environment where they can practice necessary skills and receive immediate feedback.

It is important for the simulation environment to match the clinical environment as closely as possible. If a mannequin is used an attempt should be used to make it look realistic. For example, a wig and clothing should be applied. If relevant, the mannequin should be placed on a gurney. If it is appropriate for the simulation, a wound or rash should look realistic. It would be beneficial to use current equipment that is currently in use in the institution if possible. The addition of props may also help create a realistic environment and aid in critical thinking. This is important to remember regardless of the skill or level of simulation being implemented.

ROLE PLAY SIMULATION: TO EXPERIENCE

Role play simulation basically is a student-centered learning environment. Students experience being in a different role in the simulation to learn or enhance different skills. Role play simulation lets student experience in a controlled environment to learn/enhance skills, which is perfectly aligned with generation Z's characteristics.

Role Play Simulation in Engineering

Although not as popular as in business and health care, role play simulation can be found in the engineering disciplines to enhance student skills with social features, such as user-centered design skills (Guerra & Shealy, 2018), global competence (May, Wold, & Moore, 2015), and collaborative strategies involved in the software development (Diaz Redondo, Fernandez Vilas, Pazos Arias, & Gil Solla, 2014). Those skills are important for actual engineering practice, however not emphasized in the curriculum (Diaz Redondo et al., 2014). It is observed that students playing from the users' perspective rather than their own leads to significantly different engineering recommendations. These solutions better meet user needs and, therefore, are more sustainable long term (Guerra & Shealy, 2018).

A simulation game is a special type of role play simulation that has game elements, like challenge, conflict, fantasy, and player's control (Falavigna Braghirolli, Duarte Ribeiro, Weise, & Pizzolato, 2016). Simulation games have been successfully used in a first-year industrial engineering course to present different concepts in an integrated manner, to offer a comprehensive and dynamic example that can be shared by students and professors, and to afford greater freedom to the professor for individual interaction with students and the ability to simultaneously satisfy the demand for knowledge and motivation (Falavigna Braghirolli et al., 2016). This type of simulation may also be cross-referenced as comprehensive simulation because of the requirement of decision-making.

Role Play Simulation in Business

Role playing as it is described above declined in the early 1990s with a resurgence in the late 1990s. These games were steeped in controversy – most likely due to the fantasy aspect. Role play in the business arena entered a substantial resurgence into other areas including business in the 21st century. Role play is also used in business functions such as human resource management, negotiation, finance, and international business, to name a few.

Human resource (HR) management simulation is used to teach negotiation or conflict. Students may be placed in the roles of employee and manager for performance reviews. They may also be assigned as a candidate for employment and an HR manager - negotiating starting salary, benefits, or contract terms.

A larger scale simulation in HR involves setting up two groups in a class. Two students are assigned as directors, six as “middles,” and the remainder as workers. This is also categorized as a role play. The activity takes place over three class period with students alternating roles. The scenarios require the directors to communicate to the “middles” who must then complete a specific task. Additional “curve balls” are added. Extensive debriefing over the three sessions is extremely valuable for students who learn about conflict, persuasion, negotiation, and potentially unionization.

Role play is also used in International Business. One such role play has students play a role as a person from a different culture/country. They are given information concerning their culture and a task to complete. In other words, they act in the role of an alternative culture. International role play simulations may also be used in cross-cultural negotiations. Role play in business allows the students to experience a business situation of many different types. This exercise with appropriate debriefing enables students to be better prepared for the real trials of business.

Role Play Simulation in Healthcare

Using role play or live actors is a type of simulation which can allow healthcare students to experience a scenario in a controlled situation that closely resembles real life. Live actors can play out a variety of situations. Some common scenarios where a live patient actor may be used in simulation is in mental health care and assessment scenarios. Often students from other disciplines, such as those from arts or theater majors, are used for the role play scenario in the university setting.

Role play simulation in healthcare can be used to enhance particular skills such as empathy (Bearman, Palermo, Allen, & Williams, 2015). Simulations exist which allow healthcare students to hear voices which are commonly experienced by persons living with schizophrenia. Simulation can also be used to allow students to experience what life may be like for a person living with dementia. Simulations like this are very useful in enhancing student’s empathy. Empathy is known to have many positive benefits in healthcare and patient care outcomes. It is an important component of professionalism and a necessary skill for healthcare practitioners to possess (Kourakos, Vlachou, & Kelesi, 2018).

Role play simulation also become an established pedagogy for teaching clinical skills and for providing learners with an opportunity to acquire essential skills that are necessary for practice (Bland, Topping, & Wood, 2011). The facilitator has the ability to control the simulation, which represents a benefit of simulation as a learning methodology. The facilitator can replicate a set of conditions and create an environment that resembles authentic real-life clinical cases. Participants can then practice in a real-life environment without the fear of harming a patient (Galloway, 2009). Simulation incorporates behavioral variables which also exist in the real-life clinical environment. In many cases there is a right or wrong answer, but most often it comes down to the student’s ability to prioritize and manage time and the patient. Once healthcare students enter the practice environment, it can be used to practice new skills and keep up to date on evidenced based practice. This type of simulation may also be cross-referenced as comprehensive simulation because of the requirement of decision-making.

COMPREHENSIVE SIMULATION FOR MULTIPLE-SCALE SKILLS PRACTICE

Comprehensive Simulation in Engineering

A plethora of studies show that simulation modeling is an effective tool to teach complicated systems in science (Louca & Zacharia, 2012; Luo et al., 2016), engineering (Akkoyun, 2017; Chen, Pan, Sung, & Chang, 2013; Jimoyiannis & Komis, 2001). Typically, those complex systems include many possible variables, and many possible outcomes/results. Nowadays, simulations are used broadly in an engineering curriculum to teach highly interdisciplinary and complex systems, or for students to develop comprehensive skills. A few examples include simulations used to learn HVAC system (Rampazzo & Beghi, 2018), power harmonics (Igual, Plaza, Marcuello, & Arcega, 2018), and neuromorphic engineering applications (Korkmaz, Öztürk, & Kiliç, 2018), to facilitate the acquisition of systems engineering skills at an increased rate (Arnold & Wade, 2017), or automatic control and robotics (Tejado, Serrano, Perez, Torres, & Vinagre, 2016). Those simulations are typically realized by software alone (Arnold & Wade, 2017; Igual et al., 2018; Korkmaz et al., 2018; Rampazzo & Beghi, 2018), sometimes by the hybrid of software and hardware (Papazoglou, 2018; Tejado et al., 2016)

Laboratories are essential to an engineering curriculum. Students learn and practice comprehensive skills in lab activities, including the skills to operate equipment, the skills to analyze results or data, and the skills to write the report, to name a few. In the broader perspective, lab activities are another type of simulations that are usually the scale-down version of experiments in industrial practice. Recently, with the development of technology, computer simulated virtual reality, or augment reality, has been used to generate virtual labs (Choomlucksana & Doolen, 2017). Those virtual labs provide hands-on practice and experience for students (D. Cooper & Dougherty, 2001), and have demonstrated effectiveness for improving students' career-specific skill sets.

A capstone project adopted in many undergraduate engineering curricula can be viewed as another type of comprehensive simulation for multiple-scale skills practice. This adoption is partially attributed to the updated engineering criteria for graduating students that the Accreditation Board for Engineering and Technology (ABET) has specified since 2000 (Chung, Harmon, & Baker, 2001). To target those target comprehensive skills required for engineering students, capstone projects, typically designed as scaled-down versions of real-life projects, integrate multi-disciplinary subjects and teach professional skills that are difficult to impart in a traditional lectured course (Ward, 2013). Computer simulation, in particular, has been successfully employed in capstone projects, for example to provide real-world engineering processes involved in a site investigation project for civil engineering students (Chung et al., 2001). Students consider the computer simulation being generally effective in improving their skills in dealing with complex projects, linking theory to real world applications, and improving their problem-solving performance. The assessment data also supports the idea that students gain significant content knowledge in that there are more deep than shallow propositions in the knowledge maps and there is more use of propositions with theoretical relations (Chung et al., 2001).

Comprehensive Simulation in Business

Since the environs in business are, by definition, multi-disciplinary, it is imperative that the disparate skills that are learned earlier in a business program are both practiced and experienced both individually and collectively. One of the most successful ways to practice the many intersecting skills collectively is to simulate business reality. The comprehensive scenario simulations purport to teach a number of skills. Some of the most important are the soft skills. A difficulty in using such comprehensive simulations is that it is never the same way twice. Teams are formed and then interact. The results of the interactions require the teams to adapt. It requires the instructor to also adapt. The Business Simulation Blog (Jakab, 2018) notes that holistic thinking "triggered by the cross-functional setup of business management simulation games" consists of decision-making areas from all major functions of a firm. The Business Simulation Blog identifies thirteen skills as business simulation outcomes. Perhaps in business, more than the other two disciplines in this chapter, the major outcomes are the soft skills. In fact, nine of thirteen skills should be classified as soft skills.

Strategy simulations are comprehensive and scenario-based. Anecdotally, students claim to learn more through the capstone simulations. One could opine that simulation brings out the best in both millennials and Gen Z, given that they learn best through active participation in their own learning. Strategy simulations are used after the students have mastered the basics of business including management, marketing, accounting, finance, and supply chain. Comprehensive simulations also force students to see the interactions of each of the above functions with the others. Mastering the interactions and understanding both the technical interactions as well as the organizational interactions helps to prepare students for the workplace.

Comprehensive Simulation in Healthcare

Because of the positive impacts of simulation which have been documented there have been suggestions to modify the way education has traditionally been delivered. We must adapt the way we deliver education to keep pace with the changing needs of Generation Z. Research has recently examined the impact of simulation when compared to traditional lecture style of delivering education. It is found that simulation education significantly improves clinical skills and participant satisfaction, however, further research is needed to assess the impact of simulation on various areas of clinical practice (S. Cooper, 2016). Research remains ongoing, but simulation has become an established pedagogy for teaching clinical skills and for providing learners with an opportunity to acquire essential skills that are necessary for practice in a controlled environment that closely represents reality (Bland et al., 2011).

Comprehensive simulation allows healthcare practitioners to put multiple skills together and apply them to a real life patient condition. Comprehensive simulation is an excellent way to enhance critical thinking and clinical judgement. Comprehensive simulation has been used to help healthcare providers, like physicians and nurse practitioners, improve their prescribing practices for medications like opiates (Heirich et al., 2019). This represents a comprehensive simulation that has tremendous impacts on a variety of patients and healthcare outcomes. First responders such as emergency medical technicians and paramedics use simulation to help them gain experience with trauma cases. The implementation of simulation in this setting has also been found to have a positive impact on learning (Abelsson, Rystedt, Suserud, & Lindwall, 2016). Simulation has also been used to enhance inter-professional practice. Simulation which includes a variety of different healthcare disciplines working on the same case or patient has been found to have a positive impact. Inter-professional simulation has been found to increase the understanding of other healthcare professions, improve patient outcomes, and provide participants with a valuable learning experience (Costello et al., 2018). Simulation can be used to help students and professionals bridge the gap between the classroom and real life clinical practice. Simulation can impact the different domains of learning including cognitive where knowledge is gained and utilized, the kinetic domain where students put the skills they learned into action, and the affective domain where students can explore their thoughts and feelings as well as assess group dynamics and how participants interacted.

Comprehensive simulations allow an opportunity for healthcare students to put all of their knowledge and skills together in a controlled environment. It is an opportunity for students to practice assessment skills or multiple skills within one scenario. This is commonly done in a simulated experience like a mock emergency situation in which a patient is in cardiac arrest. Here healthcare students have to employ a variety of different skills they have learned. After the comprehensive simulation is complete the facilitator or instructor can debrief the student or students to help reinforce learning.

SUMMARY AND DISCUSSION

A convenience sample which focuses on engineering, healthcare, and business is selected for a review in this chapter. These three areas have historically been used in simulation pedagogy in higher education. In this section, salient aspects of simulations in each of the three disciplines are discussed as reflects in Table 2.

The first section of Table 2 describes the types of simulation in our analysis: single skill, role play, and comprehensive. Single skill simulations are more commonly used in engineering while limited either through demonstration in healthcare and lecture or reading in business. The next section of the table describes the environment and characteristics of simulation in each of the three disciplines. Beginning with history, the earliest use of simulation was in business about 3000 BC. Engineering simulation came into being in 1947, a wide time span (Owen, 2016). The assumption may be that business simulation is much more mature in type and comprehensiveness than engineering or, at the very least, is attempting to teach at a higher level of Bloom's taxonomy.

Simulations, done in a playful manner, without any specific intention, can be detrimental to the learning process (Guzmán, Dormido, & Berenguel, 2013; Jaimovich, 2017)). Engineering, business, and healthcare majors would seem to be vastly different majors, yet each discipline benefits from incorporating simulation into their curriculum. Healthcare utilizes simulation the most as many of the individual courses utilize simulation to some degree. Healthcare and business simulation offers participants the opportunity to work together and learn from one another. Although engineering does this to some degree much of the simulation that is incorporated is used to help students understand higher level concepts or practice higher level skills. Healthcare and business have a significant history of incorporating simulation into their education whereas engineering is a discipline which has more recently been defined thus incorporates simulation into their education more recently.

Engineering rarely employs scenario-based simulations while healthcare and business do frequently. Perhaps that is attributed to the inclusion of behavior into the simulations in both business and health care. The more robust nature of behavioral variables may indicate a desire for or move to more real-life simulations than engineering. Modeling-based simulations are used more commonly in business and engineering; however, they are also used in healthcare particularly when tracking and trending disease. Modeling-based simulation can be used to help teach and enhance the study of epidemiology. All three disciplines employ computer simulations, not surprising given the advances in technology. Business and health care simulations are typically defined as interactive while engineering, not as much, again, given advances in technology and the relative age of simulation within the three fields, it is not surprising.

Table 2. Similarities and difference of simulation used in three disciplines

Categories	Engineering	Business	Health care
Types of simulation			
Single skill	Yes, dominantly	Some but infrequent (mostly lecture and reading)	Yes (Demonstration)
Role play	Some but infrequent	Yes, but not exclusively	Yes, but not exclusively
Comprehensive	Yes, upper level	Yes	Yes
Environment/Characteristics			
History	1947	3000BC	520AD
Modeling-based	Yes, numerical	Yes	Yes
Scenario-based	Rarely	Yes	Yes
Computer-based	Yes	Yes	Yes
Visual	Yes, frequently	Yes	Yes
Interactive	Yes, not exclusively	Yes	Yes
Stochastic/deterministic	Both, more deterministic	Both, most stochastic	Both, most stochastic
Continuous/discrete	Both, mostly continuous	Both, mostly continuous	Both, mostly continuous
Behavior variable	Rarely	Yes	Yes
Outcome			
Single answer (Right/wrong)	Yes	No	No
Optimization	Yes	Some	Some
Process			
Experience	Some	Yes	Yes
Application			
Application (solving a real problem)	Yes	Yes	Yes
Practice	Yes, numerical	Yes	Some, not clinically but maybe in lab

Business and health care are less deterministic and more stochastic than engineering, while all three disciplines have both continuous and discrete simulations.

Perhaps the largest difference is in the outcome and process categories. Engineering has a single answer and leans toward optimization while business and healthcare do not in general. Optimization simulation used in healthcare are not directly at the bedside, for example to study things like emergency room optimization. Further, business and healthcare simulation are, in some cases, consumed by experience and having students gain experience through simulation. Finally, while all purport to use simulation for application of skills, business and healthcare are more likely to include group interaction and bring group dynamics into their simulation. The application of engineering simulation to solve real world problem is almost exclusively based on numerical models, and frequently with visual augmented features. In summary, one could conclude that business and healthcare use simulation in many forms more frequently and more alike than different as opposed to engineering.

FUTURE RESEARCH DIRECTIONS

Each discipline is continuing to discover the benefits of incorporating simulation into their curriculum and using this valuable learning tool more often. Although the benefits of simulation in education are understood from a broad concept for a variety of disciplines, future research is needed related to specific simulations. There is needs specifically in engineering for more studies that provide more rigorous measures of learning with simulation (Magana & de Jong, 2018). Further research is needed in the health care to assess the impact of simulation on various areas of clinical practice, and develop corresponding best practice standards (S. Cooper, 2016). Business uses simulations in marketing, supply chain, project management, human resource management, and strategy, to name a few. Further research is possible in simulating soft skills and scenarios to increase the reality of simulations.

ADDITIONAL READING

The authors would like to recommend a few additional readings that may provide more examples for readers. In the engineering discipline, some good examples about how to incorporate virtual labs in e-learning courses can be found in the work done by Gwozdz-Lukawska et al, and Valdez et al. (Gwozdz-Lukawska, Janiga, & Guncaga, 2015; Valdez, Ferreira, Martins, & Barbosa, 2015). In the health care discipline, Bach et al (2018) provide a good example of a model-based health care simulation game.

In their research, Igel and Urquhart (2012) target the team play skill that Gen Z lacks. They explained the difference between collaborative and cooperative learning. Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product (Gerlach, 1994). Cooperative learning is defined as a subset of collaborative learning. It seeks to overcome some of the negative aspects of collaborative learning such as social loafing and structures that will engage the Gen Z with their propensity to learn by themselves (Igel & Urquhart, 2012). They identified three actions that are keys to successful cooperative learning with Gen Z: providing education in group processing and interpersonal skills, cooperative goal structures within the groups, and providing mechanisms for individual accountability. Their study provides useful ideas regarding how to design simulation successfully for Gen Z using cooperative learning.

Parente et al (2012) in their paper, "Facilitating the acquisition of strategic skills," determined that strategic skills can be acquired through simulation in lieu of traditional experience. This reading is valuable as an outcome of learning by simulation.

CONCLUSION

Simulation has been used as an effective teaching strategy across disciplines (Lateef, 2010). Simulation represents a valuable teaching and learning modality that enables learners to better retain information. Simulation allows the facilitator to manipulate concepts and variables and is applicable to the curriculum across academic disciplines. Simulation enables students to practice and learn skills in a controlled environment regardless of discipline. The need for a controlled environment and guidance during the simulation is necessary in all disciplines.

The vast improvements in technology will continue to impact simulation and education in general for a variety of disciplines. One thing is certain; simulation is a vital part of education and it is here to stay. Simulation aligns with how students learn best now and in the future.

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KEY TERMS AND DEFINITIONS

Behavior Variable: A construct that is likely an organizational or latent variable, not easily measurable.

Continuous Simulation: A simulation whose variables can take on any value within the specified range.

Deterministic Simulation: A simulation whose starting condition or initial states may change, but always produces the same output from the same starting condition or initials states.

Discrete Simulation: A simulation whose variables can take only specific discrete values with the specified range.

Interactive Simulation: A simulation that user's inputs affect the output.

Model-Based Simulation: A simulation realized based on a mathematical model.

Numerical Simulation: A simulation using numerical methods, typically run on a computer.

Scenario-Based Simulation: A simulation based on a situation that is typically intended to approximate real life.

Stochastic Simulation: A simulation whose variables may change stochastically (randomly) with certain probabilities. A stochastic simulation may produce different outputs from the same starting condition or initial states at different time.

APPENDIX

Discussion Question 1

Is simulation essentially equal to "play to learn"? If you are an instructor of biofluids, a course in Biomedical Engineering, you want to design a model-based computer simulation to teach human circulation system. Should you just work on the development of the simulation package and let students play to learn? Is the course plan necessary?

Discussion Question 2

What skill levels in terms of Bloom's taxonomy can simulation help students to learn? Can simulation be designed to help student learn multiple skills together? Can simulation be used to help student learn soft skills like teamplaying?

Discussion Question 3

Jenny is an instructor for International Business. She wants to design a role play simulation to teach negotiation in International Business, for example a French company negotiating purchasing contracts with a Chinese company. What information should Jenny prepare for students?

Discussion Question 4

John is an instructor for Nursing. He wants to enhance students' empathy with persons living with Alzheimer. Why is this important? What type of simulation will work best? How should the simulation be set up?

Discussion Question 5

Kelly is an instructor for Nursing. She wants students to use a mannequin to practice how to measure blood pressure. She takes some extra effort to create three scenarios for students to practice, i.e. in waiting room, in emergence room, and in ambulance. Is this necessary? Will students practice in the same setting three times achieving the same level of skills?

Chapter 16
Transforming Chemistry Curricula and Courses to Support Adult Learners

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ABSTRACT

This chapter presents a compilation of best practices for preparing chemistry curricula and courses that consider the cognitive needs of adult learners. Chemistry instructors at the post-secondary level may receive little guidance on how to meet the needs of adult learners, members of a diverse undergraduate STEM student population. The author illustrates how adult learning theories and chemical education research can be applied to support reentry learners. Some aspects of distance education for adult learners in the sciences are examined, especially the unique challenge of offering laboratory coursework in this setting. The author makes recommendations for supporting faculty who engage in course revision with adult chemistry learners in mind. This chapter is relevant for university-level chemistry faculty, administrators and instructional designers.

INTRODUCTION

This chapter provides a review of best practices for designing and delivering chemistry courses that are impactful for adult learners. Reentry adults make up more than 38% of all college students (National Center for Education Statistics, 2016), but there is surprisingly little literature that puts the tenets of adult education into direct conversation with chemistry education research. The connection to chemistry is important because many academic programs require completion of foundational coursework in the sciences early in the curriculum. Because the highest rate of attrition for adult learners occurs during the first year of enrollment, fostering positive learning experiences in the chemical sciences presents a largely untapped opportunity to improve long-term persistence for adults in numerous pathways of study.

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Figure 1. Programs requiring chemistry. Note that virtually all science majors, applied science majors, and health professional students require completion of introductory chemistry. Introductory chemistry courses include general chemistry, chemistry for the health sciences, GOB (general, organic and biochemistry) and consumer chemistry courses.

	Introductory Chemistry	Organic Chemistry	Advanced Topics
the chemical sciences	×	×	×
pre-health professions	×	×	some
the sciences	×	some	
applied sciences	×	some	
health professions	×	some	
liberal studies	some		

A summary of academic programs that require chemistry coursework is given in Figure 1. For students majoring in pure and applied sciences, undergraduate chemistry coursework provides core career skills that they need to enter the workforce. In 2014, about 10% of all first university degrees awarded in the U.S. were in the sciences and 6% were in engineering fields, according to the National Science Board (NSB) (2018). For non-science majors, undergraduate science coursework is likewise included in curricula to provide career preparation, and to help learners strengthen their math and science backgrounds and become well-informed citizens (National Science Board, 2018). Students pursuing health professional careers make up a sizeable portion of all non-science majors enrolled in first-year chemistry coursework. More than 11% of all bachelor's degrees awarded in 2014-2015 went to health professions and related careers according to National Center on Education Statistics (NCES) (2018).

Not all reentry adults will complete science coursework, but nearly all chemistry faculty will work with adult learners in their classrooms and laboratories each year. The percent of adult college students who take a chemistry course is not tracked, but using the data presented above, it is possible to generate an estimate. One may consider the number of degrees awarded across the fields presented above (27%) in combination with the percent of all college students who are adult learners (38%). Assuming an even distribution of adult learners across all fields of study, a conservative estimate is that at least 10% of all adult college students will take one or more courses in chemistry. The true value is likely higher, as this estimate does not include chemistry learners who are completing a scientific reasoning requirement as part of a university's core curriculum, or who might be satisfying a personal interest in the field.

Though adult learners admittedly make up a minority of all chemistry students enrolled at traditional 4-year colleges and universities, devoting attention to their needs is important. Improved educational experiences for adults, especially in the first year, can contribute to higher overall enrollment and persistence in post-secondary studies. Adults are part of a larger classroom community, and making even modest changes to instructional methods can benefit adults and lead to educational gains for traditional peers too. High-impact chemistry instruction for adult learners refers to the development of courses and curricula that incorporate the theories of adult learning and chemistry education research. Many instructional strategies that are effective for adult learners in chemistry can likely inform science education in related disciplines.

In this chapter, three fundamental challenges for adult chemistry education are studied. First, there is the challenge associated with designing chemistry courses and curricula that are highly effective and accessible for adults. For example, faculty should present chemistry material as relevant on a professional or personal level, while using time-efficient learning strategies, paying attention to adults' desire to share their knowledge and experiences, and being mindful of adults' aversion to low performance. A separate challenge is that many adults desire distance education options, and these often require new or unfamiliar classroom and laboratory formats. Finally, faculty face the real obstacles of limited time for course preparation and limited data demonstrating the effectiveness of potential course modifications. There are sometimes less visible career rewards for course redesign projects, especially in institutional cultures that prioritize scholarly contributions for promotion and tenure decisions. All of these challenges will be considered in the chapter, using available literature to understand how they are being addressed and what needs remain.

In the Introduction, the author provided an overview of the undergraduate chemistry landscape to contextualize the scope of the work. In the Literature Review, the author defines adult chemistry learners and considers their motivations. Then, the educational psychologies related to two distinct fields, adult learning and chemistry education, are presented to install a firm foundation upon which to review best practices. In the Discussion and Solutions, the three central challenges for adult chemistry education are examined in detail. The author outlines strategies that may be used to address these considerations, in concert with the cognitive theories introduced in the Literature Review. Finally, the author summarizes the work, and looks toward new horizons in adult education research and practice in the sciences.

LITERATURE REVIEW

At this point, it is helpful to construct a working definition for the population under study. Specifically, adult chemistry learners are individuals over the age of 24 who are enrolled in a chemistry course at a post-secondary (tertiary) institution. The definition derives from two primary sources. One is the United Nations Educational, Scientific and Cultural Organization (UNESCO) description, which states that adult education is "education specifically targeting individuals who are regarded as adults by the society to which they belong" (United Nations Educational Scientific and Cultural Organization, 2012). We combine this statement with the definition of adults from NCES, which states that adults are individuals over the age of 24 (Ries & Gray, 2018). Although age is a somewhat simplified interpretation of who is an adult, the definition nevertheless helps to focus the scope of challenges that are intertwined with the participation of adult learners in a university setting.

Adult chemistry learners are a subpopulation of nontraditional students. In general, the pathways of nontraditional students tend not to be straightforward, and they encounter different challenges than traditional students (see Table 1). Of the estimated 19.9 million students enrolled in degree-granting post-

Table 1. Comparison of traditional and nontraditional student characteristics

Traditional students satisfy all of the following criteria	Nontraditional students satisfy one or more of the following criteria
obtain a high school diploma	obtain a GED or high school equivalence certificate, or none at all
enroll immediately in post-secondary studies	delay enrollment into post-secondary education
take classes full-time	take classes part-time
are claimed by a parent or guardian as a financial dependent	are financially independent
work either part time or not at all	work full time while enrolled (>35 hours per week)
	have dependents
	are single parents

Source: (Choy, 2002)

secondary institutions in the United States in fall 2018, more than 70% of the undergraduate population was nontraditional (Choy, 2002; National Center for Education Statistics, 2017). Compared to learners at four-year colleges, there is a larger percentage of nontraditional students at two-year colleges. The American Chemical Society (ACS) emphasizes that two-year colleges provide avenues for nontraditional students to transfer to baccalaureate programs at four-year institutions or to find immediate employment as technicians and technologists in research and development careers (American Chemical Society, 2004). As such, two-year colleges play a special role in providing access to STEM careers, especially for adults and underrepresented groups in the sciences.

Motivation and the Adult Chemistry Learner

When considering the diversity of career goals summarized in Figure 1, it is clear that faculty and instructional designers will benefit from understanding adult learners' expectations and motivations for engaging in science coursework. In general, people seek educational experiences as adults "to improve their technical or professional qualifications, further develop their abilities, enrich their knowledge with the purpose to complete a level of formal education, or to acquire knowledge, skills and competencies in a new field or to refresh or update their knowledge in a particular field" (United Nations Educational Scientific and Cultural Organization, 2012). The UNESCO definition of adult education concisely captures the essence of motivation theory. To formalize these ideas, three primary motivation theories in educational research, outlined by Bannier (2010), are summarized here.

- **Goal Theory:** The desire to achieve learning goals, performance goals, social goals and work-avoidance goals are the main drivers for academic motivation and student behavior. Achieving a conceptual understanding is central to the student's learning goals, whereas instructor and peer perception of ability are associated with performance goals. Interpersonal approval is central to social goals, whereas the perceived need to avoid difficult tasks or situations is associated with work-avoidance goals.
- **Self-Determination Theory:** The influence of extrinsic motivators (rewards and punishments), intrinsic motivators (personal happiness and intellectual growth), or amotivation (a lack of the former two) are the main drivers for academic motivation and student behavior. Amotivation refers to

the perception that one's actions result from something outside of one's control, such as a student who has enrolled in college, but cannot identify why. At the other extreme, internal motivation is widely accepted as the highest level of motivation, and is a hallmark of lifelong learners. In a sense, student behavior becomes self-determined when external regulations become progressively internalized, and eventually become part of one's sense of self.

- **Expectancy–Value Theory:** A perceived incentive or high-value outcome is the main driver for academic motivation and student behavior. Confidence in one's own ability, or self-efficacy, is a crucial factor for creating expectancy–value as a goal.

These basic tenets of motivation theory draw parallels with the early work of Cyril Houle (1961), who described three motivation orientations for adult learners. For example, Houle also described goal-oriented individuals who strive to achieve a specific outcome such as attaining licensure, certification or an undergraduate degree, in order to prepare for entrance into or progression along a career pathway. In alignment with what we now call self-determination theory, Houle described activity-oriented individuals who take pleasure in the experience and social aspects of learning (external motivators), as well as learning-oriented individuals who enroll because of their passion for acquiring knowledge and their commitment to lifelong learning (internal motivators). These last two types of learners are acknowledged by Malcolm Tight (1996), who noted that, "adult education refers not just to the age or status of its clients, but also encompasses the notion of participatory learning for its own sake and not for credit" (p. 59). Self-determination theory plays an important role in theories of adult learning.

Moreover, a college education can lead to numerous professional, personal and societal benefits. Employment and economic benefits are certainly not the only factors that lead adults to return to school, but there are significant economic advantages for those who do so. The Organization for Economic Co-operation and Development (OECD) prepares reports on trends in higher education, and these contextualize some economic drivers for reentry adults. For example, from a professional standpoint, individuals with a college education have access to more career options, a higher employment rate and an enhanced ability to make contributions to a particular field or profession (Ritt, 2008). The OECD reports that adults who are 25–34 years old and hold a tertiary degree in the United States have an 85% employment rate, compared to 73% for those completing secondary education (Organization for Economic Co-operation and Development, 2018). The personal benefits of a college education are well documented and include higher long-term earning potential, better job satisfaction and improved overall quality of life (Ritt, 2008). The OECD reports that tertiary graduates in the United States earned 75% more than those who completed secondary education (the average for all OECD countries was 55%), and those with a master's degree, doctoral degree or equivalent earned 133% more (the average for all OECD countries was 91%) (Organization for Economic Co-operation and Development, 2018). Still, interestingly, El-Farargy (2009) reports that internal motivators such greater job satisfaction and self-worth are generally more compelling motivators for adults than external factors such as improved job prospects and higher salaries. Important societal benefits also stem from adults who reenter college, including their increased community leadership and activism, and a society's enhanced ability to grow a competitive and innovative workforce in the global economy (Ritt, 2008).

Introduction to Adult Learning Theories

The next piece of this review of cognitive frameworks introduces three widely accepted frameworks for adult learning: andragogy, self-directed learning, and transformational learning (Teaching Excellence in Adult Literacy Center, 2011). Knowles (1980) first introduced the idea of andragogy as a foil for pedagogy. Whereas pedagogy is "the art and science of teaching children", andragogy is "the art and science of helping adults learn" (Knowles, 1980) (p. 43). In establishing this first pillar of adult learning theory, Knowles summarized five central assumptions about adult learners.

- **Assumption One:** Adult learners mature from a state of dependency to one in which they prefer a greater role in self-directing their own learning.
- **Assumption Two:** Adult learners pull from a vast reservoir of life experiences to assist their own learning.
- **Assumption Three:** Adult learners exhibit readiness to learn when new life or social roles arise.
- **Assumption Four:** Adult learners are task- and problem-centered, rather than subject-centered, and want to apply new knowledge immediately.
- **Assumption Five:** Adult learners are motivated by internal, rather than external, factors.

Though these characteristics depend on a host of situational variables and they certainly cannot be generalized to all adults, Knowles's five assumptions are widely accepted as fundamental frameworks of adult learning (Ross-Gordon, 2011). Examining these assumptions naturally leads to ideas about how educators might begin to address specific qualities of adult learners and to leverage them in a chemistry learning environment, which will be presented in this chapter's discussion. In brief, some strategies that Knowles recommends are creating a cooperative classroom learning environment, identifying the specific needs and interests of the learner, developing learning objectives based on these needs, offering sequential activities to meet learning objectives, providing opportunities for the learner to assist with selection of learning methods, materials and resources, and continually assessing and adapting the learning experience (Knowles, 1984).

Connected to motivation theory, self-directed learning (SDL) is the second pillar of adult educational psychology. In SDL, students take initiative in planning, executing and assessing their individual learning experiences without the assistance of others. Self-directed learning is informal and usually occurs outside of the classroom (Teaching Excellence in Adult Literacy Center, 2011). For example, SDL might take the form of researching a topic online after class or interacting with a classmate or expert to learn more about a subject. In this sense, SDL provides flexibility for the individual because learning takes place according to his or her preferences and day-to-day schedule. On the other hand, students who struggle with literacy or who lack access to resources may be less ready to participate in SDL activities, and some students are simply not as inclined to engage in them (Teaching Excellence in Adult Literacy Center, 2011). Faculty who wish to foster SDL can provide opportunities for students to self-assess their current skills, identify entry points for starting new projects, identify resources and methods that align with the learning goal, and help learners to establish strategies for evaluating and reflecting on their own work in a positive way. Though SDL is essentially the first assumption in andragogy identified by Knowles, it has come into its own as an independent theory of adult learning.

The third pillar of adult learning theory is transformational learning. Transformational learning involves a fundamental shift in consciousness related to how the learner views themselves and their world

(Teaching Excellence in Adult Literacy Center, 2011). One prominent interpretation of transformational learning is presented by Mezirow (2000), who suggests that as students reflect critically on their worldview and discuss their ideas with others, they come to shift their core frames of reference (Ross-Gordon, 2011). A key component of transformational learning strategy is that students participate in critical reflection. As such, instructors attuned to fostering transformational learning for adult students should create a supportive and thought-provoking environment that provides feedback and promotes exploration of alternate perspectives. Instructors are encouraged to examine their classroom demographics and design activities that align with student interests (e.g., debates versus field trips) (Teaching Excellence in Adult Literacy Center, 2011).

The reader is now positioned to establish a theoretical foundation for discussion of best practices in adult education as they relate to chemistry. Independently, the literature on adult education research and chemistry education research are vast. However, as observed by El-Farargy (2009), "research regarding the sciences for adult returners to education seems to be sparse" (p. 250). There remains a need to integrate and expand upon key teachings from these two fields. In the following section, the basic framework of educational psychology for chemistry students is developed, and areas where these established paradigms intersect or diverge with adult learning theories are highlighted. Theories from cognitive science can assist the design of courses and curricula to meet the needs of the adult demographic. These needs are quite different from those of traditional college students, owing to their colorful mosaic of backgrounds, career goals and motivations.

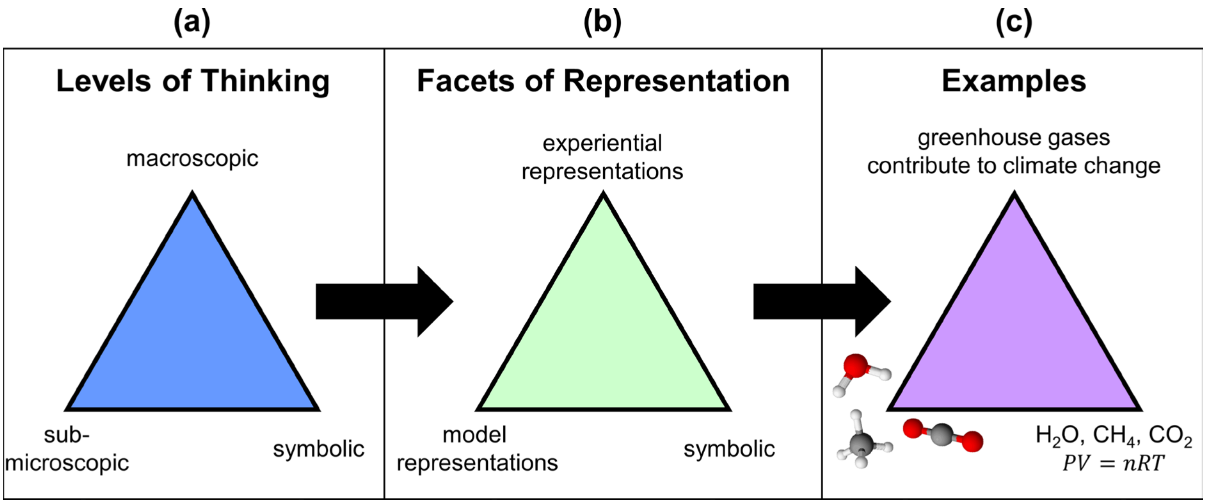
Introduction to Chemistry Education Research

The Nature of Learning Chemistry

Modern cognitive theories address several considerations unique to chemistry learners. First-year chemistry coursework tends to focus on the structure, function and properties of atoms and molecules, with consideration of reaction dynamics and energetics. As such, chemistry students must translate chemical phenomena that are observed on a day-to-day macroscopic scale to the sub-microscopic behavior of individual atoms and molecules that drive them. What's more, this sub-microscopic behavior is typically represented in the chemistry classroom using mathematical and chemical equations, and graphs. Alex Johnstone (1982) proposed that chemistry can be accessed at three connected levels of thinking, the macroscopic, sub-microscopic and symbolic levels. This model is sometimes called the chemistry triplet or chemistry triangle, because it can be represented visually as a triangle with each level of thinking situated at a vertex (Figure 2a). Even compared to other STEM disciplines, chemistry is highly abstract in nature because it so often requires thinking on the sub-microscopic molecular level.

Another conceptual framework related to adult chemistry education is the novice versus expert framework. Novices have a fragmented knowledge structure, tend to begin tasks immediately with little planning, and are more taxed by completing the task. In contrast, experts have elaborate, well-practiced and contextualized knowledge stores. They spend more time assessing a problem, breaking it into small pieces and looking for patterns. Yet, experts spend less total time solving the problem than do novices. Johnstone argued that novices experience "unreasonable cognitive demand" when chemistry instruction engages all three levels simultaneously or occurs primarily at the symbolic level (Cooper & Stowe, 2018). Experts operate at the center of the triangle, whereas novices are not yet able to do so. These ideas connect to the foundations of constructivism (Cooper & Stowe, 2018; Woolfolk, 2001).

Figure 2. Johnstone's chemistry triangle depicting (a) levels of thinking, (b) facets of representation and (c) examples of each level. Experts work at the middle of the triangle.



In an extension of the chemistry triplet, one can replace the three levels of thinking with three facets of representation (Figure 2b). For example, the macroscopic level becomes experiential representations (e.g., representations of phenomena and occurrences experienced directly by the learner), the sub-microscopic level becomes model representations (e.g., molecular model drawings and pH scale), and again, the symbolic level is present (e.g., formulas, equations and graphs). Here again, adult learners may have a learning advantage because they have experienced more physical phenomena and can use these experiences to scaffold new chemical concepts. Chemical educators can help adult learners to group fragmented knowledge into larger chunks and thereby promote efficient storage, usage and retrieval of knowledge. These actions help adult learners to begin working in the middle of the chemistry triangle.

Ashcraft (1994) presented one information processing model that is valuable for considering instructional strategies in chemistry education. In this three-step processing model, information moves from sensory to short-term to long-term memory. Learners use the perception filter of sensory memory to distinguish which stimuli to admit to working memory. Novices may have very different filtering processes compared to experts because long-term knowledge informs the feedback loop to determine what information is processed (El-Farargy, 2009). Short-term memory has limited information holding and processing space, with fast decay. Adult short-term memory is capable of holding approximately 7 ± 2 chunks of information (El-Farargy, 2009). After processing, information may be admitted to long-term memory. Long-term memory has significant capacity to store, retrieve and use information. All levels of Johnstone's chemistry triangle relate to information processing. As one example, El-Farargy (2009) conducted an applications-based learning study for non-major chemistry nursing students at a Scottish further education college. Using applications-based learning, the same content was delivered as in the tradition course, but the sequencing and presentation of material were revised. Students were introduced to the material at a macroscopic level related to the nursing field, then moved sequentially to the sub-microscopic and symbolic levels. When material was intentionally linked to the past experiences and future career needs of students, the load on their working memory was reduced. The author reported universal support for the revised course materials using this application-based approach.

Constructivism is the Core of Chemistry Education Research

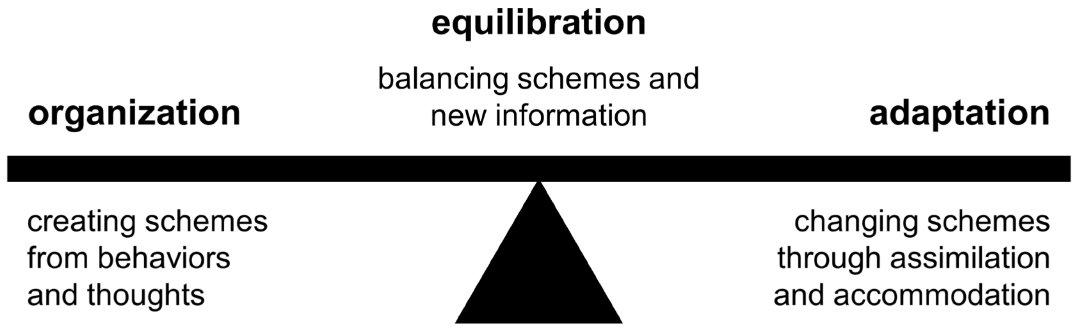
Educational psychology can help us to address the three central questions at the heart of chemistry education research as summarized by Cooper and Stowe (2018). These questions are, (1) what knowledge should students possess and what should they be able to do with it?; (2) how will we know that learners have attained a clear and meaningful understanding of chemistry?; and (3) what evidence is available regarding methods to help learners to develop this clear and meaningful understanding of chemistry? It is essential to turn to chemistry education research so that one might understand the frameworks for how students learn chemical principles.

The history of chemical education provides fascinating insights into the roots of modern chemistry curricula and cognitive theories (Cooper & Stowe, 2018). U.S. universities offered the first college chemistry courses in 1795. Over the next one hundred years, rapid growth in agriculture and industry caused some programs to begin offering multiple chemistry courses in the early 1900s. Early chemistry courses focused on practical applications in agriculture and industry, which paralleled the economic landscape in the United States at that time. Until the late 1950s, faculty generally presented chemistry from a descriptive point of view based on their personal experiences, rather than on theoretical constructs that lead to powerful predictive reasoning. A pivot in the landscape of chemistry instruction occurred when two Cornell University chemistry faculty released the first textbook that prioritized the theoretical development of chemical principles over accounts of processes (Plane & Sienko, 1957). Many topics selected for modern chemistry textbooks emulate those offered in this publication.

Now, more than two centuries after the first college chemistry courses were offered, chemistry education research draws heavily on the ideas of constructivism formed by Piaget, Vygotsky, Ausubel, Johnstone, and many more (Cooper & Stowe, 2018). In contrast to early notions that knowledge could be transferred from the instructor directly to the student, a constructivist paradigm suggests that knowledge is instead constructed in the mind of the learner (Woolfolk, 2001). The Swiss psychologist Jean Piaget (1985) famously suggested that all individuals are born with two tendencies, organization and adaptation (Figure 3). Organization is the tendency to combine and arrange behaviors and thoughts iteratively into rational mental systems called schemes. Adaptation is the tendency to make modifications to these schemes in response to the environment. It is the assimilation of new information into pre-existing schemes, or the accommodation that occurs should an individual need to change a pre-existing scheme or develop a new one. This need arises in response to some stimulus that causes disequilibrium. Piaget asserted that real changes in the learner's thinking occur through equilibration, whereby a learner establishes a balance between existing schemes and new information from the environment. Robert Karplus (1964), Beryl Craig (1972) and George Bodner (1986) were some of the first to connect constructivism to the world of chemistry. Perhaps the most important takeaway from constructivism is to recognize, as stated by Woolfolk (2001), that "students are the best sources of information about their own thinking abilities" (p. 39). In the context of adult education, adults are likely have more schema in place compared to younger peers, and these schemes are better developed.

Related to the constructivist framework are additional theories of learning that hold importance for chemistry students. The first is social constructivism, which was developed by Russian psychologist Lev Vygotsky (Cooper & Stowe, 2018; Vygotsky, 1978; Woolfolk, 2001). Vygotsky's sociocultural perspective emphasizes the importance of interactions with individuals who are more capable or advanced than the learner, who are sometimes referred to as knowledgeable others. Vygotsky claimed that even given step-by-step instructions, some problems are beyond a learner's current abilities. However, the learner

Figure 3. Depiction of the equilibration between organization and adaptation as described by Piaget, which forms the basis of constructivism

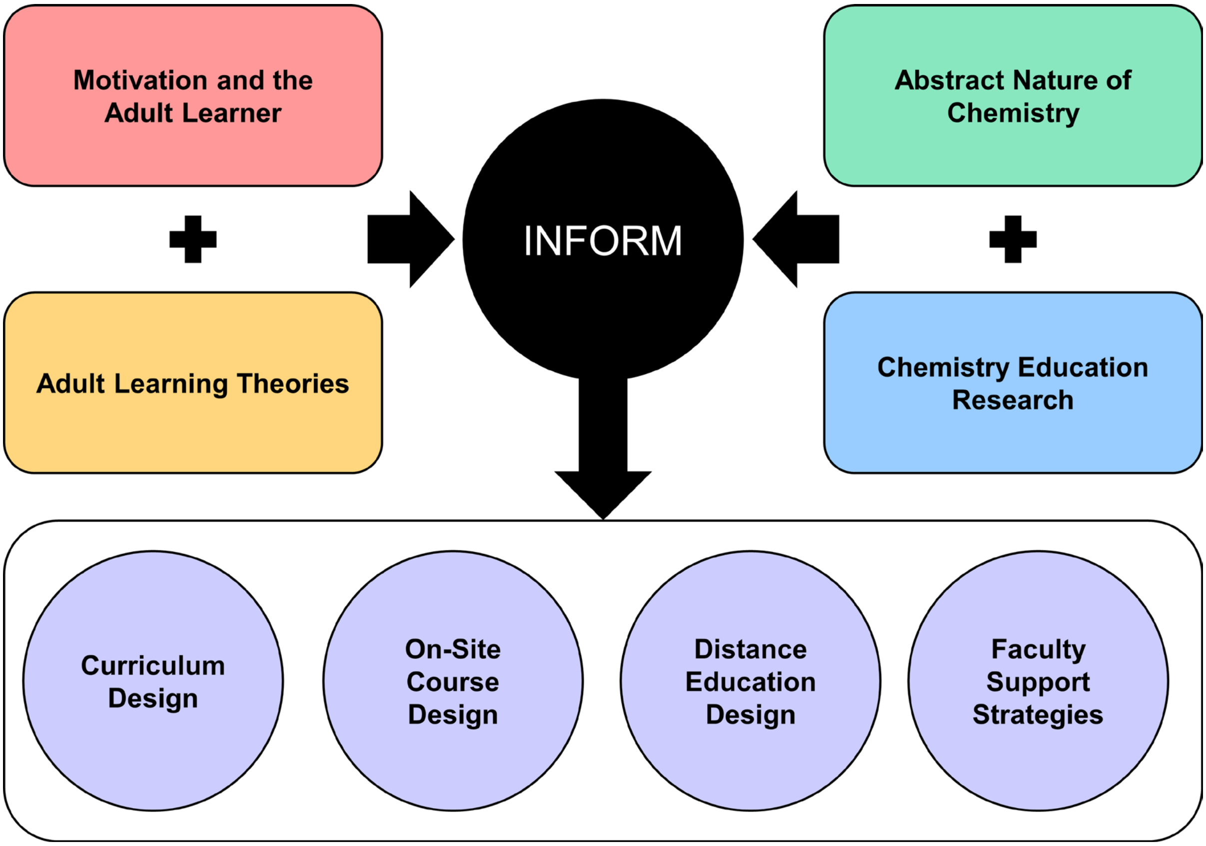


can be successful under guidance of an instructor or through collaboration with a more advanced peer, a phase called the zone of proximal development. Some examples of how chemistry students might learn alongside the knowledgeable other include forming study groups with academically stronger students or taking advantage of peer tutoring sessions. Social constructivism establishes the theoretical framework upon which several popular modern chemistry group strategies, such as Peer-Led Teaching and Learning (PLTL) and Process Oriented Guided Inquiry Learning (POGIL), are founded.

David Ausubel further refined the ideas of constructivism by emphasizing the role of meaningful learning (Ausubel, 1968; Cooper & Stowe, 2018; Woolfolk, 2001). For example, rote memorization is an example of learning that is not meaningful because it does not integrate with existing knowledge or schemes. On the other hand, expository teaching includes many examples, and fosters assembling knowledge into relational frameworks. Ausubel believed that individuals acquire knowledge through reception rather than discovery, and that highly organized presentations therefore foster greater learning. Ausubel hypothesized that learning should move deductively, from the general to the specific, in a 3-step framework. Specifically, he promoted the idea of (1) providing advance organizers to give the students prior knowledge, (2) establishing the relevance of their new knowledge in context of the prior knowledge, and (3) making connections to demonstrate the personal relevance to the learner. Ausubel's expository teaching strategies appeal to adult learners who want connection between the content and their personal experiences, and need to apply information with immediacy. This work aligns well with the ideas of information processing and the macroscopic level of the chemistry triangle.

In summary, a review of modern educational psychology sets the stage for considering, at a deep level, how adults learn, especially compared to their traditional counterparts in post-secondary educational settings. Constructivism has provided an insightful and valuable theoretical framework for chemistry education research that influences instructional approaches in the modern chemistry classroom and laboratory. There are many instances where core principles from chemistry education research intersect with and bolster those of adult learning theories, as summarized in Figure 4. Together, these constructs are used to understand the challenges that face adult learners and college chemistry educators, and they point to solutions that satisfy the cognitive needs of these nontraditional learners in increasingly diverse classroom settings.

Figure 4. Conceptual framework related to chemistry instruction for adult learners



CHALLENGES AND RECOMMENDATIONS FOR ADULT CHEMISTRY EDUCATION

From an andragogy viewpoint, adult chemistry learners share basic characteristics that lead to opportunities and challenges for instructional design in chemistry. The unifying characteristics introduced by Knowles (1980) are that adult learners tend to be self-directed, experienced learners who need to see the relevance of learning course material. They are more likely to be practical and averse to failure (Borland, 2016; Knowles, 1980). Through the lens of these characteristics, and being mindful of adult learning theories applied to chemistry students, the unique challenges associated with designing lecture and laboratory coursework for adult science learners comes into focus. Adults learn differently than the typically younger, traditional college peers with whom they share learning environments. Here, three main challenges for adult chemistry education are presented. These include effective curriculum and chemistry course design, integration of safe, high-quality distance education experiences, and overcoming barriers related to supporting faculty who choose to make adaptations that support adult chemistry learners.

Challenges for Designing Curricula and Courses that Consider Adult Chemistry Learners

Many adults identify as self-directed and seek a more independent role in their learning. However, there are several complicating factors associated with self-directed learning experiences. As introduced in SDL adult learning theory, individuals learn at different speeds and with their own learning styles. Although self-directed adult learners usually crave flexibility, they also, somewhat paradoxically, desire structure in learning experiences (Ross-Gordon, 2011). As a result, adult learners may be less inclined to use new pedagogical methods. Another obstacle is that students with lower literacy, numeracy skills and access to resources are less likely to be successful in self-directed learning settings. Bliss (2019) found that science learners are now asked to employ three distinct literacies on self-directed assignments, namely, information literacy, science literacy and digital literacy. The emphasis on literacy exacerbates the issue for students who struggle more in this area. On a related note, Kilner (2018) shared a study that examined difficulties that students encountered when solving chemistry problems requiring basic algebra and arithmetic. The author noted that students with weaker math backgrounds, or numeracy, tend to perceive chemistry courses as "all math", leading to heightened anxiety. Finally, although computer literacy is not an issue for the majority of adult learners, some individuals, especially in rural settings, may not have the resource of broadband access, thereby limiting their ability to participate in online classroom experiences.

A second challenge for curriculum and course design is effectively accommodating the considerable experience of adult learners compared to traditional peers. The adult learner generally wants opportunities to share their experiences and examples, and for their existing knowledge to be visible and respected. Yet, traditional chemistry courses are mostly often content driven and may provide few opportunities for students to share their experiences and discuss concepts in class. Even outside of class, homework assignments tend to focus on developing the ability to carry out calculations or provide basic explanations of phenomena studied in class, rather than on providing opportunities for learners to integrate their knowledge and experiences in meaningful ways. The entire underpinning of constructivism is that students bring their own knowledge to the classroom and build from that scaffolding, developing from novices to experts, and so it is important to provide forums where adult learners can share their experiences. The prior knowledge of adults is a great asset to their learning and can benefit their peers as well, especially if they are able to serve as knowledgeable others. However, adults tend to be goal-oriented and are usually less interested in the social aspects of the college experience. This factor may limit their participation in transformative learning, whereby adults would be highly engaged in discussion among peers.

Most adult learners seek immediate relevancy in their coursework, and most desire opportunities to relate course content to their lives and current or intended careers. One significant challenge in designing chemistry curricula and coursework is that adult science students are not taught in a vacuum, but rather, in a classroom environment alongside students with many diverse backgrounds in terms of demographics and field of study. For instance, keeping chemistry relevant to the specific interests of adult learners may be especially difficult in general chemistry courses, which serve science majors, applied science majors, health and pre-health professional students, and those engaged in fulfilling scientific reasoning requirements of liberal studies coursework. Complicating matters further is that, though chemistry provides opportunities to connect with a myriad of other fields, traditional general chemistry courses tend to be highly subject driven. There is a great deal of content that faculty are asked to address in a short amount of time. Cooper and Stowe (2018) describe general chemistry, in particular, as having a tendency to run "a mile wide and an inch deep" (p. 6062). Although most faculty do include many applications-based examples throughout the semester, it is challenging for faculty members to provide continuous, relevant examples that consistently connect with so many different fields of study (see Figure 1) and so many different learners. Ironically, chemistry courses designed for non-majors are usually those that provide the most direct connections between the content and phenomena that students have experienced, such as interaction with consumer products or observations related to climate change.

A fourth consideration when designing curricula and courses for adult learners is that most reentry adults tend to be practical. In this usage, practicality means that adults need efficient strategies for learning because there are many demands on their time. Although many traditional students maintain full schedules with studying, athletics, clubs, part-time work, internships, community outreach, and more, adult learners tend to have an entirely different set of competing external responsibilities. For example, for those adult learners who work while attending university, it is particularly telling that two-thirds characterized themselves as workers first and students second (Ross-Gordon, 2011). Adult learners may want to grasp key points and then take a deeper dive later as their schedules permit, but traditional chemistry classrooms do not typically provide for such flexible pacing. Excluding summer courses, there are very few opportunities for adults to engage in accelerated course formats. Here again, traditional college science courses seemingly run counter to the types of educational experiences that could most benefit some adult learners based on cognitive theories.

A final consideration for faculty, instructional designers and universities as a whole, is that some adult learners tend to be averse to failure. Tsai, Li and Cheng (2017) report that compared to younger individuals, adults have reduced levels of self-efficacy, or confidence in one's ability to complete a task. Many reentry students delay entrance into science coursework (as do some traditional students). As noted by Longo (2007), some individuals feel apprehension because they understand the high level of commitment generally needed to be successful in STEM coursework. Others are averse to taking STEM courses because they do not feel academically ready or because it has been a long time since they took a chemistry course, if they had one at all. For instance, the National Science Board (2018) reports that only 76% of high school students have completed a chemistry course, indicating that a significant number of traditional and nontraditional students have had no formal training in chemistry upon entrance to a college or university. As a result, some adult learners focus on completing their liberal studies coursework first, and wait to enroll in their math and science courses (Longo, 2007). A challenge, then, is for chemistry faculty and instructional designers to establish encouraging learning environments that provide opportunities for students to make mistakes as they accommodate new concepts into pre-existing mental schemes. It may be also advisable for universities to develop bridge courses to help students gain requisite knowledge and skills, and therefore, be better positioned for success in subsequent science coursework (Kilner, 2018).

Recommendations for Designing Curricula that Consider Adult Chemistry Learners

With regard to curriculum design, there are numerous strategies that begin to address the issues identified above. One overarching recommendation for addressing the needs of adult learners is that universities continue to support modifications to overall curriculum design at an institutional level. Specifically, many adult learners are practical learners and benefit from the ability to take evening courses, accelerated courses, or distance and online courses. One example of such transformational curriculum design comes from a study on adapting undergraduate research experiences. The authors hail from a university made up mostly of nontraditional students (63% attend part time due to employment and the average learner is 31 years old) (Ries & Gray, 2018). As noted in the study, traditional faculty-led undergraduate research experiences lead to increased confidence, independence and ability to overcome setbacks in the laboratory. They lead to greater persistence and increased ability to consider research as a career. All of these qualities align with the needs of adult learners to have self-directed learning experiences, develop resiliency, and establish deep and meaningful connections with mentors. The authors of the study sought to maximize the learning outcomes for nontraditional students by adapting their undergraduate research course, replacing a traditional undergraduate research experience with a nontraditional Faculty Developed Independent Study (FDIS). The redesigned course preserved all of the elements of the traditional experience, including a literature search, safety training, project design, and exposure to techniques and analysis, often in small-molecule synthesis. However, the FDIS provided opportunities for flexible scheduling (e.g., doubling up on credits to complete the course in half of a semester) and involved a higher fraction of assignments that could be completed off-site at the student's convenience, such as soft skill assessments and an ACS-style research report. In contrast to the previous course, the authors observed 100% completion of the experience and increased interest in graduate studies. Works like these show the successes of meeting the needs of learners through creative and adaptive curriculum design, even in upper-level chemistry coursework and learning experiences.

Another facet of effective curriculum design relates to providing greater access to high-quality and upper-level chemistry courses. In its report on *Science Education Policies*, the American Chemical Society makes a number of recommendations for 2- and 4-year colleges that pertain to adult science education (American Chemical Society, 2004). For example, ACS recommends that high schools and 2-year colleges create clear articulation agreements with 4-year institutions to ensure clear pathways to 4-year degrees with direct transfer of credits. For example, at community colleges, organic chemistry is usually not offered due to lack of equipment, instrumentation, and faculty time and skill set (Holden & Kurtz, 2001). Delaying entrance in the organic sequence until the third year of study puts transfer students at a disadvantage when they enter into 4-year programs to complete pre-health tracks (Figure 1). Specifically, with the revision of the Medical College Admissions Test (MCAT) in 2015, pre-medical students now take a 5-course chemistry sequence that includes a course in biochemistry, and most plan to take the MCAT at the end of the junior year. Candidates who were unable to complete organic chemistry in the second year typically need to take the MCAT without having completed biochemistry, or having completed biochemistry with reduced organic chemistry knowledge and schemes. A higher percentage of adult learners attend 2-year colleges, and so clear articulation agreements or partnerships with 4-year universities boosts access to coursework needed for future career steps.

Recommendations for Designing Courses that Consider Adult Chemistry Learners

Adult chemistry learners typically constitute a small fraction of all learners enrolled in a traditional chemistry course. Nevertheless, they are equally important members of the classroom community, and even small course modifications can greatly benefit their learning experiences. Regarding the design of chemistry courses that consider adult learners, it is recommended that faculty use a variety of teaching methods, foster constructivism, make clear connections between content and practical applications, and provide access to quality online learning materials. Implementing these strategies effectively is likely to benefit the traditional peers who study alongside adult chemistry learners. Yet, they are particularly important to prioritize for universities who serve larger populations of adults, such as community colleges, or those intentionally working to attract and support adults in their learning communities.

From this review, it is clear that a best practice is for faculty to use alternate teaching methods to ensure multiple representations of chemical concepts, as many adults have different learning styles compared to traditional peers. One example of course design that was introduced previously is applications-based instruction. In this model, learners move from the macroscopic to sub-microscopic to symbolic representations in order to limit the demand on working memory. Another example of using multiple representations is to give chemistry students the opportunity to participate in structured group work settings. For example, PLTL and POGIL methods of learning can help students to accommodate new chemical knowledge through social constructivism frameworks. Along these lines, the American Chemical Society recommends that faculty include opportunities for students to participate in oral and written communication in chemistry courses, which enable adult learners to link the content to their own experiences and career goals.

From an educational psychology standpoint, there is a general consensus that chemistry faculty and instructional designers should transition toward fostering constructivism, thereby focusing on development of expert knowledge structures in their adult science learners as described previously. Increased recognition of students' prior knowledge must be considered in designing coursework, and getting to know students is key to tailoring curricula to meet their needs. In small classrooms or laboratories, this goal may be easier for faculty to achieve through one-on-one or small group conversations. However, even in large classroom settings, faculty may use simple strategies including a prior learning assessment, a brief survey during the first week of class, or informal conversations during office hours to become better acquainted with individual learners and their needs. Over the years, much emphasis has been placed on identifying what students don't know and what misconceptions novice learners bring to the chemistry classroom. However, novice learners tend to have more fragmented and fluid knowledge structures, rather than being erroneous and solidified (Cooper & Stowe, 2018). Easing overload on working memory, for example through applications-based instruction, helps learners to anchor their existing knowledge and begin to develop more expert-like (e.g., less fragmented) knowledge constructs.

Science education empowers learners to connect with and understand their physical world. A strong foundational knowledge of chemistry leads to deeper understanding of traditional scientific disciplines and a host of other fields. Chemistry faculty should design courses that demonstrate how science is able to solve problems in a global society and how chemistry is relevant to the needs of the general public (American Chemical Society, 2004). For example, developments in science and technology impact our everyday lives, from the creation of new electronic devices and consumer products to understanding climate change and advances in health care that improve quality of life. This sentiment is echoed by Cooper and Stowe (2018), who make a recommendation that content should be relevant to learners with clear connections to the personal experiences of students. One strategy for doing so is not only to include real-world examples in chemistry courses, but also to break from the traditional topic-by-topic layout of chemistry courses. In identifying what content should be taught, especially in first-year chemistry courses, ACS and others have prepared major core concepts that offer a new perspective for how faculty might structure the curriculum (Cooper & Stowe, 2018). These overarching themes tend to collect around the big-picture topics of atoms, bonding, intermolecular forces, chemical reactions and more. By focusing on major themes, traditional and adult science learners alike may be able to chunk fragmented information into more organized and unified schemes.

For adult chemistry learners who tend to be self-directed, transformative learning occurs when they seek out information and assess their own learning. In line with the adult learning theory of transformational learning, learners must have ample opportunity to participate in information management and retrieval assignments (American Chemical Society, 2004), which encourages students to access and interpret multiple points of view. There is growing recognition regarding the multitude of online resources related to chemistry, now available in a quick, digital format. Given the complexity and range of online chemistry information, ranging from reputable to intentionally misleading, it is essential that faculty provide examples of quality resources to students. For example, Kilner (2018) identifies the Khan Academy and chemreview.net as two reputable sources that can assist students with development of their chemistry–mathematics numeracy skill set. The work of Kilner is a good example of how faculty can provide entry points for students seeking to access quality online content, in line with best practices from SDL. Though some adult chemistry learners come in with strong mathematical backgrounds, a recitation format for those with weaker backgrounds is an effective tool for helping underprepared students to join lecture courses, and small group settings provide opportunities to dispel misconceptions as students make accommodations in their mental schemes (Kilner, 2018).

Challenges for Designing Distance Education Chemistry Coursework

Borne of a need for flexibility and self-directed learning opportunities for adult chemistry learners, distance chemistry education has become an important area and warrants focused study in this work. Indeed, distance learning offers a highly flexible setting for adult students to complete their coursework. Distance education has come a long way and has grown more prevalent since the emergence of online coursework only a few decades ago. The effectiveness of distance learning in chemistry lecture settings has long been demonstrated in the literature. For example, one early study focused on organic chemistry courses, where one regional college was designated as a hub for two smaller rural community colleges. The authors found that when interactive live lectures were provided from the traditional college to the community colleges via interactive video feeds, there was no significant difference in academic performance between the two groups (Holden & Kurtz, 2001). Students' attitudes toward distance education were positive, even in light of a few technical glitches.

It is crucial to promote the development of asynchronous programs that can reach nontraditional students unable to attend college classes on site. Adult chemistry learners may need access to flexible education options whereby they can set their own hours and schedules. For example, it may not be possible for someone working full time to attend laboratory courses scheduled during regular daytime hours. Distance education is an important option for such learners. The literature related to distance education course offerings in chemistry is extensive, so here, the focus will be on the unique challenges associated with delivering chemistry laboratory coursework in a distance education format. The three primary options for distance education chemistry laboratory experiences are providing small-scale chemistry kits for home use, use of visual and virtual simulation laboratories, and development of remote-triggered real-time laboratory experiences. All of these present a host of unique challenges for chemistry faculty and instructional designers.

In the first distance learning laboratory model, students purchase a laboratory kit and complete small-scale experiments in their homes. Some of the first distance education chemistry labs using kits of experiments were offered in the United States in the 1990s, though other countries such as Canada and the United Kingdom had already been offering these for some time (Boschmann, 2003). These kits are similar to the modular experiments and demonstration kits that have been offered for many years by manufacturers of science education products. Still widely in use today, many chemistry programs outsource the process for compiling these laboratory kits through an external third-party vendor. For chemistry programs, the primary concerns underpinning instructional design involving lab kits are that, if students are to perform chemistry experiments, they must be able to do so in a way that is safe, legal and retains academic rigor.

Few distance education courses have presented so many logistical obstacles for course development as performing physical, off-site chemistry experiments. Distance chemistry laboratories present issues of safety, legality and rigor in abundance. For example, students often complete chemistry experiments from kits, using their homes as laboratory spaces. If a home environment is used as even a basic laboratory space, then a number of safety and legal issues must be considered before delivering kits to students. In this sense, it would be prudent to replace some laboratory experiences with similar alternatives that pose inherently lower risk (Boschmann, 2003), though questions arise about retaining the rigor of the course. The issue of cost is important too, as many first-year laboratory experiments make use of precision analytical balances, which are too expensive for students to purchase in kits (Boschmann, 2003). Another drawback is that the use of more sophisticated equipment and instrumentation is typically not an option for students in this model.

In a second model, distance learners complete laboratory work through virtual simulation settings. For example, a simulated laboratory experiment may ask students to perform a virtual titration of an acid with a base in a computer program. Virtual laboratories are attractive options in that they circumvent the legal and safety issues that accompany the design of physical laboratory kits. However, laboratories are, at their core, hands-on experiences. Virtual methodology naturally circumvents the development of dexterity, exercise of safety measures, and participation in first-person laboratory experiences that are tied intimately to chemistry laboratory work. One common complaint among faculty and students is that these simulations are based on mathematical models and, while valuable as a learning tool, they tend not to mimic the real feel of an actual laboratory experiment. Many faculty feel that it is important demonstrate to students the best practices associated with working in a laboratory environment, including proper laboratory technique, ethical treatment of data and proper disposal of waste. Interestingly, these virtual laboratory experiments must be intentionally designed to include errors in the data or in the simulated student experience in order to retain some of their authentic nature (Kennepohl, Baran, & Currie, 2004).

Indeed, online laboratory experiences that are simulations of actual laboratory experiences (virtual laboratories) suffer from the lack of the authentic laboratory component that are associated with in-person chemistry learning experiences. More recently, universities have started to blend virtual and real-time laboratory experiments to provide off-site laboratory experiences. For example, remote-triggered laboratory experiments have been used for years in the military and space exploration (Kennepohl et al., 2004), but they are starting to become a more widely considered as a distance education option. In remote-triggered lab experiments, students log into a server and interface directly with instruments to carry out experiments off-site. This is a fascinating concept in that the students gain legitimate laboratory experience and are able to perform at least part of the experiment from any location on the globe.

Laboratory courses present singular challenges for distance education delivery, though several options exist to meet the growing need for flexible, off-site laboratory coursework. Many questions remain regarding how best to administer distance chemistry laboratory experiments. For example, how is it possible to know that the student, and not another individual, has completed the experiment? How can safe and proper laboratory technique be ensured in an unsupervised at-home laboratory setting? The challenges are many, and present ample room for development of future research in this area.

Recommendations for Designing Distance Education Chemistry Coursework

Here the author reviews modern best practices for administering distance education laboratory experiences, in light of a review of the three primary delivery methods introduced above. Boschmann (2003) describes best practices for designing off-site chemistry experiment kits to help mediate concerns about safety, legal responsibility and academic rigor. Specifically, experiments should be carried out on a microscale using chemicals that have low concentration, low toxicity, have simple disposal protocols, and that use household chemicals whenever possible. Virtual laboratory experiences can replace some experiments that would use more expensive equipment or elaborate experimental setups. Boschmann (2003) emphasized the need to involve the university's chemical hygiene officer and safety committee in designing courses that use laboratory kits. Likewise, it is crucial to ensure that learners have access to excellent safety training and that the importance of safe laboratory practices is emphasized throughout the course (Boschmann, 2003).

One recent virtual laboratory effort describes an effort to develop virtual chemistry experiments on gravimetric analysis of drinking water, based conceptually on Johnstone's chemistry triplet (Davenport, Rafferty, & Yaron, 2018). In the experiment, high school students were provided with a hook to engage them and provide a real-world scenario where gravimetric analysis might be used. They conducted a virtual experiment, simulating an experimental procedure that would transpire in an actual chemistry lab, analyzed their data, and drew conclusions about the quality of the drinking water. Specifically, students manipulated solutions in the virtual experiment (macroscopic representation), sorted particles at different temperatures and concentrations using models (sub-microscopic representation), and interacted with chemical equations and chemical quantities expressed in different units (symbolic representation). Thus, faculty provided multiple representations to help students integrate fragmented knowledge into larger chunks as they developed a more expert-like knowledge structure. In this way, virtual laboratory experiments can offer a unique, enhanced development of molecular model systems and their connection to macroscopic phenomena, in a way that is difficult to visualize in a chemistry laboratory. Another advantage is that immediate feedback can be provided to the learner in this setting (Davenport et al., 2018). Interestingly, the authors of this study found that students who worked independently seemed to gain more from the learning experience than those working in pairs, which holds promise for transfer to adult learners, who often prefer to work independently.

In contrast to simulated laboratory experiments, remote, real-time experiments offer a safe, engaging and true-to-life laboratory experience for distance laboratory learners. The literature describes initial studies investigating the possibility of performing instrumental analysis in chemistry using remote instrumentation (Kennepohl et al., 2004) and the development and prevalence of remotely-triggered, real-time laboratory experiments has grown in recent years. Best practice for remote online laboratory learning experiences is to provide a friendly and easy-to-use instrument interface for the user, create a scheduling system where students may reserve a time slot (just as in a real research laboratory), make tutorials available, and provide the opportunity to chat in real time with an instructor as questions arise. In what would be an elegant combination of distance laboratory options, Baran and co-workers (2004) advocated for including a virtual pre-laboratory experience, which would provide a method for students to practice the experiment before executing the steps in real time. This approach aligns with the work of

Ausubel (1968), who promoted the idea of organizing knowledge before the user practices and then applies knowledge to their own immediate needs. Ten years later, Saxena and Satsangee (2014) described a suite of electrochemical experiments based on these ideas. In one of these experiments, students interfaced with a website, performed a simulation, remotely dispensed a dopamine solution onto an electrode, and then remotely triggered a potentiostat to complete a cyclic voltammogram measurement. These developments are encouraging, as remote laboratory experiences can be highly cost effective, provide access to equipment for smaller institutions, and can serve learners in remote locations.

Challenges and Recommendations for Supporting Chemistry Faculty

Advances in adult education for chemistry learners hinges on the engagement and professional development of science faculty and instructional designers. Faculty already face numerous challenges as previously outlined, including the highly diverse student population served in introductory chemistry courses and an audience with many different intended career pathways.

Another major obstacle is associated with faculty buy-in. The chemical literature contains countless examples of how instructors can incorporate real-world examples into their courses. Some of these include the use of case studies, service–learning opportunities, and project-based learning methods in lecture or laboratory settings. As noted by Ausubel (1968), it is crucial that learners be able to connect what they have learned in the classroom or laboratory back to their own experiences in this way. However, faculty have limited time for (and some have little interest in) transformative course development. Faculty must have evidence that making changes to their courses is likely to yield improved student learning outcomes for adult learners, and hopefully an improved faculty experience, without negatively impacting other student populations in the same classroom. However, research in this area is very limited. There is a great need to demonstrate the evidence for improved outcomes for students when faculty adopt new practices for their courses (Cooper & Stowe, 2018).

Increased support and recognition for faculty who participate in course development related to adult science learners will be key to the progression of this area. With the exception of general education courses for non-majors, chemistry courses tend to be subject driven with limited time for discussion-based activities in the classroom. Compounding these issues is the tendency in higher education to reward faculty advances in scholarship over innovations in teaching, even when adopting frameworks like the Boyer model of scholarship (Boyer, 1990). If faculty are to address the needs of adult learners in their classrooms, continued professional development and increased university recognition of the value of curriculum development in the promotion and tenure process will be crucial. Greater value placed on bold instructional design in promotion and tenure decisions may encourage faculty to invest time and effort into researching and selecting new methodologies, and redesigning their curricula to incorporate, combine and assess these practices.

FUTURE RESEARCH DIRECTIONS

An aging and increasingly diverse population, the rapid integration of new technologies in the workplace, and changes in employer needs all predict continued relevance and vitality in the study of adult education (Ritt, 2008). Specific to chemistry and other STEM fields, there is much room for future research in the area of adult education. Many of the pedagogical strategies for teaching and learning chemistry that are suggested in the literature apply to the typical population of students already engaged in chemistry coursework, rather than focusing specifically on understanding the needs of adult learners. Furthermore, there is scant research related to adult learners in upper-level chemistry courses such as physical, analytical and inorganic chemistry. Nearly all chemistry graduate students are adult learners, and the undergraduate setting provides a structured environment in which to study how more advanced learners begin making the transition to increasingly independent structured learning settings.

To engage a larger population of adult students who study chemistry, increasing universal access to quality chemistry learning experiences remains a priority. For example, continued growth in the number of online and open access education opportunities including Massive Open Online Courses (MOOCs) is expected. However, the persistence and pass rates in MOOCs are typically very low, and are disproportionately low for low-income or underprepared learners, which may reflect some of the obstacles that hinder self-directed learners, as discussed previously. For example, an MIT solid-state chemistry course yielded only a 7% pass rate in its first iteration in 2012 (Cooper & Stowe, 2018). It remains vital to refine online and open access courses such that faculty deliver content in an interactive, encouraging atmosphere that minimizes risk of failure and supports learners who join courses with varying levels of preparedness.

Chemical safety is another area for research exploration. Although ACS (2016) has published *Guidelines for Chemical Laboratory Safety in Academic Institutions*, there still exists a need in the chemistry community to create a standard universal laboratory safety training program that could be utilized or adapted for undergraduate students taking chemistry courses. Such a program would benefit nontraditional learners engaged in off-site laboratory experiences as well.

One of the most intriguing areas for future work in adult chemistry education research rests with the development and assessment of instructional technologies as learning tools. As reported by Cooper and Stowe (2018), there is as of yet, very little evidence to indicate the effectiveness of instructional technology in meeting student learning outcomes. Instructional technology may include the use of clicker devices or visualizations in the classroom. However, if faculty are to adopt new technologies, there must be sound evidence indicating that these tools positively influence achievement of student learning outcomes and attitudes toward chemistry. Instructional technologies can help students to connect personally with content, and to engage in independent guided practice and self-assessment of their learning. All of these characteristics align with our understanding of how adults learn.

There exists a need for the chemistry community to continue to grow and develop a catalog of online, remotely triggered laboratory experiences. Simulation-based activities can be valuable tools when in-person laboratory experiences are not possible. Some of these scenarios occur in high schools and community colleges where budget may be a significant factor in offering laboratory coursework, and when adult learners have limited ability to travel to campus to perform laboratory coursework. One challenge for this area is the number of individual tasks that require automation when preparing an online experiment (Saxena & Satsangee, 2014). Interestingly, the chemical industry is beginning to see a shift to increased inclusion of robotics in the completion of experimental chemical work. More research in this field will be fascinating for future studies related to distance chemistry education. Students who provide feedback on these distance laboratory experiences are a guiding force in their future development, in line with the idea that adult learners bring a vast pool of experience that should be respected and incorporated into classroom activities and into curriculum design.

There is a growing body of research regarding the connections between scientific engagement and competencies related to adult affective factors (Tsai et al., 2017). For adults, self-efficacy (self-confidence) is the greatest predictor for engagement in science, with enjoyment and interest as additional important influencers. Adult learners tend to be mature and demonstrate a readiness and motivation to learn, but they also tend to have lower self-confidence because of their self-perception as perhaps being less competent than those already enrolled in academic pursuits. Future studies should develop self-assessments for adult learners to gauge their true competence in science and compare their own perceptions.

As more adult learners turn to online sources and media to build their knowledge of chemistry and explore their interests, chemists and educators have a responsibility to understand how adults interact with online content, and to create and assess quality, credible online resources. Bliss (2019) emphasizes the need to identify the specific channels through which adults navigate online content and how they use it. Adults have consumer-driven expectations for online content such as professional-looking websites, efficient web page organization, a complete overview of facts, content that is conveyed as relevant to their own experiences, reputation, and sharing of knowledge from trusted others. This last point speaks to the relevance of Vygotsky's social constructivism even in a modern online setting. Development and assessment of online science-based resources has shown some growth and interest recently. For example, the *ACS Climate Science Toolkit* is an example of a quality, credible online resource that was developed by experts to inform those seeking information about climate change through informal channels (American Chemical Society, 2012).

Finally, future research should include the design of curricula for adults in non-formal science education settings, such as museums and community learning centers. In one study, Gagnon and Komor (2017) describe a chemical education and mentoring program for adult learners engaged in study toward a high school equivalency degree. Engaging with a community partner allowed the university to take advantage of a pre-existing class structure and attendees, and provided a clear pathway for future students to enroll at the post-secondary level. Making an investment in chemistry education in the community is important for many reasons. The development of scientific reasoning, problem solving and critical thinking skills is of immediate value for adults making decisions that affect their communities. The authors assert that when parents complete higher education, it leads to successes for their children as well, evident through examination of numeracy and literacy scores. Adults who participate in community-based continuing education programs are making intentional decisions to develop their education, and such experiences have been reported as highly rewarding for both the program participants and those involved in its offering (Gagnon & Komor, 2017).

CONCLUSION

In conclusion, adult chemistry learners are nontraditional, reentry students over the age of 24 who are engaged in chemistry coursework. As a whole, nontraditional students make up 70% of all college students enrolled at degree-granting institutions, with 38% of all college students identifying as reentry adults, and at least 10% of adult learners engaging in at least one chemistry course. It is therefore relevant to design chemistry curricula and courses with adult learners in mind. Adult chemistry learners tend to be more mature than traditional students, and are driven by a desire to achieve specific personal and professional goals. Attainment of an undergraduate degree can lead to improved job opportunities, significant employment and earnings advantages, enhanced community and political engagement, and overall improved quality of life. An accurate and developed knowledge of chemistry is important for those adult learners pursuing STEM degrees and careers in health care. It is also relevant for the adult population as a whole, owing to continued advancements in science and technology, as well as environmental stewardship and science policy considerations, all of which affect the general public.

Students have been taking university chemistry courses in the United States for over 200 years. In that time, chemistry education research has blossomed from early days of experience-based accounts to well-founded studies of knowledge frameworks that converge on a constructivist model. The work of Piaget (1985), Vygotsky (1978), Ausubel (1968), and Johnstone (1982) are but a few of the pioneers who have helped to guide an understanding of how students acquire knowledge in chemistry and move from fragmented novice constructs to well-developed, efficient expert schema. Through the lens of chemical education research, insightful theoretical frameworks have been developed that help faculty and course designers to select course content, create assessments and design curricula. Even so, adults learn chemistry differently than their traditional peers, and it is necessary to consider the three major adult learning theories (andragogy, self-directed learning and transformational learning) as targeted activities are created for adult chemistry learners.

Many reentry adults display characteristics of life-long learners. They may be self-directed, experienced, goal-oriented, practical learners who avoid situations where the risk of failure is relatively high or where they are asked to engage with a new instructional strategy (such as PLTL or POGIL). These considerations are central to understanding the challenges that face adult learners, especially because traditional chemistry classroom and laboratory experiences often do not naturally accommodate these characteristics in learners. Faculty can assist adult learners by designing instructional components and assessments using a constructivist approach, with multiple representations at the macroscopic, submicroscopic and symbolic levels. Faculty might assist learners in moving to expert knowledge constructs by centralizing their courses around key themes and by providing ample examples of how course topics influence learners on a personal level. Faculty play a key role in helping self-directed learners to identify and access quality resources for independent study, and in empowering students to improve their ability to evaluate these resources during independent learning. It is crucial to provide curriculum options that encourage participation from nontraditional students. Distance education, particularly laboratory courses, offer unique instructional design challenges and opportunities as they pertain to experiments performed off-site using laboratory kits, simulated experiments, and remote-triggered real-time laboratory experiments. Faculty buy-in for creative and effective course redesign requires demonstration that curriculum innovations are backed by studies that provide evidence thereof. Faculty should be acknowledged and rewarded in the promotion and tenure system for making bold and continual curriculum innovations.

There are plentiful opportunities for future research studies to inform our practice of adult science education. Some of these areas are a focus on adults enrolled in upper-level chemistry courses, improvements to universal access courses such as MOOCs, development and assessment of instructional technologies as chemistry learning tools, development of quality online laboratory and information resources, and study of informal adult science learning. Though the field of chemistry is presented here as a focal point for considering the needs of adult learners engaged in chemistry courses, many of these principles extend to other STEM fields.

In many ways, adult learners are similar to the faculty who instruct chemistry courses. Many of the educational strategies presented in this work likely appeal to the educators who have dedicated all or part of their careers to sharing the joy of learning chemistry. Perhaps the simplest guiding credo for faculty and instructional designers with an interest in adult chemistry education is to teach their students as they themselves are inspired to learn.

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KEY TERMS AND DEFINITIONS

Adaptation: The tendency to make modifications to mental schemes in response to the environment.

Adult Chemistry Learners: Individuals over the age of 24 who are enrolled in a chemistry course at a post-secondary institution.

Andragogy: The methods and principles of teaching adult learners.

Constructivism: The idea that knowledge is actively constructed in the mind of the learner as new information is assimilated into existing mental frameworks, or as those systems are adapted to accommodate the new information.

Organization: The tendency to combine and arrange behaviors and thoughts iteratively into rational mental schemes.

Self-Directed Learning Theory: The theory of adult learning in which students take the initiative to plan, execute and assess their own learning experiences without outside assistance.

Self-Efficacy: Confidence in one's ability to complete a task.

Transformational Learning: The theory of adult learning in which students experience a fundamental shift in consciousness related to how the learner views himself or herself and the world.

Zone of Proximal Development: The gap between what a learner can do independently and what he or she can accomplish with the support and assistance of a knowledgeable other.

APPENDIX

APPLICATION ACTIVITIES

1. Suppose that a faculty member is designing a class survey with the goal of better understanding the backgrounds and interests of all learners in the classroom. The instructor intends to use the results of the survey to inform some elements of course design and out-of-class assignments. Considering the motivators for adult learners and theories of adult learning, develop four questions that could be included on the survey.
2. What are the three facets of representation of the chemistry triangle presented by Johnstone? What are the three steps of information processing summarized by Ashcraft? Describe the relationship between these two models, and explain how instructors can design coursework to assist adult chemistry learners in moving from novice to expert constructs.
3. Chemistry education research suggests that there are some advantages to approaching chemistry as overarching themes rather than topic-by-topic presentations. What is one potential advantage of designing chemistry courses in this way? How would a course designed around broader themes look different than a traditional topic-by-topic chemistry course?
4. Indicate three strategies that universities and programs can implement to improve the accessibility and effectiveness of their chemistry programs for adult learners.
5. Consider the following statement. "Although most students who enroll in chemistry courses are not adult learners, it is important that faculty incorporate strategies that address the needs of adult learners." Do you agree or disagree with this statement? Support your argument.
6. Suppose that an instructor is teaching an undergraduate general chemistry course and is updating the presentation of gas laws this year. Using the *Recommendations for Designing Courses that Consider Adult Chemistry Learners* presented in the chapter, suggest three specific changes that could be used to address the needs of the adult learners in this setting.
7. Distance education options for chemistry laboratories pose unique challenges for instructional design. Suppose that you are asked to offer a distance education laboratory to accompany an introductory chemistry course designed for nursing students. These students are mostly reentry adults enrolled in an RN to BSN program. Considering the advantages and disadvantages of the three delivery methods discussed in this chapter (i.e., off-site laboratory kits, virtual simulations, and remote-triggered laboratory experiments), which option(s) would you choose for your distance laboratory course and why?

Chapter 17
3D Modeling and Printing Integrated Lesson Planning:
A Competency-Building Project to Improve Pre-Service Teachers' Readiness for Technology Integration

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ABSTRACT

This chapter presents the design and development of the competency-building 3D Instructional Video Project intended for developing pre-service teachers' technology integration competency. Unlike traditional projects in educational technology courses that are well defined and structured, involving using an educational tool to complete a task, the 3D Instructional Video Project is a semester-long project requiring pre-service teachers to plan their 3D modeling and printing integrated lesson, explore Tinkercad and design their 3D models, test their 3D models with the Makerbot Desktop, print off their 3D models with a Makerbot 3D printer, and present their 3D modeling and printing integrated lesson planning through a video created with iMovie. This 3D Instructional Video Project engages pre-service teachers in discovery learning and is designed to help pre-service teachers to build their competency for dealing with the constant changing landscape of educational technology and transforming teaching and learning with emerging technologies.

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INTRODUCTION

Technology integration has long been acknowledged as an important means of improving learning experience and enhancing student achievement (U.S. Department of Education, 2001, 2004, 2013). The past two decades have witnessed incessant efforts to increase access to technology resources in schools, from the 3.8:1 ratio of students to instructional computers with Internet access in 2005 (Wells & Lewis, 2006) to one-to-one laptop or ipad and one Smart Board each classroom (Lu, Ottenbreit-Leftwich, Ding, & Glazewski, 2017; Poll, 2014) in recent years. However, these efforts have not always been accompanied with effective uses of technology. On one hand, there is high access to technology resources, and on the other hand there are technology uses for low-level learning tasks (e.g., word processing, Internet research, random video watching, and practiced drills) associated with teacher-centered instructional practices (Cuban, Kirkpatric & Peck, 2001; Ertmer, 2005; Sun, 2013). This "high-access vs. low-use" paradox (Cuban et al, 2001) is not uncommon in technology integration practices (Becker, 2001; Culp, Honey & Mandinach, 2005; Ertmer, 2005; Govender & Govender, 2014; Palak & Walls, 2009;). Behind this "high access vs. low use" paradox lies teachers' unpreparedness for technology integration (Tondeur, Roblin, van Braak, Fisser, & Voogt, 2013).

Most teachers with access to technology, teaching experience, and technology knowledge and skills are still not able to effectively incorporate technology into their teaching (Akbaba-Altun, 2006; Govender & Govender, 2014). Pre-service teachers are worse off due to their lack of experience in teaching. Grown up as digital natives, pre-service teachers are expected to be ready for integrating technologies into teaching and learning when graduating from their teacher preparation programs. Unfortunately, it has been reported that pre-service teachers lack the knowledge and skills of teaching effectively with technology and are not ready for technology integration (Brinkerhoff, Ku, Glazewski, & Brush, 2002; Brown & Warschauer 2006; Johnson 2012; Sun, Strobel, & Newby, 2017). Although teacher education programs have included educational technology courses as part of their teacher preparation curriculum (Kleiner, Thomas, & Lewis, 2007; Lawless and Pellegrino 2007; Polly et al. 2010), such courses are typically stand-alone courses primarily focusing on technological knowledge and skills rather than how technology should be used to effectively to improve teaching and learning (Admiraal et al., 2017; Angeli and Valanides 2009; Graham, Culatta, Pratt, & West, 2004; Hargrave & Hsu 2000; Jimoyiannis, 2010; Sun, Strobel, & Newby, 2017).

Technological knowledge and skills alone are not enough to prepare pre-service teachers for technology integration. As Earle (2002) noted, "integration is defined not by the amount or type of technology used, but by how and why it is used" (p. 3). It calls for paradigm shift and innovations in educational technology courses to equip pre-service teachers with an understanding of the "how and why" about technology integration and improve their competency and readiness for technology integration. This chapter introduces the 3D Instructional Video Project as an attempt to help innovate educational technology courses and identify effective ways for preparing pre-service teachers for technology integration.

The 3D Instructional Video Project was designed and developed in the big context that training or preparing teachers for technology integration may be harder than we have expected in face of the fact that we are dealing with moving targets (Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 2000) undergoing fast and constant upgrading and transformation and creating the possibility of teachers' being "perpetual novices" in the technology integration process (Mueller Wooda, Willoughby, Ross, & Specht, 2008). In such a big context, educational technology courses need to do more than just exposing pre-services teachers to a bunch of technology tools and requiring them to develop knowledge and skills of these tools. The 3D Instructional Video Project was intended to search a new paradigm on which to build educational technology courses capable of improving pre-service teachers' competency in dealing with the moving targets of the educational technology landscape and facilitating pre-service teachers' growth to become "veterans" in technology integration.

LITERATURE REVIEW

Educational Technology Courses in Teacher Preparation

Technology integration has become one of the standards to be met by teacher preparation institutions seeking accreditation (NCATE, 2008), and most states across the nation have technology standards for teachers seeking certifications (Hightower, 2009). Consequently, educational technology courses have been added into teacher education programs in order to prepare pre-service teachers for technology integration (Admiraal et al., 2017; Kleiner et al., 2007; Lawless & Pellegrino 2007; Polly, Mims, Shepherd, & Inan, 2010). However, existing educational technology courses fail to prepare pre-service teachers adequately for technology integration leaving them feel unprepared to use technology for instruction in their future classrooms (Admiraal et al., 2017; Brinkerhoff et al., 2002; Brown & Warschauer 2006; Johnson 2012; Sun, Strobel, & Newby, 2017; Tondeur et al., 2013). An up-close look at the strategy and focus of existing educational courses would shed some light on why this is the case.

Predominant in teacher education programs is the model of one single stand-alone educational technology course separate from other methods courses and focusing on developing literacy of specific technology tools (Belland, 2009; Gomez, Sherin, Griesdorn, & Finn, 2008; Gronseth et al., 2010; Hargrave & Hsu 2000; Sun et al, 2017). As reported by Hargrave and Hsu (2000), based on their survey of technology-related courses in 88 teacher preparation institutions, "most teacher preparation programs offer one course in which pre-service teachers are to develop their basic technology skills. If innovative pedagogy is the goal (of technology use in the classroom), the single instructional technology course may not effectively prepare pre-service teachers to meet this goal" (p.303). Unsurprisingly, such stand-alone educational technology course is not effective in preparing pre-service teachers for successful technology integration into their instruction (Karatas, 2014; Polly et al., 2010). Admittedly, technology knowledge is critical for the ability to use educational technology effectively (Becker, 2001), but technology knowledge alone does not prepare pre-service teacher for technology integration.

Technology integration is always contextualized in specific content areas and student populations. Therefore, educational technology courses in teacher education programs should go beyond technology literacy to emphasize developing knowledge and skills in the areas where technology intersects with pedagogy and content (Finger et al., 2013; Sweeney & Drummond, 2013). This requires educational technology courses to help preservice teachers develop technological pedagogical content knowledge (TPACK: Knowledge of the complex interplay of the three components of content, pedagogy, and technology) as proposed in the TPACK framework (Mishra & Koehler, 2006). Focusing on TPACK instead of technology knowledge (TK: knowledge about standard technologies, such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video, and skills for operating technologies), educational technology courses are helping pre-serviced teachers approach technology integration from a student-centered perspective and better understand the ultimate purpose of technology integration.

Technology Integration vs. Using Technology

The purpose of including educational technology courses in teacher preparation curricula is to prepare pre-service teachers for technology integration in their future classrooms. The existing educational technology courses' narrow and limited focus on technology knowledge necessitate a revisit of the concept "technology integration". Although previous literature is replete with research and reports on technology integration, a common and consistent definition of this term is disturbingly unavailable. As implied by the word "integration", technology integration emphasizes making technology part of the instructional process to improve learning; enhance student motivation, curiosity, and learning efficacy; and facilitate the development of various abilities (e.g., creativity, problem solving, critical thinking, etc.) (Carle, Jaffee & Miller, 2009; Idris & Nor, 2010; Jonassen & Reeves, 1996; Koç, 2005; Lin & Lu, 2010; Molins-Ruano, Sevilla, Santini, Haya, Rodríguez & Sacha, 2014; U.S. Department of Education, 2001, 2004, 2013). Hamilton (2007) provides us with a great insight about technology integration in his definition of "what integration is not":

Integration is NOT the use of managed instructional software, where a computer delivers content and tracks students' progress. Integration is NOT having students go to a computer lab to learn technical skills while the classroom teacher stays behind to plan or grade papers. Integration is NOT using the Internet to access games sponsored by toy manufacturers or popular television shows. Integration is NOT using specialty software for drill and practice day after day (p.21).

Those above technological practices are NOT technology integration but "technology use". There are essential differences between technology integration and technology use as summarized in the following "technology integration" vs. "using technology" table originally created by Aditi Rao and published on https://teachbytes.com/.

For technology integration, technology usage is purposeful, and technology is an essential component of the learning process and is indispensable for achieving the specific learning goals and learning objectives a teacher has planned to achieve. To enable pre-service teachers to integrate technology into their future instruction instead of just "using technology" as described in Figure 1, the existing stand-alone and technology-focused model of educational technology courses needs to be replaced with new models that provide opportunities to engage pre-service teachers in the process of planning and making pedagogically sound decisions about technology uses that are intended to improve student learning experience and learning achievements. The 3D Instructional Video Project introduced in this chapter was an attempt searching for such new models.

TPACK Framework and a Missing Piece

Students are the most active agent in the learning process and the target audience or users of technology integration. Existing educational technology courses, focusing on technology knowledge and skills, exclude students from the landscape of preparing pre-service teachers for technology integration. Capturing the interplay of the three knowledge bases of content, pedagogy, and technology, the TPACK (Technological Pedagogical Content Knowledge) framework (Mishra and Koehler 2006) offers a great perspective to be built into educational technology courses to allow pre-service teachers to contextualize their technology integration in pedagogies for specific content and for specific student audience. Based on their

Figure 1. Technology integration vs. using technology

Using Technology	Technology Integration
Technology usage is random, arbitrary & often an afterthought	Technology usage is planned & purposeful
Technology is rare or sporadically used in the classroom	Technology is a routine part of the classroom environment
Technology is used purely for the sake of using technology	Technology is used to support curricular goals & learning objectives
Technology is used to instruct students on content	Technology is used to engage students with content
Technology is mostly being used by the instructor(s)	Technology is mostly being used by the student(s)
Focus on simply using technologies	Focus on using technologies to create and develop new thinking processes
More instructional time is spent learning how to use the technology	More instructional time is spent using the technology to learn
Technology is used to complete lower-order thinking tasks	Technology is used to encourage higher-order thinking skills
Technology is used solely by individuals working alone	Technology is used to facilitate collaboration in & out of the classroom
Technology is used to facilitate activities that are feasible or easier without technology	Technology is used to facilitate activities that would otherwise be difficult or impossible
Technology is used to deliver information	Technology is used to construct & build knowledge
Technology is peripheral to the learning activity	Technology is essential to the learning activity

years of experience in teaching educational technology courses, Mishra and Koehler (2006) proposed the Technological Pedagogical Content Knowledge (TPACK) framework as a teacher knowledge model essential for technology integration and as a measure against the standard approach of focusing mostly on technology knowledge and skills in professional development and teacher education. The TPACK framework defines seven knowledge domains:

- **Technology knowledge (TK):** Knowledge about standard technologies, such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video, and skills for operating particular technologies
- **Content knowledge (CK):** Knowledge about the actual subject matter that is to be learned or taught
- **Pedagogical knowledge (PK):** Knowledge about the processes and practices or methods of teaching and learning, involving student learning, classroom management, lesson plan development and implementation, and student evaluation

- **Pedagogical content knowledge (PCK:** Knowledge of pedagogy that is applicable to the teaching of specific content
- **Technological content knowledge (TCK):** Knowledge of the manner in which technology and content are reciprocally related including how technology affords newer and more varied representation of subject matter and how subject matter is changed by the application of technology
- **Technological Pedagogical Knowledge (TPK):** Knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies
- **Technological Pedagogical Content Knowledge (TPACK):** Knowledge of the complex interplay of the three components of content, pedagogy, and technology

The TPACK framework illustrates that teachers' effective uses of technology entails not only technology knowledge and skills but knowledge of technology from the pedagogical and subject matter perspectives. The 3D Instructional Video Project introduced in this chapter used TPACK to provide theoretical guidance in understanding teacher knowledge required for effective technology integration (Mishra and Koehler, 2006). But what is missing in the TPACK framework is that it does not address how teacher education programs can prepare pre-service teachers for the constantly changing technology landscape. To add this missing piece, teacher educators need to think about how to help pre-service teachers to develop technology integration competency that is transferable from technologies to technologies.

Competency Building and Transferability of Technology Integration Competency

With new technologies emerging at a fast pace and offering exciting potential for improving learning, pre-service teachers need to develop such competency that allows them to continue to be successful in their technology integration efforts with new technologies and new learning situations. This type of competency is versatile competency. There are two types of competencies: versatile competency and specific competency (Makulova et al., 2015). Versatile competency manifests itself in one's ability to use existing knowledge and experience in new conditions and is not attached to specific objects (e.g., trainings and disciplines) or tools. In contrast, specific competency reflects specialty and is attached to specific objects or tools. In the context of technology integration, versatile competency refers to transferable technology Integration competency enabling pre-service teachers to use their existing content, pedagogy, and technology knowledge and skills to work with new technologies and effectively integrate them into teaching and learning.

The technology integration research literature has documented a variety of studies investigating the transfer of technology integration knowledge and skills from teacher education programs to real world classrooms by early career teachers. In their synthesis of studies with such research focus, Brenner and Brill (2016, p. 139) identified nine best practices that promote transfer of technology integration knowledge and skills:

- Meaningful Activities
- Expert Guidance
- Knowledge Building Guidance
- Authentic, Hands-on Activities

- Authentic Contexts
- Modeling Effective Use of Technology in Content-Specific Areas
- Opportunities for Collaboration with Others
- Opportunities for Practice and Experimentation with Technology
- Reflection upon Learning Activities that Utilize Technology

The above best practices, though intended for promoting transfer of technology integration from teacher education programs to real world classrooms, provide useful practical insights about how to promote the development of technology integration competency transferable across different technologies. Technology is changing and advancing at an exponential rate. If transfer of technology integration from teacher education programs to real world classrooms, as indicated by Brenner and Brill (2016), must not be assumed but be designed for across courses and curricula, transfer of technology integration competency across technologies must also be designed for in our educational technology courses. It was with such a vision that the 3D Instructional Video Project was designed and developed. Informed by previous research on transfer of technology integration, the 3D Instructional Video Project was intended to be a competency-building project promoting the transferability of technology integration competency and improving pre-service teachers' technology integration competency in dealing with the constantly changing educational technology landscape.

Pre-service Teachers as Adult Learners of Technology Integration and Epistemic Cognition Changes

Pre-service teachers enrolled in educational technology courses are adult learners. Learning technology integration as adult learners, pre-service teachers may have the issue that is captured by the notion of "apprenticeship of observation" (Lortie, 1975) that has been cited over and over again in teaching and teacher education studies. This notion is related to the fact that, as Lortie (1975) put it, "the average student has spent 13,000 hours in direct contact with classroom teachers by the time he [sic] graduates from high school" (p. 61). One of the consequences of having spent thousands of hours as schoolchildren observing teaching in action is that teachers teach the way they were taught (Heaton and Mickelson, 2002). Due to the widespread "high access vs. low use" paradox and teachers' unpreparedness for technology integration (Becker, 2001; Culp, Honey & Mandinach, 2005; Cuban, Kirkpatric & Peck, 2001 Ertmer, 2005; Govender & Govender, 2014; Palak & Walls, 2009; Tondeur, Roblin, van Braak, Fisser, & Voogt, 2013), years of "apprenticeship of observation" may lead pre-service teachers to mistake "using technology" for "technology integration" (see Figure 1). From an epistemic cognition perspective, pre-service teachers' beliefs about teaching with technology may have been framed by their years of "apprenticeship of observation".

Epistemic cognition refers to people's beliefs about knowledge and the process of knowing, and it "concerns how people acquire, understand, justify, change, and use knowledge in formal and informal contexts" (Greene, Sandoval, & Bråten, 2016, p. 1). While epistemic cognition is subtle, it is ubiquitous (Schommer-Aikins, 2004). Growing evidence has shown that epistemic cognition is related to disciplinary learning, comprehension, critical thinking, and instructional approaches and strategies (e.g., Buehl & Fives, 2009; Greene et al., 2016; Kuhn, 2016; Lunn Brownlee, Johansson, Walker, & Scholes, 2017; Lunn Brownlee, Schraw, Berthelsen, 2011). Research focusing particularly on student teachers has shown that epistemic cognition is related to their learning approach and the teaching goals they developed, and has impact on their learning in teacher education courses and their decision making related to instructional planning and assessment (Buehl & Fives, 2016; Chan, 2003; Yadav, Herron, & Samarapungavan, 2011; Yadav & Koehler, 2007). Given the importance of the epistemic cognition to teacher preparation and its potential influence on instructional practices and approaches, educational technology courses should make efforts to effect changes in pre-service teachers' epistemic cognition about technology integration so that their old epistemic cognition shaped by "apprenticeship of observation" can be replaced by new epistemic cognition of effective instructional use of technology.

A growing body of research has suggested that cognitive conflict or doubt about one's beliefs can promote pre-service teachers' epistemic cognition changes (e.g., Bendixen, 2002; Lunn Brownlee, Schraw, Walker, & Ryan, 2016; Parkinson & Maggioni, 2017). Specific cognitive conflict strategies or methods suggested by this body of research include cognitive conflict induced by constructivist approaches to learning (Rodrıguez & Cano, 2007), exposure to conflicting theories (Sosu & Gray, 2012; Walker, Brownlee, Whiteford, Exley, & Woods, 2012), and refutational texts (Kienhues, Bromme, & Stahl, 2008; Lunn Brownlee et al., 2016; Lunn Brownlee, Ferguson, & Ryan, 2017). In addition to cognitive conflict, there is also evidence suggesting explicit reflection can support changes in epistemic cognition (e.g., Deniz, 2011; Lunn Brownlee et al., 2016; Muis, 2007). According to Lunn Brownlee and colleagues (Lunn Brownlee et al., 2017), the previous literature on the role of explicit reflection in promoting epistemic cognition changes fails to be specific about how this can take place and what is meant by "reflection".

To address this gap, this group of researchers proposed the concept "epistemic reflexivity" and the 3R-EC Framework of Epistemic Reflexivity (Lunn Brownlee et al., 2017). Reflexivity, as defined by Lunn Brownlee and colleagues (Lunn Brownlee et al., 2017), is "characterized as an internal conversation that includes *discernment* (reflecting on a key issue or aim for them as a teacher or person, e.g., student well-being), *deliberation* (reflexively weighing personal and contextual concerns including motivations, priorities, and the impact of potential subversion of expected practices such as teaching to the test), and *dedication* (resolved action, e.g., not following school leadership expectations of testing drills in order to maintain the goal of student wellbeing)" (p.247). The afore-discussed "*discernment*", "*deliberation*", and "*dedication*" are the three steps in the 3R-EC Framework of Epistemic Reflexivity that capture how changes in epistemic cognition may take place.

The above reviewed research on epistemic cognition and the mechanism for changing teachers' epistemic cognition reveal the importance for teacher preparation programs to change pre-service teachers' epistemic cognition about technology integration and, at the same time, provide valuable insights about how to make the changes take place. Informed by the previous research on teachers' epistemic cognition, the 3D Instructional Video Project built into the project strategies intended for promoting changes in pre-service teachers' epistemic cognition regarding technology integration. Such changes are meant to make effective use of technology in teaching and learning take place.

Evaluation of Technology Integration

Various frameworks and instruments have been developed for evaluating technology integration. A review of some of these frameworks and instruments was made by the authors of the chapter. The review shows that these frameworks and instruments embrace respective operational definitions about technology integration and thus approach the evaluation of technology integration from different perspectives: quantity-oriented perspective; level or stage-based perspective; technology use, attitudes, and beliefs integrated perspective; technology, pedagogy, and content integrated perspective; and standard oriented perspective. The following table gives a summary of the frameworks and instruments reviewed in this chapter. The frameworks and instruments are grouped according to their evaluation perspectives and their implied operational definitions of technology integration are also suggested in the table.

There are some problems in the above frameworks or instruments that may render them ineffective in evaluating technology integration as expected. The first problem involved is related to the "quantity over quality" approach employed in these frameworks and instruments. Vannatta and Banister (2009) criticized that "previously developed self-reporting instruments have often focused on measuring the frequency of using certain applications, while such measures provide information regarding how often a teacher uses a specific technology, it typically has not indicated how teachers are using technology to facilitate student learning" (p.2). In addition, most of the instruments listed in Table 1 are self-report Likert-scale surveys. Leaving alone the possibility that teachers may exaggerate their technology uses when responding to surveys (Kopcha & Sullivan, 2007), the chances are low that we are able to know much from the quantitative survey results about teachers' thoughts and understanding about technology integration and their ability to use technology to improve student learning experience and learning

Table 1. Frameworks and Instruments for evaluating technology integration and implied operational definitions of technology integration

Quantity-Oriented Perspective	
Frameworks and Instruments	**Computer Integration Questionnaire (Mueller, Wooda, Willoughby, Ross, & Specht, 2008)** **Classroom Use of Computers scale (van Braak, J., Tondeur, J., & Valcke, 2004)**
Implied Operational Definition of Technology Integration	Technology integration is about the frequency of technology uses for certain types of classroom learning activities.
Level or Stage Based Perspective	
Frameworks and Instruments	Technology Knowledge Proficiency Levels (Zhao, 2003) Levels of Technology Implementation (LoTi) framework (Moersch, 1995, 2001)
Implied Operational Definition of Technology Integration	Technology integration can be distinguished into different levels or stages and can be evaluated based behavioral indicators of each of the levels or stages.
Technology Use, Attitudes, and Beliefs Integrated Perspective	
Frameworks and Instruments	Teacher Technology Integration Survey (TTIS) (Vannatta and Banister, 2009)
Implied Operational Definition of Technology Integration	Technology integration is a construct that should be understood by linking technology use to teacher beliefs and technology related attitudes.
Technology, Pedagogy, and Content Integrated Perspective	
Frameworks and Instruments	Survey of Preservice Teachers' Knowledge of Teaching and Technology (Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009) Survey of Online Teachers' TPACK (Archambault & Crippen, 2009 Technology Integration Assessment Rubric (Harris, Grandgenett, & Hofer, 2010) Technology Integration Assessment Instrument (TIAI) (Britten & Cassady, 2005)
Implied Operational Definition of Technology Integration	Technology integration is the interplay between technology, pedagogy, and content.
Standard Oriented Perspective	
Frameworks and Instruments	Technology Integration Standards Configuration Matrix (TISCM) (Tincher & Mills, 2002) Teacher Technology Standard Continuum (TTSC) (Dirr, 2003)
Implied Operational Definition of Technology Integration	Technology integration is standard-based practice.

outcomes. And information as such may also not be readily available from using those instruments in the form of scoring rubrics.

"Decontextualizatoin" is another problem that can be identified in the frameworks and instruments reviewed in this chapter. Teaching is situated and deeply dependent on particular times, places, and contexts (Orton, 1993). However, most of the frameworks and instruments evaluate teachers' technology integration in a decontextualized fashion. This is obvious in the case of those Likert-scale survey instruments. Even in such instruments like the *Technology Integration Assessment Rubric* and the TIAI where pedagogy and content are taken into consideration together with technology, teachers' technology integration is evaluated based on the decontextualized analyses of the teaching plans without setting such analyses within contextualized teaching and learning process.

In the frameworks or instruments reviewed in this chapter, the problem of relying mainly on behavior indicators to evaluate teachers' technology integration is rather prominent. The assumption involved is that if teachers use certain types of technology in certain types of ways or for certain types of activities, certain expected effects will be achieved. When a teacher uses technology for "authentic hands-on inquiry related to a problem, issue, or theme" as described in the LoTi (Moersch, 1995, 2001), does this indicate that this teacher is using the technology effectively? Or when a teacher checks those high level behavior indicators listed in the checklist of the TISCM (Tincher & Mills, 2002), does this mean this teacher is capable of making effective use of technology? The answers to these questions may not necessarily be positive.

THE 3D INSTRUCTIONAL VIDEO PROJECT

Project Design Context

The 3D Instructional Video Project was designed and developed by the authors of the chapter as part of an educational technology course. This course is the only educational technology course offered to all undergraduate pre-service teachers across the teacher education programs housed in a university in the south of the United States. The pre-service teachers enrolled in this educational technology course were traditional undergraduate students in their junior or senior years with ages between 20-22. Like most educational courses in teacher education programs in the nation, this course focuses on introducing technology tools and requiring pre-service teachers to create technology products with the tools. According to the old syllabus before the 3D Instructional Video Project was implemented, the final project of this course was a lesson plan project asking pre-service teachers to create a lesson plan using a 5E (i.e., Engagement, Exploration, Explanation, Extension, and Elaboration) lesson plan template. In creating their lesson plans, pre-service teachers were required to pick 2 E's to integrate technology.

This course is a typical stand-alone and technology-focused educational technology course as discussed earlier in this chapter. The following problems had been identified based on class observations, conversations with pre-service teachers enrolled in the course, and their 5E lesson plans: (1) Most of the class was spent on introducing technology tools and helping students create technology products with minimal amount of time for discussion, team work, and reflections; (2) There was minimal modeling of best practices of technology integration; (3) Technology uses were decontextualized from content and pedagogy; and (4) Pre-service teachers lacked understanding about technology integration and transferable technology integration competency. In light of these problems, the 3D Instructional Video Project was designed and developed with the intention to innovate the course and explore new approaches for an educational technology course to prepare pre-services for technology integration.

Project Overview

The 3D Instructional Video Project was designed and developed to allow pre-service teachers to work in pairs throughout a typical 16-week semester. This project involves the following four stages:

Stage 1: Planning the lesson: decide the topic/content to teach with 3D modeling and printing; plan lesson by answering the questions listed below; learn how to use Tinkercad (https://www.tinkercad.com/); and design 3D model using Tinkercad.

- Who are your target students?
- What are the relevant learning standards?
- What are the objectives of your lesson aligned with the learning standards?
- Why are 3D modeling and printing essential for the lesson and for achieving the objectives?
- What are the procedures of your lesson and how are you going to use 3D printing in your lesson?

Stage 2: Print off 3D model: download 3D model from Tinkercad as a .stl file; install MakerBot desktop software; use the software to convert .stl file into .makerbot file; use the software to check 3D model and revise model as necessary; print off 3D model

Stage 3: Collect and prepare materials for creating the 3D instructional video: taking pictures of the 3D design and 3D model, creating video clips of the 3D printing, collecting and preparing any instructional materials to be included into the 3D Instructional video Project.

Stage 4: Create instructional video using iMovie: create a video presenting the 3D modeling and printing integrated lesson; justify the purpose of using 3D modeling and printing in the lesson; incorporate opening and closing background music, audio narration, text overlays, and transitions in the video; present the video in class.

Project Design Framework

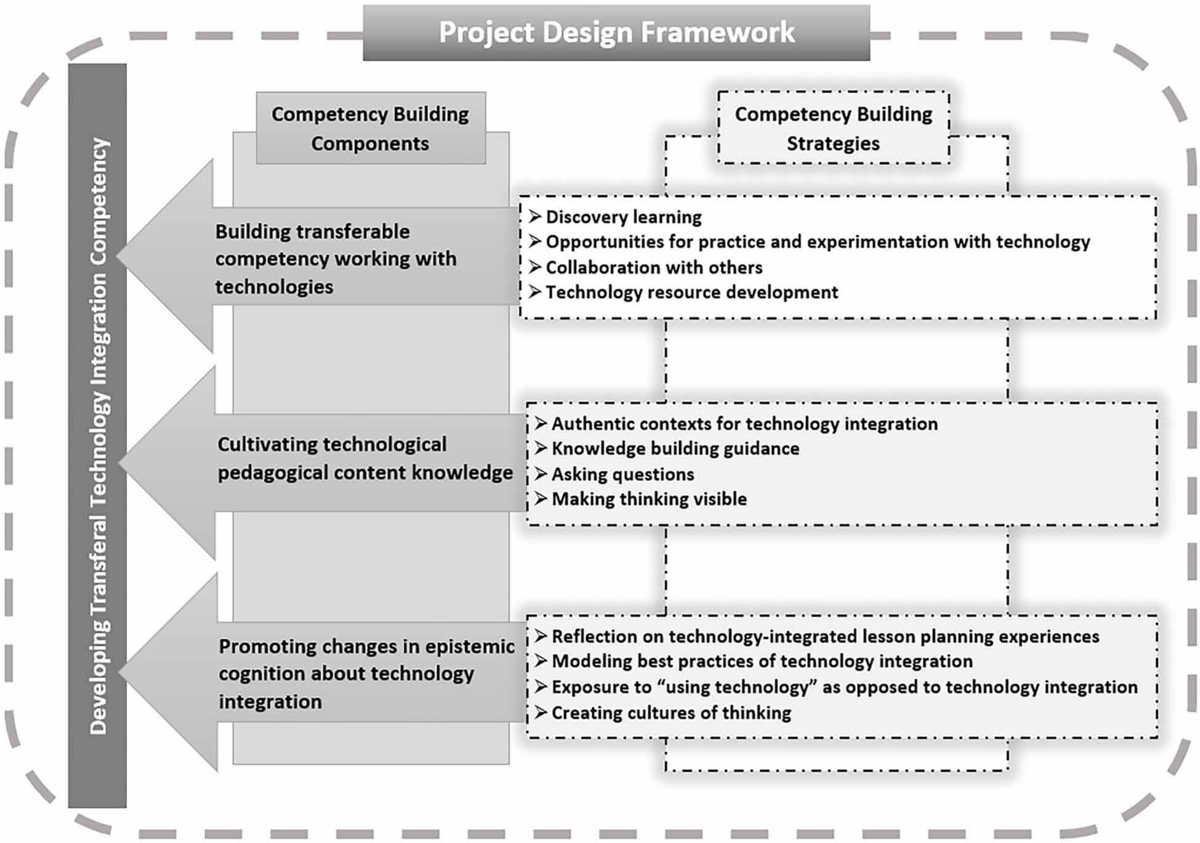
The 3D Instructional Video Project was intended as an attempt seeking to innovate educational technology courses and promote a paradigm shift in preparing pre-service teachers for technology integration. Underlying this project is the strategy that works a bit like the "flipped classroom": moving what normally take place in a typical educational technology class (i.e., introducing technology tools and creating technology products with the tools) outside of the classroom and leaving the classroom time for reflections, sharing experiences, questions and answers, and modeling best technology integration practices.

Informed by the literature on TPACK, best practices promoting transfer of technology integration, and changing teachers' epistemic cognition, the 3D Instructional Video Project used the following framework for project design.

Developing Transferable Technology Integration Competency: The Strategies

As shown in Figure 2, the 3D Instructional Video Project was designed to help educational technology courses to achieve the goal of developing pre-service teachers' technology integration competency that

Figure 2. Design framework for the 3D Instructional Video Project



is transferable from one technology to another. This goal will be achieved through three sub-goals: building transferable competency working with technologies, cultivating technological pedagogical content knowledge, and promoting changes in epistemic cognition about technology integration. To achieve these sub-goals, specific strategies were built into the 3D Instructional Video project. These strategies are explained in detail below.

Building Transferable Competency Working with Technologies

As discussed in the Literature Review section, one missing piece in the technology integration research is how to prepare pre-service teachers for the ever-changing technology landscape. The answer to this question does not lie in the practice of our existing educational technology courses to develop pre-service teachers' literacy for a list of technologies. Rather, educational technology courses should help pre-service teachers build transferable competency working with technologies that allows them to feel comfortable working with new technologies, be able to figure out on their own how the new technologies work, and be capable of assessing the new technologies from instructional perspectives. To help pre-service teachers develop such competency, the 3D Instructional Video Project applies the four strategies: discovery learning, opportunities for practice and experimentation with technology, collaboration with other, and technology resource development.

The discovery learning strategy is reflected in the selection of four rather unfamiliar technology tools to be used in the project: Tinkercad (https://www.tinkercad.com/), MakerBot 3D printer, MakerBot Desktop software, and iMovie app on iPad:

- Tinkercad is a free brower-based 3D CAD design tool owned by Autodesk, Inc.. It is known for its simple interface and ease of use. It is a good classroom tool for creating 3D designs from scratch or quickly modifying existing designs. 3D design can be done in Tinkercad by selecting, dragging, and placing basic shapes on the Work Plane, and combining and manipulating them to create 3D models as wanted. In addition to basic shapes, flexible tools like text, shape generators, and parametrized forms make 3D design with Tinkercad more versatile. Tinkercad excels at splitting objects into parts, adding simple features, cutting holes, and combining, aligning, and arranging objects. Tinkercas users can make their designs public to share with others and search through hundreds and thousands of public models for designs to tinker and modify. It's easy to import existing 3D models into Tinkercad to make quick modifications or additions. Tinkercad allows easy download of 3D models as .stl or .obj files for printing. For instructional purposes, teachers can design digital making projects to engage students in digital making that requires them go through the iterative process of designing, building, testing, and improving in order to optimizing their design solutions. Or, teachers can design digital making projects in a way that allow students to learn math concepts or require them to apply math knowledge. Tinkercad can also be used in learning experience that allows students to learn the engineering design process of creating 3D objects that can be used to solve real world problems. Students can easily send their 3D models to 3D printers to turn their digital design ideas into real 3D products.
- MakerBot 3D printer: The 3D printer used for the 3D Instructional Video Project was MakerBot Replica+. This 3D printer model uses the Fused Deposition Modeling (FDM) printing technology and thermoplastic filament is used for printing. The extruder or the extrusion nozzle of the printer heats the filament to its melting point and extrudes it, layer by layer, to the printing platform to create a 3D object. MakerBot Replica+ supports cloud enabled USB and Wi-Fi connectivity to MakerBot's printing software, which provides users with refined, streamlined 3D printing experience.
- MakerBot Desktop software is the older version of the MakerBot printing software. The most recent version is the MakerBot Print. It is free software with which users can import 3D design files and prepare them for printing. The software allows users to generate an estimation of the amount of time needed for printing, re-scale their 3D designs as needed, decide if it's necessary to add breakaway support for printing, and watch animated preview of the path the extruder will take to print the 3D model. In addition, Makerbot Print provides cloud-enabled management to make it possible to remotely control and monitor multiple connected 3D printers via live camera feeds and printing status updates.
- iMovie app on iPad is the tool to be used by pre-service teachers in the 3D Instruction Video Project to product their video on teaching with 3D modeling and printing. This app allows the pre-service teachers to compile pictures, videos clips, screenshots, and audio narrations to create their 3D instructional videos and share the videos on YouTube using their group Google account.

A typical project in existing educational technology courses requires pre-service teachers to use an educational technology tool to create a technology product as specified in the project instructions. What is experienced in such projects does not reflect the complex process of planning and implementing a technology-integrated lesson in real classroom settings. This complex process is more often than not ill-structured, involves using more than one technology tool, and may require a mastery of emerging technologies. The 3D Instructional Video Project reflects this complex process of technology integration by purposefully selecting the above technologies unfamiliar to the pre-service teachers and letting them learn how to use technologies by themselves. As mentioned earlier, learning how to use the technologies is "flipped" to take place outside of classroom in the 3D Instructional Video Project. As such, pre-service teachers are engaged in a discovering learning process where they take an active role of learning how to use the technologies and exploring those technologies' potential for improving teaching and learning. Equally important is that this discovery learning process is meant to broaden pre-service teachers' comfort zone and improve their confidence and competency working with technologies that are new to them.

The opportunities for practice and experimentation with technology strategy is identified in the literature (e.g., Brush & Saye 2009; Polly et al., 2010; Seels et al., 2003; Williams et al., 2009; Wright et al., 2002) as effective for promoting transfer of technology integration from teacher education programs to real world classrooms. In the 3D Instructional Video Project, this strategy is adopted to help pre-service teachers to develop technology competency that is transferable across technologies and this strategy is closely related to the discovery learning strategy. In the discovery learning process, the opportunities for practice and experimentation with technology are embedded in the tasks that require pre-service teachers to: learn how to design 3D models with Tinkercad; make decision about what 3D model to design; design the 3D model and export the model as .stl file; import the file to MakerBot Print software, and manipulate the 3D model and prepare it for printing with the software; print the 3D model with a MakerBot Replica+; learning how to use iMovie on iPad to create a video; and upload the video to YouTube.

The collaboration with others strategy is reflected in the pair work pre-service teachers are engaged throughout the 3D Instructional Video Project. Working in pairs will make pre-service teachers feel less stressful in their experimentation with the new technologies, which will in turn improve their confidence and competency working with new technologies. The interactions embedded in the collaboration will motivate pre-service teachers to persist in the discovery learning process. In addition, the collaboration is also intended to prepare pre-service teachers for working with other teachers in their future schools to update their technology knowledge and skills. The design decision of pair work instead of group work for the project is to achieve the purpose of minimizing the free-riding phenomenon that is common in team projects.

The technology resource development strategy in the 3D Instructional Video Project is intended to help pre-service teachers to develop their own technology resource collection or database. This strategy was reflected in the online resources provided to the pre-service teachers by the instructor of the course (i.e., one of authors of the chapter) to help them learn how to use the new technologies. When meeting in class, the pre-service teachers were guided to use online tools such as Diigo to save and tag useful online technology resources and class time was allotted for sharing technology resources. When stepping into real world classrooms, pre-service teachers need to possess useful technology resources to allow them to keep abreast of emerging technologies and be informed of new technology integration trends. This well justifies the technology resource development strategy as an important component designed into the 3D Instructional Video Project.

Cultivating Technological Pedagogical Content Knowledge

Developing pre-service teachers' literacy of specific technology tools is the focus of most existing educational technology courses (Belland, 2009; Gomez et al., 2008; Gronseth et al., 2010; Hargrave & Hsu 2000; Sun et al, 2017). The concept of technology integration as conveyed to pre-service teachers in educational technology courses becomes technology uses decontextualized from specific learning situations defined by the learning content and the participating students. Technology integration is rooted in specific instructional content and intends for specific student audience. Educational technology courses should cultivate pre-service teachers technological pedagogical content knowledge (TPACK) to help pre-service teachers conceptualize technology integration from correct perspectives and develop technology integration competency in and beyond teacher education programs. Cultivating pre-service teachers' TPACK is one of the competency development components in the 3D Instructional Video Project and four strategies are adopted in the project for promoting TPACK: authentic contexts for technology integration, knowledge building guidance, asking questions, and making thinking visible.

The <u>authentic contexts for technology integration</u> strategy in the 3D Instructional Video Project refers to the requirement of asking pre-service teachers to plan their instructional use of 3D modeling and printing on a real topic in K-12 subject areas and for teaching to a class of students at a specific grade level. This requirement helps create authentic contexts for the 3D printing integrated lessons pre-service teachers plan to teach. Within such contexts, pre-service teachers will identify relevant learning standards and align their learning objectives with the standards, and design teaching procedures appropriate for teaching the topic and the students. As such, the 3D Instructional Video Project is pushing pre-service teachers to approach and understand technology integration from a contextualized perspective.

The <u>knowledge building guidance</u> strategy specifically refers to providing guidance to pre-service teachers for building their TPACK. In the educational technology course in which the 3D Instructional Video Project is part of, the learning of how to use Tinkercad, MakerBot 3D printer, MakerBot Desktop software, and iMovie app on iPad take place outside of classroom at pre-service teachers' own pace. Part of the face to face class time is devoted to explicitly teaching and discussion of the TPACK framework, which has been reported to be conducive to the development of TPACK related knowledge and skills (Harvey & Caro, 2017). Guidance provided to pre-service teachers during class time also includes pedagogical modeling (Pope, Hare, & Howard, 2005) that consists of introducing educational technology tools (e.g., Google Docs, Scratch athttps://<u>scratch.mit.edu/</u>, Go-Lab at https://www.golabz.eu/) and their technological affordances for achieving pedagogical purposes and discussing about the pedagogical functions these technology tools in pre-service teachers' respective subject areas.

The <u>asking questions</u> strategy, like the knowledge building guidance strategy, was implemented in class when meeting face to face. The 3D Instructional Video Project consists of 4 stages (see Project Overview section). At the end of each stage, the pre-service teachers are required to report their progress in class followed by Q & A sessions. Either the pre-service teachers ask questions to seek help from the instructor or the instructor asks questions based on the progress reports to push the pre-service teachers to dig deeper into their pedagogical considerations of 3D modeling and printing or to call their attentions to some issues in their 3D modeling and printing integrated lesson planning.

The <u>making thinking visible</u> strategy was reflected in the requirement of asking pre-service teachers to create an iMovie video presenting the planning of their 3D modeling and printing integrated lessons. This strategy was informed by the research of Visible Thinking Project (Richard, Church, & Morrison, 2011) at Harvard Graduate School of Education that identified "making thinking visible" as an important principle for facilitating the development of complex thinking: thinking happens mostly in our heads, invisible to others and even to ourselves. Foster thinking requires making thinking visible by externalizing thoughts through speaking, writing, drawing, or some other methods. Planning technology-integrated instruction involves complex thinking about the interplay of the three components of content, pedagogy, and technology. By making pre-service teachers' thinking about 3D modeling and printing, pedagogy, and content visible through speaking and video creation, the 3D Instructional Video Project can promote their thinking about TPACK and consequently improve their technology integration competency.

Promoting Changes in Epistemic Cognition About Technology Integration

Epistemic cognition is related to instructional approaches and strategies and affects instructional planning (Buehl & Fives, 2016; Lunn Brownlee et al., 2017; Lunn Brownlee et al., 2011; Yadav & Koehler, 2007). Years' "apprenticeship of observation" (Lortie, 1975) of the "low use" of technology in schools may have framed pre-service teachers' epistemic cognition about how technology should be used in teaching. Therefore, changes in pre-service teachers' epistemic cognition needs to take place so that they can make real technology integrations as indicated in Figure 1. The 3D Instructional Video Project includes promoting pre-service teachers' epistemic cognition changes as an important component for developing their transferable technology integration competency. Four strategies are adopted in the project to promote such changes: reflection on technology-integrated lesson planning experiences, modeling best practices of technology integration, exposure to "using technology" as opposed to technology integration, and creating cultures of thinking.

The reflection on technology-integrated lesson planning experiences strategy in the 3D Instructional Video Project reflects the three steps (i.e., *discernment, deliberation, and dedication*) in Lunn Brownlee and colleagues' 3R-EC Framework of Epistemic Reflexivity (Lunn Brownlee et al., 2017). Pre-service teachers' reflection on their 3D modeling and printing integrated lesson planning experiences take the forms of written reflections and in-class reflection sessions. At the end of each of the four project stages, pre-service teachers are required to write a reflection paper and share their reflection in class. Reflection prompts are provided to pre-service teachers to purposefully lead them to reflect on: the aim or objectives of using 3D modeling and printing in their lessons; issues or problems of integrating 3D modeling and printing to achieve the objectives; changes made or actions taken to deal with the issues or problems; and what differences will it make to teach the same lesson without 3D modeling and printing.

The modeling best practices of technology integration strategy aligns with the previous research finding about the positive effect of modeling effective technology uses on preparing pre-service teachers for technology integration (Brush & Saye, 2009; Gronseth et al., 2010; Keeler 2008; Polly et al., 2010; West & Graham; 2007; Williams, Foulger& Wetzel, 2009). YouTube videos, journal articles, or web pages reporting exemplary models of technology integration are presented and discussed with pre-service teachers in class. It is argued that vicarious experiences obtained by observing successful task performance by others can enhance one's confidence for performing the same tasks (Bandura, 1977). Therefore, these exemplary models are intended not only to reshape the pre-service teachers' epistemic cognition about technology integration but to allow the pre-service teachers to identify themselves with those similar and successful others so as to enhance their confidence in their abilities of using technology effectively in teaching.

The exposure to "using technology" as opposed to technology integration strategy is based on "cognitive conflict" suggested in the literature (e.g., Bendixen, 2002; Lunn Brownlee et al, 2016; Parkinson

& Maggioni, 2017) as a method to promote pre-service teachers' epistemic cognition changes. This strategy is closely related to the modeling best practices of technology integration strategy. Exemplary models of technology integration are presented to the pre-service teachers together with examples of "using technology" as summarized in Figure 1. The purpose of doing so is to induce cognitive conflict in the pre-service teachers' beliefs about technology integration and consequently cause changes in their epistemic cognition.

The creating cultures of thinking strategy is also related to the research of Visible Thinking Project (Richard, Church, & Morrison, 2011) at Harvard Graduate School of Education. "Cultures of thinking" is another important principle identified by the Visible Thinking Project for facilitating the development of complex thinking. Cultures of thinking are where the act of thinking and making thinking visible is valued, nurtured, and practiced daily. This strategy requires instructors of educational technology courses to create a nurturing and supportive learning environment encouraging pre-service teachers' deep thinking about "technology integration" vs. "using technology" and how to make technology integration happen. Thinking as such will usher in changes in epistemic cognition about technology integration.

CONCLUSION AND RECOMMENDATIONS FOR FURTURE PRACTICE AND RESEARCH

The 3D Instructional Video Project was a semester long project designed and developed as part of an educational technology course for pre-service teachers. Flipping the typical educational technology classroom, the project engages pre-service teachers in discovery learning of technologies outside of classroom at their own pace and leaves the classroom time for structured discussions, technology integration modeling, reflection, and competency development guidance. The 3D Instructional Video Project was an attempt to promote a paradigm shift in educational technology courses: preparing pre-service teachers for technology integration by developing their transferable technology integration competency. This transferable competency is to be achieved through three competency building components (i.e., building transferable competency working with technologies, cultivating technological pedagogical content knowledge, and promoting changes in epistemic cognition about technology integration) built into the 3D Instruction Video Project. Each of the three competency building components is supported by the strategies specified in Figure 2.

The 3D Instructional Video Project was implemented in two semesters with two different groups of undergraduate pre-service teachers aged between 22-24 before this chapter was written. The pre-service teachers' 3D modeling and printing integrated lessons covered topics in different subject areas as the following examples show:

- **Mathematics:** Learning geometric shapes by building a house; learning by seeing fractions
- **Physics:** Teaching force & motion with 3D printed spinning top
- Chemistry: Teaching water molecules by 3D printing
- **Engineering:** Understanding gear ratios by designing and printing a gear train
- **Geography:** Understanding landforms by 3D printing
- **Social Studies:** Learning the spearhead history of Native Americans through 3D printing

Based on the design, development, and implementation of the 3D Instructional Video Project, we make the following recommendations for future practice and research.

Evaluating pre-service teachers' technology Integration competency: a process-focused and context-based approach. The final products the pre-service teachers turned in for the 3D Instructional Video Project were their YouTube videos in which they presented their lessons and made their thinking visible about integrating 3D modeling and printing in the lessons. As shown by their videos, the degrees of "integration" varied greatly among the pre-service teachers. However, the reflection papers, reflections and discussions in class, and Q&A sessions taking place in the classroom indicated an obvious trend: the pre-service teachers' understanding of technology integration and their thoughts of using 3D printing in teaching moved along the continuum during the semester from "using technology" to "technology integration" (see Figure 1). This raised an interesting question: How should pre-service teachers' technology integration competency be evaluated?

It is tempting to use the instruments listed in Table 1 to evaluate pre-service teachers' technology integration competency. However, the problems of "quantity over quality" and relying heavily on decontextualized self-reported survey results, scoring rubrics, or behavior indicators are rather obvious in those instruments. The development of technology integration competency is a complex contextualized process where pre-service teachers improve their ability to use technology to enhance the learning and teaching process embedded within various interrelated factors. This process is even more complex in the context of the 3D Instructional Video Project where pre-service teachers' technology integration competency is defined as being transferable across technologies.

In the two semesters when the 3D Instructional Video Project was implemented, there was no pre-arranged data collection taking place. However, the reflection papers and in-class discussions and Q&As over the semester together with the final 3D instructional videos provided rich information and contexts to understand the pre-services teachers' evolution of thinking about technology integration and their changes in technology integration practices. What is implied here is a process-focused and context-based approach for evaluating pre-service teachers' technology integration competency. This approach is recommended in this chapter for future research on the 3D Instructional Video Project or other similar projects in evaluating pre-service teachers' technology integration competency. With this approach, a qualitative longitudinal research method (Derrington, 2018; Holland, Thomson, & Henderson, 2006) can be adopted: collecting in-depth qualitative data over a certain amount of time and analyzing the data to understand and interpret pre-service teachers' technology integration competency development and changes in contexts.

Adding real classroom teaching components. Field experiences of various forms and culminating student teaching experiences have become the sine qua non of teacher preparation programs (Abell, 2006; Darling-Hammmond, Hammerness, Grossman, Rust, & Shulman, 2005; Greenberg, Pomerance, & Walsh, 2011; Teitel, 2000). For preparing pre-service teachers for technology integration, field experience or student teaching experience that allow pre-service teachers to teach with technology is also crucial. According to Schrum (1999), three components are important for preparing pre-service teachers for technology integration: (1) skills-based courses, (2) integration of technology into methods courses, and (3) technology rich field placements. The 3D Instructional Video Project, though contextualizing technology skill development and instructional applications of technology in specific content and target student audience, does not include real classroom components allowing pre-service teachers to implement their 3D modeling and printing integrated lessons. It is recommended that future projects like the

3D Instructional Video Project add built-in real classroom components or connect the projects with practicum courses to make real classroom teaching with technology take place.

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APPENDIX

Practice Activities

1. Do you think the 3D Instructional Video Project introduced in this chapter is effective for helping improve pre-service teachers' competency for technology integration? Why or why not?
2. Do you think it is important for pre-service teachers to develop transferable technology Integration competency? Why or why not?
3. Are there any strategies other than those listed in Figure 2 you think need to be added to improve the 3D Instructional Video Project? If yes, what are the strategies?
4. If you are asked to design a project for developing pre-service teachers' transferable technology Integration competency, what will your project be like?
5. How do you think "apprenticeship of observation" affect pre-service teachers' competency for technology integration?

Chapter 18
Examining the Adult Learning in "Giving Back" Initiatives

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ABSTRACT

Service-learning has been identified as a high-impact, experiential teaching practice by the Association of American Colleges and Universities. This chapter examines how service-learning (SL) initiatives at one public institution of higher education allowed students opportunities to give back to their community while gaining valuable adult learning experiences. Three cases are presented describing how graduate and undergraduate students (N=229) enrolled in one of four courses (Political Science, Special Education, Early Elementary Education, and Business) incorporated a service-learning component for relevant and purposeful adult learning outcomes. Following the presentation of each of these cases of service-learning, a cross-case analysis and key terms and definitions are offered.

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INTRODUCTION

Service-Learning has been found to be a high impact instructional method for "giving back to the community" (McWhorter, Delello & Roberts, 2016, p. 80) by providing adult learners with meaningful opportunities that meet local needs where students live. Also, SL provides students an opportunity to transfer skills learned in their higher education coursework to positively impact adult education (Hendrix, 2019; Niehaus & Crain, 2013).

The tenets of adult learning theory recognize the transformative power of incorporating authentic meaningful experiences in the learning process. Gibb's 1960 functional theory of adult learning (as cited in Trotter, 2006) embraces the belief that, "learning should be problem and experience centered and meaningful to the learner" (p. 11). Service-Learning experiences can provide adult learners with meaningful opportunities to serve their local community while also learning through purposeful application of new academic skills.

This chapter explains how Service-Learning (SL) fostered adult learning through four different academic lenses which include political science, early elementary education, special education, and business for both graduate and undergraduate students enrolled in face-to-face, online, and blended courses at a south-central university. The students, academic institution, and community partners benefitted from meaningful, relevant, and purposeful SL experiences.

The objectives of this chapter are three-fold. First, we will discuss relevant literature on the topic of adult learning (including theory and practice) within community engagement activities including SL initiatives in higher education that can promote adult learning. Second, we will identify and present three diverse cases of SL at one public university in the USA to provide readers a variety of ways that SL can be implemented to promote adult learning in higher education; then, we will provide a culminating cross-case analysis and synthesis of SL practices and offer recommendations to maximize adult learning in various disciplines.

BACKGROUND

Adult learning is concerned with experiential learning, creating meaning, and formal as well as informal learning (Bennett & McWhorter, 2020; De Vito, 2009; Knowles, Holton & Swanson, 2005; Merriam & Bierema, 2014; Okojie, Okojie-Boulder, & Boulder, 2008). Because Service-Learning as an instructional method is "growing in popularity for giving back to the community while connecting the experience to course content" (McWhorter, Delello & Roberts, 2016, p. 80), it is ripe as an adult learning pedagogy since it allows for students to customize their own learning while experiencing and applying knowledge from higher education courses to a community context. Experiential learning "is one of the central concepts of andragogy" (Sato, Haegele, & Foot, 2017, p. 455). Also, experiential learning has been described as a "process of using life experience to internalize knowledge. Learning by experience works cyclically: one gains external experience, reflects on observations of that experience, forms new abstract concepts from that reflection, and reapplies what is learned to new experiences" (LeBaron, Runyan, Jorgensen, Marks, Li, & Hill, 2019, p. 436; see also Kolb, 2014).

Experiential learning is also a part of Knowles' andragogy theory and according to Knowles, Holton and Swanson (1998) includes six assumptions regarding adult learners which are: the learner's need to know, self-concept of the learner, role of the learners' experiences, readiness to learn, orientation to learning, and motivation to learn (pp. 76-81). The first assumption is important because educators need to help learner's understand the value of learning (i.e. explaining why they need to know). The second assumption is important because once adults realize they are responsible for their own decisions, they are more capable of self-direction (see p. 77). The third assumption of andragogy theory relates to the volume and quality of experiences over adults' lifetime meaning there are wider ranges of differences between adult learners and thus individualizing teaching strategies is imperative. The fourth assumption is that timing of the learning is very important for providing motivation. The fifth assumption is that life-centered learning is crucial as adult learners see it helpful to tackle real-life problems. The sixth assumption is that external motivation as well as internal pressures like the desire for quality of life help adults motivated to keep learning.

Other important types of adult learning include self-directed learning (Dietz, 2018; Merriam, 2001; Reed, Rosing, Rosenberg, & Statham, 2015; Tough, 1971), transformative learning (Mezirow, 1997), and experiential learning (Tennant & Pogson, 1995). In regard to *self-directed learning* (SDL), Merriam and Bierema (2014) noted that adult learning projects often involve much planning by the learners themselves as they "take control of his or her own learning; that is, the learner decides what and how to learn…the key is that the learner takes responsibility; that is, self-directs what and how something is learned" (p. 62). *Transformative learning* was explained by Clark (1993) as learning that "shapes people; they are different afterward, in ways both they and others can recognize" (p. 47, cited in Merriam and Bierema, p. 82). Another type of adult learning covered by Merriam and Bierema (2014) is experiential learning whereby "an adult's life experiences generate learning as well as act as resources for learning" (p. 104).

In 1999, Eyler and Giles posited Service-Learning as having the potential for adult learning by combining affective service and cognitive classroom learning. They noted that SL utilizes experiential learning that links "head and heart" (p. 9) in a holistic approach for effecting multiple dimensions of students' learning. Service-Learning as an instructional practice was defined as a "credit-bearing educational experience in which students participate in an organized service activity that meets community needs… reflect on service activity…to gain further understanding of course content, a broader appreciation of the discipline, and enhanced sense of civic responsibility" (Bringle & Hatcher, 1996, p. 222). Jacoby (2015) also promoted service-learning as a form experiential learning one that "has its roots in Dewey's theory of experience and education" (p. 14) that address community and human needs.

Later, several authors (Strait & Nordyke, 2015; Waldner, McGorry, & Widener, 2012) discussed the appropriateness of utilizing an adapted version of Service-Learning they called eService-Learning where Service-Learning would be adapted for online and hybrid students. Jacoby (2015) offered ideas on eService learning projects where the students could select their own service sites based on the requirements of the faculty member.

Furco (1996) noted that Service-Learning was distinct from traditional community service, volunteering, field education, and internships. Volunteerism and community service were designed to be beneficial for the community or organization being served without linkage to learning or reflection. In contrast, Service-Learning, field experiences, and internships provide experiential learning for a purpose and typically include activities or assignments requiring reflection and identification of learning. It is noted that "Service-Learning is based on the assumption that learning does not necessarily occur as a result of the experience itself, but rather as a result of reflection designed to achieve specific learning outcomes" (p. 3).

In this chapter, both traditional (face-to-face) students as well as eService-Learning (performed by online students) are presented. Case 1 involves face-to-face undergraduate students who engage in traditional Service-Learning. Case 2 involves both an instance of online graduate students who engage in eService-Learning as well as traditional face-to-face service-learning. Case 3 offers another example of eService-Learning with online graduate students. These three cases will be presented next as instances ripe for adult learning.

THREE CASES OF ADULT SERVICE-LEARNING

Case 1: Service-Learning in a Political Science Context

Project Description

Service-Learning (SL) projects sponsored by Political Science departments are a natural way for universities to partner with local governments in ways that benefit the community and student learning. SL instruction transforms adult education by training a student for a task and empowering the student to make decisions in a real-world situation (Bringle & Hatcher 1996; Harris 2010; Morgan & Streb 2001). This case reviews how a class on campaign politics (American Campaign Politics, POLS 3335) became the source of a lasting partnership between The University and the area County Elections Department.

Over three semesters (Fall 2016, Spring 2018, and Fall 2018), undergraduate students (N=56) participated in the program and contributed 320 hours of assistance to the county where the university is located. While participating in the course, the students observed how elections are administered and the ways a county must adapt to new regulations. The partnership was a localized project in response to a 2014 report by the Presidential Commission on Election Administration that emphasized the need for enhanced poll worker training programs; therefore, students received training from county and state election administrators, as well as the instructor. A principle underlying these projects was the expectation that individuals with experience administering an election are more likely to vote in future elections.

The initial motivation for the project was to establish a long-term partnership between the university and county government. Our approach was to create an opportunity for students to experience being part of a government action through SL. The college poll worker program provides a national model of how local partnerships can be built. Also, the schedule of elections provides clear dates to align with the objectives of a course.

As participants in the election, students benefit from experiencing the challenges a community faces when conducting an election. These challenges include the rules that govern participation and the technology used to count the ballots. Students develop professional experiences and relationships in the community by assisting voters. Their involvement provides a new avenue to engage with the course material, because students recognize they are essential to make voting easier for the community.

Model for Communication

Prior to initiating a partnership involving the recruitment of students, guiding students to complete the training, and getting students to polling locations across the county, it is important to establish how each actor will communicate with each other. Establishing the faculty member and election administrator as focal points for communication among several election judges and students eases the communication difficulties that can surface in the final days of an election.

Figure 1. Polling Site for Political Science Undergraduate Students

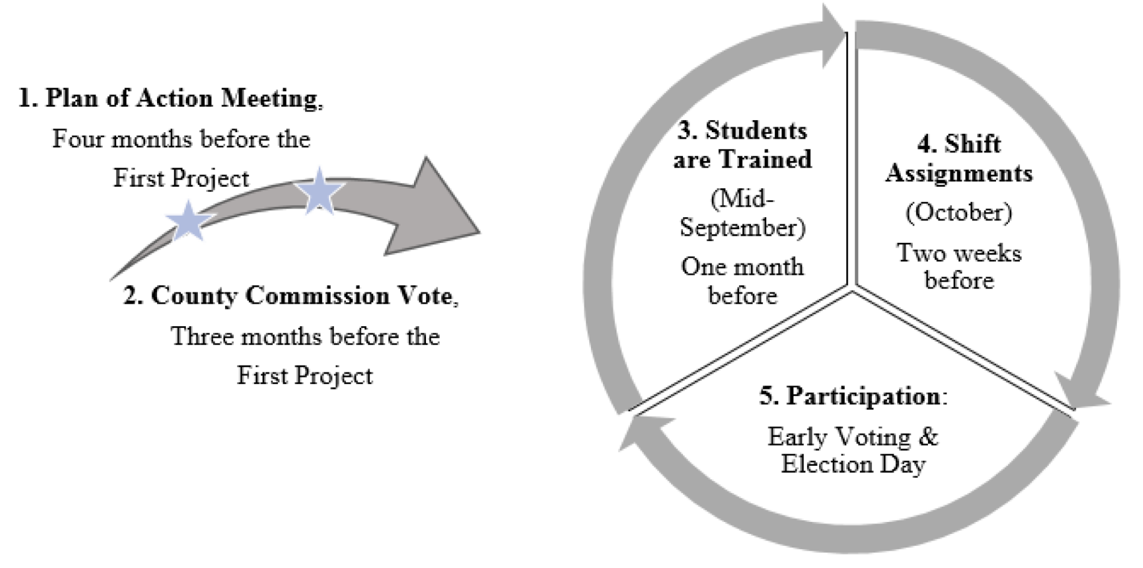
Draft a clear plan of action months ahead of time; this provides a necessary structure and trust to address unexpected concerns that may come up. In our case, the faculty member and Election Administrator met four months before the election (July 2016). The only details that could be communicated at the time were the expected number of participants, tasks that would be required, and a schedule of dates for future meetings. Any additional steps were contingent on a vote of approval from the County Commission, which occurred after the plan of action was circulated to the county leaders three months before (August 2016).

After receiving approval, the first two steps do not need to be repeated. For each election, the election administrator and faculty member can restart their partnership. Therefore, much of the communication revolves around the faculty member. Students receive instruction about the potential dates to attend poll worker trainings and a link to the state's online training system is provided to the students in the learning management system. It is advisable to set a deadline for the class two weeks ahead of the county's deadline to complete the poll worker training. Two weeks allows time for a faculty member to collect training certificates from students and present them to the Election Administrator.

Meeting the poll worker training requirement as early as possible helps students become invested in the program. It also gives the faculty member and Election Administrator enough time to start planning the size of the workforce and the polling locations where students are needed. Expect there to be a few exchanges before the schedule is set, because students have busy and unstructured schedules. An early match between a student and polling location provides fairness to the students and the county officials, as well as the greatest opportunity for learning.

Communication between the faculty and election administrators continues as needed through Election Day. However, discussions can be quick because the faculty has complete information about what the

Figure 2. Plan of Action for Political Science



students need and who is paired to work with whom. Giving each student a letter signed by the faculty member with the contact information of the election administrator adds to the legitimacy of the student serving as a poll worker. The process is often smoother when supervising election judges receive a letter reminding them what to expect from the college poll worker and hours of service.

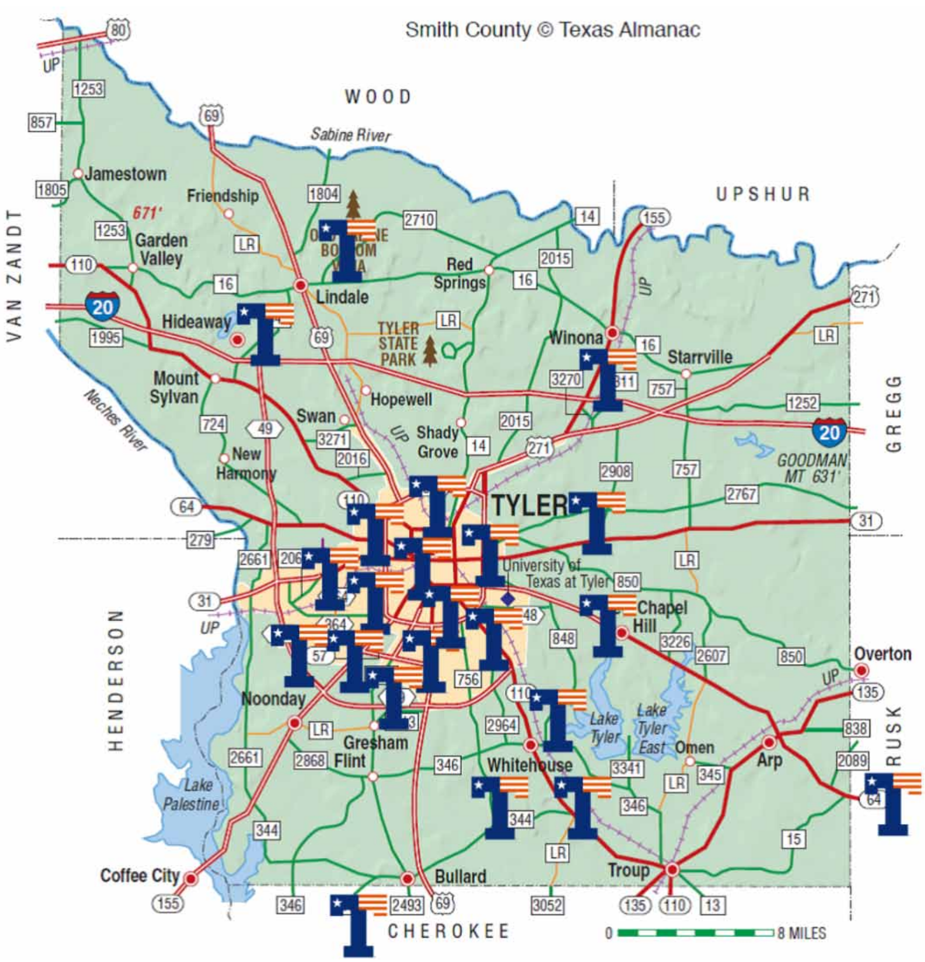
Aligned Course Objectives and County Requirements

Developing a strategy to include students as poll workers is essential to meeting the consistent need of well-trained poll workers, as is the need to specify how real-life experience inform course objectives. In this case, the state requires poll workers to be trained, which aligns with course objectives that students learn how elections are conducted. Therefore, the minimum requirement that students meet is the level of understanding the government requires for its election judges. The course assignments serve the purpose of building on the county's requirements to encourage students to discuss the rich differences of each of their own individual experiences.

Establishing the credential as the minimum threshold for the course project ensures that students achieve the appropriate knowledge of Election Day procedures to assist voters. Using the certification quiz administered by the state of Texas to assess student knowledge adds additional recognition of how valuable the topics are to learn. The importance of each lesson is further underscored by the requirement to receive a passing score before being permitted to participate as a poll worker.

The assignment of students as poll workers is the mechanism for students to apply their knowledge and observe an election as it happens. Students sign up for shifts that are a minimum of two hours and maximum of eight hours in one given day. Overall, participants in this project provide 8 to 10 hours of civic engagement. The placement of a student at a polling place can facilitate the opportunity for them

Figure 3. Political Science Map of Area Voting Maps



to interact with as many as 1,200 voters at the central voting location during early voting on a weekend or 400 voters in a two-hour period on Election Night. A tally of voters on November 6, 2018 in Smith County saw 145 individuals in a ten-minute period during the last two hours of voting on the night of an election. The volume of interactions presents students with a view of how diverse the electorate is. The frequent interactions present unexpected challenges that students will respond to, including individuals not eligible to vote at the location or those that may be voting for the first time.

Pairing students to work with an experienced election judge held benefits for quality control and instruction. Experienced election judges describe to students how to assess whether a voter is indeed violating an election rule or if an assessment is unclear. Placing students in the field also creates opportunities where students enforce new rules adopted after the students committed to the project. In our experience, the state of Texas adopted a new election rule to allow registered voters without photo identification to vote if they signed an affidavit stating they were unable to obtain a valid form of identification. The change was intended to make voting more convenient, but poll workers needed to be educated about the rules’ change to let voters who were unaware know what procedures had to be taken. In a primary election, a new rule was initiated that poll workers were prohibited from verbally asking which party primary a voter wanted to participate; the voter had to point to one of two boxes to indicate the party primary the voter wished to participate. For experienced poll workers, the change was unusual. Many seasoned election judges needed to be reminded not to ask a voter to state the political party preference aloud. These changes are examples of how the county benefits from having new poll workers that can intuitively understand how to help voters with new technology. Each change makes the poll worker training and our course involvement more important to make sure that students are knowledgeable about the electoral process before they graduate.

Adult Learning Gains from the Project

The strengths of SL when learning about elections are the mutual benefits of a partnership between a school and county. The county election office benefits from the consistent recruitment of new poll workers, which is a challenge seen across the country (Vasilogambros, 2018). Student poll workers receive additional training and knowledge than other first-time poll workers due to their enrollment in a related class. Furthermore, the involvement of a faculty member provides additional assistance to the elections office to manage the scheduling and participation of these newly recruited poll workers.

To reflect on their experience, groups of students who worked at the same location make a 7-minute presentation to the class about their perspective of serving at a specific polling location. If students in the group worked at different times, the explanations offer descriptions of how dynamic the voting conditions are with respect to time of day and days until the election. As more groups present, students observe how different polling locations are set up across the county and analyze what characteristics of a polling location add to the convenience of the voter.

After recognizing the standard practices of administering an election, students have the ability to evaluate the effectiveness of Election Day procedures in the county, as "street level bureaucrats" (Lipsky, 1980). Each group is also tasked with writing a two-page memo to the county's Election Administrator to synthesize their observation of the voting procedures at the specific polling location and evaluate the effectiveness of current practices relative to the experiences of the class at other polling locations. Selecting a professional to receive student work enhances the experience for a student and reminds each group to keep their evaluation limited to what is possible given the availability of resources, federal and state regulations.

Among the course outcomes outlined above, three can be measured based on student performance. Therefore, focus will be given to evaluating how students can: 1) explain Election Day procedures, 2) describe multiple ways how voters can cast a ballot, and, 3) analyze how Election Day procedures are implemented. In the third semester the project was implemented, a pre and post survey was included to ask students to answer a series of questions to identify how service enhanced interest and confidence.

The certification test to become a poll worker is one metric, the only metric that was equally applied to all three classes. Among the 47 students that started the project, 95.7 percent passed the poll worker exam. Passing the exam requires a score of more than 70 percent. In class, it is valuable for instructors to emphasize the significance of obtaining a certification from the state because research has shown poll workers that were more confident about their training are likely to have better interactions with voters at the polling location (Claassen et al. 2008; Hall, Monson, & Patterson 2007). If a student was not certified by the state, they were assigned an alternative assignment to collect data during the wait times for voters outside of the polling location. This alternative assignment was intentionally chosen to provide an outlet that would enhance the large project and allow a student to still observe voters during the election within the rules of the state.

When students were surveyed in Fall 2018, they responded that working at the polls provided a good amount (64%) or a lot (36%) of new knowledge about voting. Furthermore, when asked how valuable the SL project was, students answered it was somewhat valuable (14%) or extremely valuable (86%). After working with [Blinded] County election officials, the level of understanding for students increased in each area that was surveyed. Student confidence in explaining Election Day operations was the largest gain with the mean response from the survey increasing 16 percent between the anonymous pre-survey and post-survey. An impressive gain was also in the confidence students felt when describing election laws (12 percent). Together, these two evaluations track with the expected contribution of working as a poll worker to implement the procedures and voting laws of the state.

Students that participated also offered the following observations after their experience. One student said the hands-on experience helped her understand the amount of communication that workers at polling locations need to do with the main Elections Department office. Another mentioned, the experience showed what can be done to reduce line length and voting time, as well as the role that an election judge can play in reducing these. The participants also recognized how their experience was shaped by the geographic location that they served. This was clearly pointed out by a student that emphasized the value of seeing the efficiency of elections in a rural area as part of their understanding of the election system.

Following the evidence of improved knowledge and confidence of students to explain how elections work, a key motivation for a college poll worker program is to spark interest in elections. The Secretary of State in Texas and the Federal Election Assistance Commission have identified the pressing need for counties to produce younger and better trained poll workers. The experience of learning through real-life experience became a motivation for students to learn more about Election Day operations. Most students began with significant interest in explaining what motivates the public to vote, but being part of the election elevated interest in trying to understand the requirements that voters must meet to be eligible. An example of the critical thinking that occurred was that a quarter of the students explicitly noted they were surprised by the number of people voting, because they initially assumed voter turnout in Texas was low.

An important component of the project is that students are treated as professionals, because the County shows great appreciation for the important skills students have with technology, language, and their ability to welcome voters. This helps students transfer the value of the experience they gain. Student comments reinforce this idea by stating that the best part of the project was learning how to operate the voting machines and scan voters' IDs at the polling place; also, helping voters check in and telling them how to cast their ballot. Students appreciated being an essential part of the election process because they were able to talk to people with different backgrounds and gather information from them to study elections locally. Also, one student reflected that it was also encouraging to see parents educating their young children on why voting was important. Overall, students appreciated the department creating a program for them to add to their professional experience. To date, all students have said that they would be very likely or extremely likely to recommend this experience to their friends. This has helped the growth of the College Poll Worker Program at The University of Texas at Tyler because students from different disciplines are helping as first-time volunteers and others are returning to work in other elections.

Case One Conclusions

This case offers an example of a SL project that has been implemented in multiple communities across the nation. A total of seventy-six communities supported these projects and were funded by discretionary grants authorized by the Help American Vote Act between 2005 and 2010. Others, like the university started the program later and have developed unique partnerships with the county government and county political parties.

The key to the learning gains of this project is the comparable activities that students experience by following a systematic structure. Then as students become experts in performing Election Day operations their shared memories and experience offer an informative collection of how well a county is performing its duties of administering an election at various locations. Through their experiences during early voting and on Election Day students were enriched by assisting voters check in and use electronic voting machines to vote. Students also witnessed how the county was prepared to assist non-English speakers, disabled voters, and allow voters to sign affidavits when they were not able to present photo-identification. Like most projects, site selection is important. Smith County is fortunate to have an Elections Department that is interested in creating ways for young adults to be involved. Furthermore, the county has been a leader within the state of Texas to adopt new election reforms that strive to make the election experience more convenient for voters.

The mutual benefits to the county and students at the university provided by the program contribute to the Department of Political Science's interest in continuing the SL project. The next step is likely to grow the program outside of the involvement of one class and invite the larger student body to participate which will expand the opportunities for adult learning in other levels and disciplines through civic engagement and application of professionalism.

Case 2: Service-Learning in an Education Context

Project Descriptions

The School of Education at the university includes undergraduate and graduate courses that are recognized as approved Service-Learning courses. Included in the following sections are descriptions of how Service-Learning is implemented in a pre-service undergraduate course in Reading (N=36) and an online graduate course in Special Education (N=28). Also discussed are reflections of adult learning that occurred within this context.

Undergraduate Course in Reading

The pre-service teaching degree at the university is a face-to-face degree program that fulfills the course requirements to become a professional educator certified by the Texas State Board of Educator Certification (SBEC). As part of this program, students are required to take two reading practicum courses. The first course, *Literacy Assessment & Instruction, Parts I* (READ 4320) prepares pre-service teachers to work in a public-school setting with children who are at risk in literacy. The primary focus of the second course, *Literacy Assessment & Instruction, Parts II* (READ 4326), is a Service-Learning project, Literacy Tutorial Plan, where pre-service teachers tutor elementary students who are at risk in literacy to create a cohesive literacy instructional plan individualized around elementary students' specific literacy needs. The Literacy Tutorial Plan is aligned with the following course objectives (Neel, 2019).

- Develop foundational knowledge of the development of literacy in young children, beginning from birth and continuing into the upper elementary grades.
- Explore an understanding of literacy development theories, research, and effective instructional practices, and how they can be used to inform and promoted reading, writing, and oral language development in young children.
- Apply the knowledge gained about the development of literacy in young children to develop, implement, and evaluate literacy instruction in EC-6 settings.

The goal of the Service-Learning project in READ 4326 is to help pre-service teachers use theoretical information and research-proven strategies in relevant ways to contribute to the literate life of the child at risk in the areas of literacy. The Service-Learning project consists of (1) interpretation and analysis of assessment data, (2) developing an individualized tutorial plan and lesson, and (3) reflections of each lesson.

Literacy Tutorial Plan

Pre-service teachers work in one elementary school under the close supervision of the professor tutoring a first or second grade student who is in the third tier of response to intervention for one to two hours per week throughout the semester. Due to the intensity of the reading interventions, tutoring is conducted one-on-one. Most often the following areas are addressed: reading comprehension, written composition, word decoding, grapho-phonemic and phonemic awareness, alphabetic principle, and reading fluency.

Elementary teachers and administrators select the students who will receive tutorial assistance. These selections are based in part on previous state, district, and classroom assessments. The elementary school administrators obtain informed written consent from the parent(s) and/or guardian and submit a formal proposal that is approved by the instructor of the course before tutorials begin.

Pre-service teachers are expected to arrive early and manage time, routines, and procedures while implementing differentiated literacy lessons during the tutoring sessions. Establishing rapport, respect, and trust between the pre-service teacher and the elementary student is essential in the overall success of each session.

During each tutoring session, pre-service teachers prepare and teach the following elements of the lesson framework (familiar reading, interactive reading, interactive writing) choosing appropriate strategies and resources. Further, each pre-service teacher is required to monitor their student's progress with a variety of informal assessments (e.g. running records, detailed observation notes, reading interest survey, etc.).

Graduate Course in Special Education

The Master's Degree in Special Education at The University of Texas at Tyler is a 36-hour online degree program that fulfills the course requirements to become an educational diagnostician certified by the Texas State Board of Educator Certification (SBEC). As part of this program, students are required to take *Overview of Transition Services for Students with Disabilities*. The central focus of this course is a Service-Learning project where students work with a family that has a child with significant special needs in order to create an individualize transition handbook (Rueter, 2019).

Transition Handbook for eService-Learning

The handbook is specific to the family and designed to meet their individual needs. Students interact individually with the child and family, conduct a person/family-centered assessment to help the family and child think about their future, and explore resources available to the family and child that may assist them in their plan. The goal of this project is to help students use information in the course in a concrete way and also contributes to the life of the child with a disability and his/her family. The transition handbook is aligned with the following course objectives (Rueter, Spring 2019).

- Write individual transition plans/create individual transition projects for families, children, and school personnel.
- Identify various types of assessments recommended for students with disabilities transitioning to post-secondary or adult living and relate uses for the purpose of writing individual transition plans.
- Identify various types of assessments recommended for use in early childhood special education and relate uses for the purpose of informing instruction and program design.
- Identify agencies available in community, state and nation to assist families in meeting needs of individuals with disabilities.

The project consists of 3 major phases: (1) background information of the family, (2) transition assessment and interpretations, and (3) community services. Students are required to choose a family in their local community. The family must have a school-aged child who has a disability with significant needs (i.e. intellectual disabilities, autism spectrum disorders, medically fragile) meets eligibility for services under the Individuals with Disability Act (IDEA) 2004, and requires transition services. Once the student selects a family, the student obtains informed written consent from the parent(s) and/or caregiver and submits a formal proposal that is approved by the instructor of the course before beginning the first phase of the project.

At the end of the course, students write a reflective summary describing their experiences and learning that occurred while developing the transition handbook. For the purposes of this chapter, student reflections from Spring 2018 form the basis of this discussion. From these reflections three broad topics emerged: (1) learning experiences, (2) application of course content, and self-reflections.

Adult Learning Gains From these Projects

Undergraduate Course in Reading

At the end of the course, students write a reflective summary describing their learning. They are also encouraged to consider what was successful and what still needs attention. For the purposes of this chapter, sample reflections that were submitted over the past four semesters, form the basis of this discussion. From these reflections three broad themes emerged: (1) learning experiences, (2) application of course content, and (3) self-reflections.

Figure 4. Student Participating in Creating Her Own Transition Plan

Learning Experiences

The tutoring experience provided an opportunity for the undergraduate student to shift from a pre-service mindset to professional educator. This is exemplified in the following quote by a pre-service teacher. "This [tutoring experience] was a big eye opener on how basic things can help improve a student's reading level. This experience has made me crave my own classroom in order for me to expand each individual student and help make them succeed." Another pre-service teacher commented. "I saw growth continue over the semester, not only in my student's literacy skills, but in me as a pre-service teacher." Another pre-service teacher noted: "Looking back over my time tutoring I realize that this has been such an amazing journey! Was it easy no way, but I do believe it was worth it!"

Course Content

The hands-on practical application of teaching literacy addresses literacy learning standards and teacher preparation standards, while providing a valuable service to the community. For example, this student explains how she approached teaching a child who had attention deficit hyperactivity disorder (ADHD). "I asked myself, as a tutor what can I do to help this child succeed? I researched learning strategies that might help and consulted with my professors to develop a teaching plan with strategies to help. Another pre-service teacher expressed what she learned while reading to a child and the use of questioning strategies. "I realized that you may think a child is engaged but really they are not listening, but if you stop reading and ask them questions it is going to engage them more."

Student reflections

To understand the learning that occurred during the semester, pre-service teachers wrote reflections that elucidated their growth. Two pre-service teachers remarked on their own learning by identifying their student's oral reading errors. The first pre-service teacher commented, "I noticed that my student was guessing at words instead of taking the time to decode them. To help with this, I instructed my student to break the word up into segments." The second pre-service teacher noticed that her student was implementing a specific strategy for decoding an unknown word.

When doing lessons from the phonemic awareness packet she struggles with rhyming words that are actual words. She makes up a word just changes the first letter, this means she knows how to rhyme but having the word have a meaning she struggles. I have to help her to find words that are real words. She does love to do the phonemic lessons because she is good at them and thinks it is fun to blend words and to take off parts to say a different word or sound.

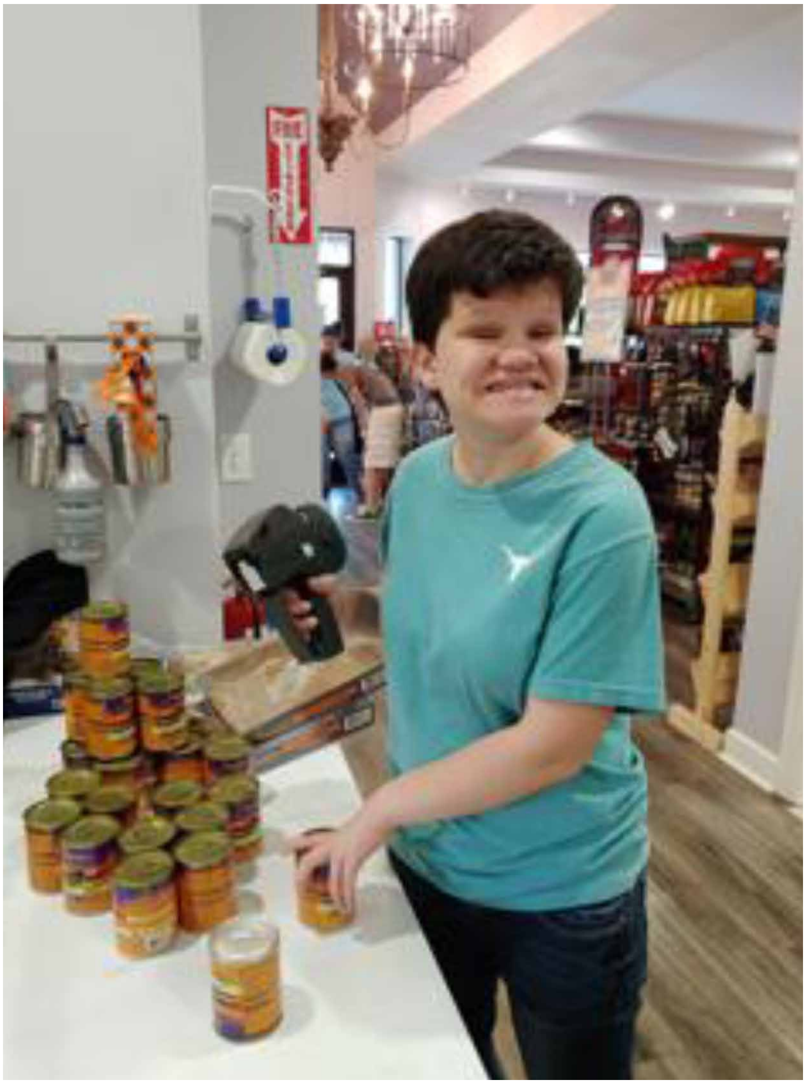
Another pre-service student noted her student's growth by reflecting on specific reading interventions that were implemented. "A student can grow a lot in literacy…Seeing what basic read aloud, constructing our own sentences, illustrating our own sentences, creating words with magnetic letters. Those are only a few easy ways on how to help a student expand their learning."

The gains from this project include: learning experiences, application to the course content, and self-reflection. Each of these will be discussed further.

Graduate Course in Special Education

Reflecting upon learning experiences provide opportunities for students to acquire direct knowledge and skills that translate into applied practice. This is exemplified in the following excerpt, "From an educational perspective, these opportunities afford the learner to acquire direct knowledge and skills that translate into applied practice. Ultimately, these experiences forge new pathways of thinking as it relates to the underlying rationale and methods for educational practices." Students also discussed the benefits of working with families who has a child with a significant disability. One student stated, "I learned that when you get out of your comfort zone and help those in need you not only are bettering a family, but a student's life." Another student summed up the learning experiences expressed by many in the course. "This class made me step outside myself and try to see things from the eyes of a parent of a child with a disability."

Figure 5. Student Engaging in Active Learning



Application to Course Content.

Application of course content to a larger context is a critical component of learning. Student reflections suggested that the two most important applications of content in this course is communication and relationship building. One student commented,

I had to create a relationship with the family early on, letting them know that they could trust me and that I would not judge their family dynamics or the answers that they would give me to very personal questions. I feel this experience has better prepared me for the types of conversations I will have with families and the working relationships I will have with them as well as I get to know them more deeply.

In addition, another student asserted, "This course taught me the necessity of building productive collaborative relationships among the key stakeholders, which included the family, teachers, and agencies."

Self-Reflections

As a result of completing a semester-long Service-Learning project, students reported a variety of emotions. For example, one student said, "The experience working with a family from the school's community with a child with significant special needs through their transition was humbling." While another student stated, "This semester has been very challenging, rewarding, and informative. I found the freedom to explore the content and create the transition handbook highly effective." Most notably another student mused, "The experiences that unfolded this semester taught me about true grit and to persist for a cause greater than myself."

Case Two Conclusions

Undergraduate students who complete READ 4326 and the Service-Learning project transition from being a pre-service teacher to thinking of themselves as a professional educator. This transition marks a critical milestone for many students in their educational journey. This case also provides an example of how graduate students can provide hands-on assistance to a family who has a child with significant needs in navigating the child's transition within an educational setting or to adult living. As a result of participating in this project graduate students were able to view the transition of a child from the parents' perspective which enabled a new understanding of the process.

Case 3: eService-Learning in a Business Context

Project Description

Jacob (2015) offered eService-Learning as an option for transformative learning in online courses that benefit both the student and organization where they are geographically located. In three sections of a human resource development (HRD) online graduate course on leadership and ethics, the students developed and completed a 20-hour eService-Learning project in the community where they lived or worked (Schulten & Gonchar, 2016). Each of the graduate students chose a 501(c)(3) nonprofit organization in their geographical area and they were required to initiate contact by meeting in-person or phone conference with the Volunteer Coordinator (or person who manages that role) and complete a SL proposal that included information such as description and location of the nonprofit, the scope of service they would performing, proof of their 501(c)(3) status and communication with the coordinator to schedule training and performing volunteer hours.

Over three semesters (Summer 2017, Fall 2017, and Summer 2018), 109 graduate business students participated in a eService-Learning project at a 4-year public university in Texas and contributed a total of 2,602 hours of assistance to the local communities where the online students resided. Once the SL hours were completed, the students had their supervisor at the nonprofit sign their log as proof of their service hours. The students then were asked to write a final reflective report of their Service-Learning project that gave the background and context of the nonprofit organization, descriptions of the type(s) of service they gave to the nonprofit organization. In addition, while serving at the nonprofit, the graduate students were expected to ask their supervisor what the future needs of the organization are and record those needs in a section of the report. In addition, they were also to think about what needs the nonprofit organization might have that was not already articulated by their supervisor, and these experiences were asked to be included in their final report.

Also, students were asked to think deeply about their hands-on learning at the nonprofit through eService-learning and earlier readings from the textbook and scholarly literature that they had read and analyzed earlier in the semester. They were then instructed to write at least two pages in their report about the strong connections of their SL experience to their earlier readings and discussions in the semester about leadership, ethics, and social responsibility. The report also included a signed log from the nonprofit leader documenting the hours completed, and any other documents or graphics such as pictures they had taken during the experience, flyers or promotional materials that were attached to the report. These reflective reports were then analyzed for adult learning outcomes. Students were also required to complete a poster template outlining the highlights from their experience as depicted in Figure 6, an example of a student poster that was shared online with other students and instructor and used later for a yearly "Celebration of Service-Learning" event. The annual event is held on campus and community partners are invited to attend as the university's special guests. A number of the online students travelled up to 10 hours to attend the event to present their poster to visitors and engage in open dialogue with them about their service-learning experiences at a nonprofit organization.

Application to Course Content. The major content of the graduate course in human resource development (HRD) was provided by the textbook, peer-reviewed journal articles, and business articles that covered the leadership process, moral philosophies, and ethical decision making. The service-learning projects were developed to apply concepts of ethical leadership to a real-life situation involving a 501(c)(3) nonprofit organization. The students were asked as they developed the final report of their service-learning experience to provide connections they found between the course content (i.e. textbook, other readings, class discussions) and the nonprofit organization where they acquired their service-learning experience

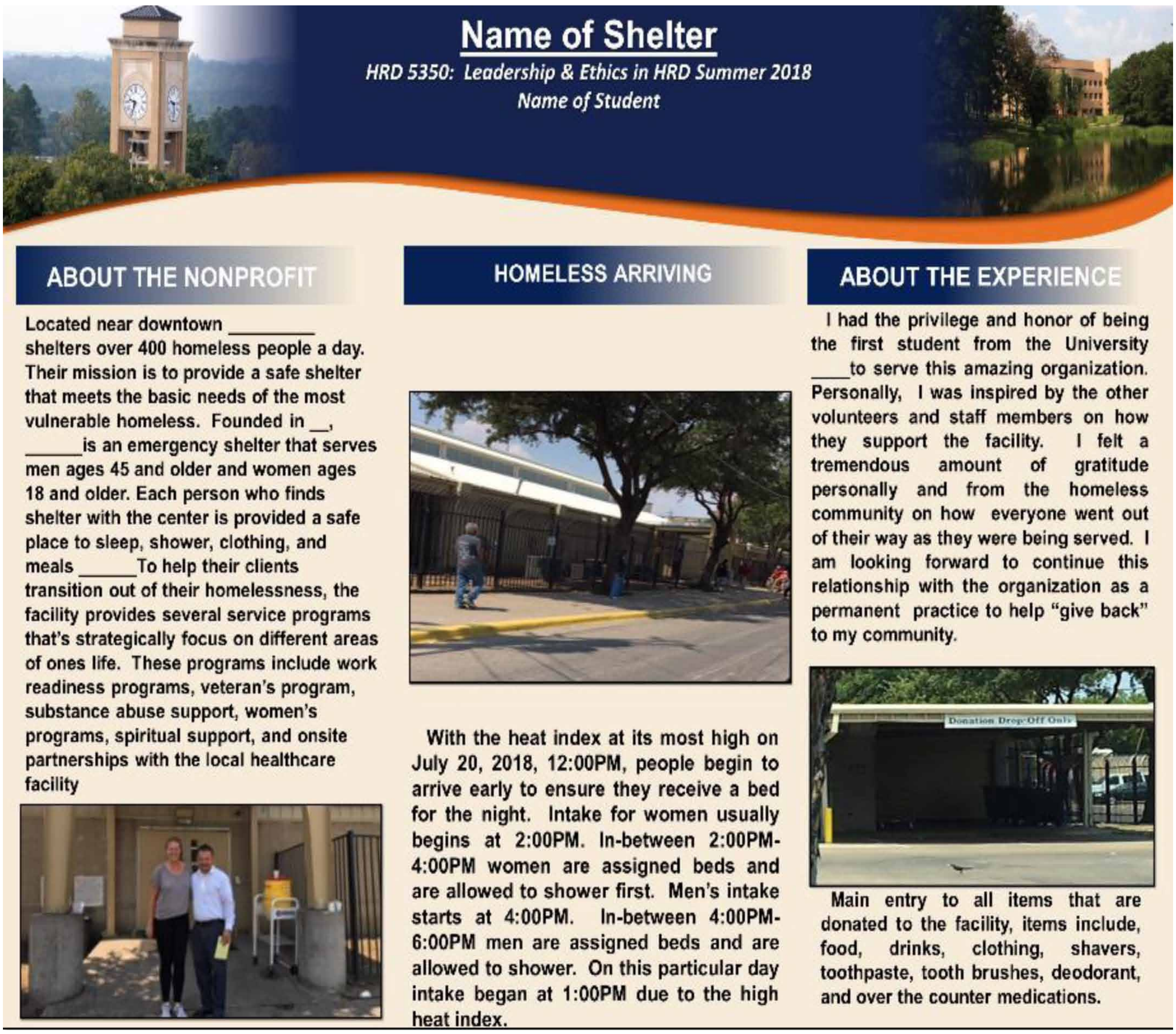
Student reflections. At the conclusion of their service-learning hours, the graduate students were asked to complete 3 different assignments that involved student reflection on their service-learning (reflection in their final report of service-learning; a posting on their LMS discussion board and respond to a classmate; and, complete an essay question on their final exam). Each is explained below with selected student responses.

1) After completing service-learning hours, each student completed a final report of their service-learning experience. Section II of the report asked them to write at least 2 pages about their experiences. This writing reflects their experiential learning:

One student wrote: "Everything that I experienced and learned during this service-learning event has and will continue to fit into my needs as a human being, community member, and a business student. The methods used during at the nonprofit are things that I can do anywhere that I am in order to help bring myself back to a comfortable level whenever I feel stressed, alone, or confused. Also, the ability to be able to speak to other veterans who understand what I am dealing with on both a personal and professional level is a tool that I can use at any time"

Another student wrote: "My experience at the nonprofit increased my adaptability and flexibility in terms of how I responded to new situations. For example, I worked with a child who has autism and has

Figure 6. Student Example of Service-Learning Poster for Business Course



difficulty concentrating on what he was doing. It was challenging to keep him focused on giving the horse proper commands while also listening to the riding instructor's directions. I learned that it was important to spend a few minutes with him before his riding session began so that he could talk about his day. Before completing my service-learning project at the nonprofit, I had never considered volunteering because I thought my life was too busy to take on additional commitments, but I found that it was easy to make the hours I spent at the nonprofit a part of my weekly routine because I quickly realized it made a real difference with the riders at the nonprofit"

2) Discussion Posting Directions*: Post a well-written 2-paragraph posting about your SL experience specifically offering: where you served, what you did there, what you learned from the experience, how your work benefitted the organization and the community; and, provide at least one tie-in of*

your service to the organization to our course on leadership and ethics. Then, please read the other postings and respond to at least one classmate.

One student posted: "I was the first volunteer to work at the nonprofit who told me via email after I had completed my hours that I helped him discover many ways to improve processes and the volunteer experience for others who lend their time to the organization in the future… which led me to discuss future volunteer opportunities with my supervisor so I can continue to give back".

A classmate responded: "You made some meaningful conversations with your nonprofit supervisor which will likely result in a change in their programs. I think this is a silver lining of the service-learning projects. If you can make a meaningful connection with the right person, that can impact many people to come in the future". This exchange of communication lends credibility to the notion that SL projects can be a vehicle for transformative learning not only in the student, but for the community partner as well.

3) For their final exam, students were asked to write a 7-paragraph essay with one paragraph about their service-learning experience. Directions for that paragraph was stated: *Reflect on your learning around your Service-Learning project.*

One student wrote: "The service-learning project was truly an enjoyable experience. In the beginning I had a difficult time connecting ethics with the service-learning project. I honestly could not figure out what one had to do with the other. However, during and after the project it was easy to connect the two. An ethical individual is concerned with more than just themselves. Additionally, an ethical person is socially responsible and wants to make sure that there is a contribution made to do their part and give back. It is very easy to focus on our own selves and what is happening in our own lives, but it is truly satisfying to take time out and do for others around us that are in need. Completing this project has not only influenced my way of thinking but has encouraged me to make some changes on how I can use my time to benefit those around me".

Another student shared, "The service-learning project made me more aware of the practice of ethics within my community. It provided me with a deeper understanding of how our morals and values extend throughout the different areas of our lives. Helping out at the Food Bank made feel very much needed. I felt that several people were relying on me. This idea made me want to work harder and do as much as I could, because I felt that was the right thing to do. The most valuable lesson was the fact that it was done with free will. Providing services to the community teaches you not only about the ones in need but also teaches yourself what your true principles are and how you should put them to use"

Adult Learning Gains from the Project

When the reflections for each of the students were examined from three separate semesters, results included examples of how students gained a deeper understanding of organizational processes such as recruiting and training volunteers, budgeting, fundraising, and project management. For example, one graduate student related their SL experience to topics covered in the textbook and outside readings as they remarked, "as a future business leader, I have a social responsibility to all stakeholders…my services to the nonprofit taught me the importance of empathy, compassion, inclusion, service, problem-solving and most importantly hands-on service". Also, students reflected on business ethics such as abiding by IRS rules and social responsibility in for-profit businesses to give back to their community. Such active learning experiences have been referred to as experiential learning by various scholars (Knowles, 1962; Kolb, 2014; Merriam & Bierema, 2014).

A surprising outcome was that many of the students indicated that they plan to continue serving at the nonprofit organization even after their business course was completed. This echoes the thoughts of Cook and Artino (2016) that students will persist when they find value in activities (see also Schunk, Meece, & Pintrich, 2014). Alston et al. (2016) noted that since adult education was grounded in responding to others' needs, and that the Adult Education field placed much emphasis on adult learning theories (like experiential learning and transformative learning), they asked, "So why is there paucity in our field with regard to service learning in graduate programs of adult education?" (p. 174).

Case Three Conclusions

Adult learners engaged in experiential learning as they performed their service-learning projects. Numerous examples abound from the 109 graduate student reports that were examined and reflected that the students each participated in a Service-Learning project and contributed a total of 2,602 hours of assistance to the local communities where the online students resided. Their experiential learning was done when they each volunteered at a nonprofit organization and carried out various assignments. These "doing" experiences included SL work at soup kitchens, shelters, riding stables, cemeteries, resale shops, home building, community centers, among others. Their projects included requests from nonprofits for help from the business students in helping them to "go paperless", packing boxes of food for those in need, helping promote upcoming events to raise awareness and to raise funding. Each of the SL projects completed were an act of doing and experiencing as students learned to serve others in their community.

The adult learning literature reflects that adults want choices when performing service-learning; for instance, they want to choose when and where they serve and they want to share in deciding what they will be doing. By allowing adult students to choose a nonprofit 501(c)(3) organization for performing their service-learning hours, students in each of the three sections of the graduate course on leadership and ethics were able to experience self-directed learning (Merriam & Bierema, 2014). SDL allows for students to learn through discovery, provides them with autonomy, and also encourages students in thinking critically, while applying new material from their assignments to their own lives and experiences. Adult learners also want opportunities to learn within a real-world context that makes a difference.

Transformative learning was also evident in the SL performed by the graduate students enrolled in the leadership and ethics course. The reports reflect that Service-Learning promoted a shift in both the mindset and skillset for university students in the way that work was performed in the nonprofit with many students remarking that they had no idea that the needs in their community were so great. Also, many were surprised that although they went into the 20-hour assignment not sure how they would accomplish it, most commented that they planned to continue serving at the nonprofit in the future after the class had ended.

CROSS-CASE FINDINGS, FUTURE DIRECTIONS, AND CONCLUSIONS

The researchers examined the demographics of these three cases and compiled the number of participants in the study and found that 92 undergraduate students and 137 graduate (masters) students across four disciplines participated in this study. Findings by the research team for the study noted three major themes: Communication, Shift from Student to Professional, and Application of Course Content. Each of these are explained further.

Communication: Service-Learning promoted communication such as between student and professionals (Cases 1 and 3); and, from university student with parents and their child (Case 2).
Shift from student to professional: Service-Learning promoted a shift in both the mindset and skillset for university students across all 3 cases.
Application of course content: In all 3 cases, students involved in Service-Learning remarked that they were able to directly apply their learning into an authentic setting.

Also, another finding from a cross-case analysis revealed that adult learning was evident in three areas of adult learning. Namely, Experiential Learning, Self-Directed Learning and Transformative Learning. Table 8 utilizes descriptions of projects and learning assignments that provide a context for the varied service-learning initiatives that lend credence to the finding that adult learning is indeed present in the service-learning projects assigned students in the higher education classroom.

FUTURE RESEARCH DIRECTIONS

Although service-learning has been in place at the university highlighted in this chapter for four years, only eleven courses have been recognized with the Service-Learning distinction. Moving forward, the members of faculty learning community (FLC) in Service-Learning should conduct extensive outreach across the campus to contact faculty who are teaching courses that may be a good fit for Service-Learning and also discuss the benefits for adult learning to administrators so that they can grasp how adult learning can occur when experiential learning experiences such as Service-Learning are promoted and supported at all levels as well as the benefits of forming partnerships with community organizations.

Moreover, by providing professional development on embedding Service-Learning in online courses, the FLC in SL can assist faculty members who teach both in person and online courses who may be reluctant to do so because they do not have the tools or the campus leadership support to begin. Scaling up the FLC to build and recognize additional course as approved Service-Learning courses and reaching out to a diverse group of faculty members can increase the opportunities that traditional and face to face students experience. Courses can be designated on student transcripts and reflected on student resumes for likely advantages when students apply for employment.

Future research should be conducted with community partners and beneficiaries of the Service-Learning initiatives. Case studies and other in-depth empirical work can further document the expected and actual outcomes from Service-Learning initiatives and create new learning around multidisciplinary SL efforts in departments and across campuses.

CONCLUSION

Service-Learning was the cornerstone of learning for these undergraduate and graduate adult learners. According to the Center for Teaching and Learning (2018), “Service-Learning refers to learning that actively involves students in a wide range of experiences, which often benefit others and the commu-

Table 1. Examples of Adult Learning found in Cases 1, 2 and 3

Type of Adult Learning	Case 1 (Political Science)	Case 2 (Education)	Case 3 (Human Resource Development)
Experiential Learning (student has opportunity to learn within real-world context)	Undergraduate students served as a poll worker and experienced elections and government in action firsthand one of various polling places in the area. Before serving, they received training from actual county and state election administrators. They experienced firsthand the challenges that a community faces to conduct an election.	Undergraduate students experienced the role of serving as a reading tutor to students that needed extra assistance and reading strategies and reading practice. Graduate students served as a consultant in creating a transition plan for a family that assembled information on additional resources in their community.	Students volunteered in nonprofit organizations and performed various assignments that the nonprofits requested such as assisting the HR director to "go paperless", or pack boxes at their local food bank or create publicity items for an upcoming event. Others worked on projects such as planning with veterans to build a veteran's center or assist in building a house for a needy family.
Self-Directed Learning (provides learner with ability to make choices for their learning context/content)	The undergraduate students chose the shifts that they wanted to work (time and location). Also, each student was able to invest time in becoming an expert on their choice of a core aspect of administering an election.	Undergraduate students serving as reading tutors were given the autonomy to select strategies most appropriate to differentiate the student lessons. Students in the graduate course chose a family with a child in their local community work and worked individually with them and chose appropriate resources.	Graduate students chose the nonprofit organization in their geographical area. They worked with the nonprofit to define the scope of work and days they would serve and additional service they would provide.
Transformative Learning (Student experience shifts in their thinking and skillset)	Service-Leaning promoted a shift in both the mindset and skillset for undergraduate university students as they assisted at polling locations and learned that it was much different than what they expected, and they had not realized all the work that went on behind the scenes before, during, and after an election.	Service-Learning promoted a shift in both the mindset and skillset for university students. Typical student remarks included: "I learned how to teach and I learned how to adjust my teaching to meet the needs of students", "I now see myself as an educator instead of a pre/service teacher", "I can do this! I am confident now that I can asses and teach-I know what to do!"	Service-Learning promoted a shift in both the mindset and skillset for university students in the way that work was performed in the nonprofit with many students remarking that they had no idea that the needs in their community were so great. Also, many were surprised that although they went into the 20-hour assignment not sure how they would accomplish it, most remarked they plan to continue the nonprofit in the future after the class is over.

nity, while also advancing the goals of a given curriculum" (para. 1). These adult learners experienced multiple situated contexts within their own academic disciplines in order to provide a needed service to the specific community population while learning important content and specific skills related to their academic fields. Adult learners are highly motivated to learn when the learning is purposeful and tied to real world applications. Service-Learning is the pinnacle of real-world application leading to the ultimate goals of serving *and* learning. In their study, Alston et al. (2016) concluded, *Adult education professors should consider encouraging adult learners to extend beyond just completing required course hours to complete their degrees. Community engagement, a different type of learning experience, benefits professional and personal growth as adult educators reflect on theory and practice (p. 177).*

This chapter has highlighted three case studies across four disciplines on one public university campus where Service-Learning is beginning to come of age. Although challenges have been seen, powerful adult learning outcomes have piqued the interest of other faculty, administrators, and community partners. Service-Learning has shown to be a worthwhile endeavor to enhance student engagement in the community and to spread the name of the university to other communities (and, other states and countries) through eService-Learning for distance students. Service-Learning is a high impact practice and the researchers in this study recommend SL and eSL to other higher educators who are interested in engaging their students in non-traditional ways to promote adult learning of course material as well as prepare them for professional employment and professional development through networking with community partners.

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KEY TERMS AND DEFINITIONS

501(c)(3) organization: A specific nonprofit organization as designated by the U.S. Internal Revenue Service for tax exemption status.

Affidavit: A legal document swearing that an individual is a registered voter. These are to be completed and signed by the voter and witnessed by a poll worker. In states that require photo identification to vote, a voter who cannot produce photo documentation can submit a sworn affidavit to confirm their identity and voter registration status.

Andragogy: A concept of helping adults learn. (Storey & Wang, 2017, p. 108)

Educational Diagnosticians: Assessment personnel who diagnose the learning problems of children (Council for Exceptional Children [CEC], 2015).

Individuals with Disability Education Act (IDEA): A law that makes available a free appropriate public education to eligible children with disabilities throughout the nation and ensures special education and related services to those children (Retrieved from https://sites.ed.gov/idea/about-idea/).

Presidential Commission on Election Administration (PCEA): PCEA was established in 2013 by President Barack Obama to identify best practices in election administration and to make recommendations to improve the voting experience. The PCEA is no longer active, but the report is available to the public by the U.S. Election Administration Commission.

Service-Learning Log: A report of Service-Learning hours completed by student and verified by supervisor at an organization to document time spent in service assignment.

Street Level Bureaucrat: Individuals that interact with citizens every day to implement programs on behalf of the government. Examples include teachers, police officers, poll workers, and clerks at the Department of Public Safety.

Transition Services: A coordinated set of activities for a student with a disability that is designed to be within a results oriented process that is focused on improving academic and functional achievement of the student with a disability to facilitate the student's movement from school to post-school activities, including: post-secondary education, vocational education, integrated employment, supported employment, continuing and adult education, adult services, independent living, or community participation. It is based on the student's needs and takes into account the student's strengths, preferences, and interests and includes instruction, related services, community experiences, development of employment and other post-school adult living objectives and if appropriate, acquisition of daily living skills and provision of a functional vocational assessment [300.43(a)(2)].

APPLICATION ACTIVITY: DISCUSSION QUESTIONS

1.) Describe in detail your service-learning experience in terms of the setting (i.e. location including the city, state, recipients of your service) and how the setting may have affected the outcome.
2.) Describe your service-learning experience in terms of other(s) who were involved in your project and how they affected the outcome.
3.) Describe in detail why you believe your service was important to the recipient. Give specific examples.
4.) Describe in detail how your service-learning experience is an enhancement and important component for our course. Give specific examples from your textbook and other assigned readings in the course.
5.) Describe in detail your recommendations for improving the service-learning assignment for future students.

Chapter 19
The Use of Social Media:
Issues, Challenges, and Strategies for Adult Teaching and Learning

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ABSTRACT

This chapter provides the readers with an overview of the use of social media technologies and how the media is applied in adult teaching and learning environment. It examines the current educational purpose of using social media based on a review of scholarly publications. The aim is to keep up-to-date changes in social media, and to better understand the paradigm shift, including the trends and issues pertinent to the application of social media in adult learning. The chapter reviews the literature on the benefit of using social media and provides strategies and guidelines for adult instruction using social media. The chapter discusses some challenges facing social media use in adult teaching and learning. The idea is to help the reader determine if social media is a valuable tool to improve learning and develop better instructional strategies for engaging students and stimulating academic dialogue using social media.

INTRODUCTION

Over the past years the use of social networking services, such as Facebook or Twitter, has exceptionally expanded across the global world. Because the platform is highly interactive and multidimensional, social media has been popular and thus widely adopted for instructional purposes. As the number of the social media studies increases, it becomes essential that researchers and instructors investigate how the platform of the social media affects adult learning. Social media users not only have the power to share and connect with others, but also can instantly discuss and share all types of information and knowledge through the share status function. Although many scholars have suggested that social media may not always be appropriate or successful vehicles for formal teaching and learning activities (Salaway, Caruso & Nelson, 2007; Waycott et al., 2010), integrating social media for classroom instruction seems to be a feasible means for instructors to enhance learning. Therefore, there is a need to investigate whether or

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not the implementation of emerging social media can result in a positive impact on supporting learning processes and outcomes, especially for adult learners.

The chapter intends to provide the readers with an overview of the association between social media technologies and the nature of adult teaching and learning. The chapter seeks to examine current educational uses of social media based on a review of scholarly publications, and keep up-to-date on the paradigm shift as well as on the trends and issues pertinent to the development of social media. The chapter not only reviews the benefit of using social media, but also attempts to provide some strategies and guidelines for adult instruction. By outlining some fundamental issues and considerations, the chapter discusses some challenges of social media in teaching and learning also. The chapter can help readers in two folds: a) determine if social media is a valuable tool to improve teaching and learning, and b) develop better instructional strategies for engaging students and stimulating academic dialogue with social media.

Defining Social Media

Bryer and Zavattaro (2011) defined social media as technologies that facilitate social interaction, make possible collaboration, and enable deliberation across stakeholders. Social networks can be defined as nodes of relationships that are used by people as a resource to solve problems, share knowledge, and make further connections (Wenger et al., 2011). Kaplan and Haenlein (2010) defined social media as the applications that are supported on the Internet and are based on the ideological and technological foundations of Web 2.0 and allow creating and interacting with contents generated by users by open and free means. Similarly, Khan (2013) delineated that they provide opportunities to users to develop relationships, communication, and collaboration (sharing contents). A central feature of social media is the ability of users to establish an online group with which or whom to interact. Although this may range differently from a few family members to millions of followers, the presumption is that there is a selected group (Taylor, 2015). "Traditional" social networking sites include Facebook and the business-oriented LinkedIn (Taylor, 2015). Other examples of social media applications include Twitter, MySpace, YouTube, Flickr, Skype, Wiki, blogs, Delicious, Second Life, open online course sites and forum, text messaging, online games, mobile apps, etc. (Cao et al., 2013).

SOCIAL MEDIA IN ADULT TEACHING AND LEARNING

With social media becoming an integral part of million people's lives, there is an increased use of social media in adult learning. The flexibility and adaptability of social media applications have the potential for customization of the learning process to the needs of each student and for accommodation of any adult learning style (LeNoue, Hall, & Eighmy, 2011).

Research reported different reasons why social media technologies could potentially benefit current teaching practices. First, young adults are already using such technologies in their private settings, and second, social media activities are understood to be important from a theoretical learning perspective (as cited in Awan et al., 2018). Apostolova (2013) pointed out the primary reason for adopting social media in teaching is because it is familiar to many adults from other areas of their life, and it is free of charge and requires minimal training.

So, what makes social media different? According to Orth (2018), *First, social media may allow instructors and students to communicate and collaborate in ways that are potentially more efficient and effective. Second, it supports a climate for learning that is open, networked, personalized, and connected. Third, these learning communities can be used to help students break poor study habits and take responsibility for their learning (p. 132).*

The adoption of social media by students outside of coursework leads to examining its potential in teaching and learning (Apostolova, 2013).

Benefit of Using Social Media

Research showed that there are benefits associated with the use of social media for educational purposes. Many studies demonstrated how adult users have effectively used social media for academic purposes too. For example, Abdelraheem and Ahmed (2015) indicated that the benefits of social media in teaching include communicating with colleagues to benefit from their previous experience, encouraging students to use technology in instructional processes, assisting students to understand the lesson through their discussion, encouraging students to share more information inside the classroom, responding to students' questions, and instilling responsibility and self-confidence through free writing expression. DiVall and Kirwin (2012) noted that social media can facilitate active learning and easy sharing or posting of current events, and can serve as an accessible, real-time, dynamic platform to allow course-related discussion. Hsu and Ching (2012) specified that the proliferation of social media among people with use of mobile devices contributes to broaden the possibilities of ubiquitous, collaborative learning. Atanda (2018) indicated that social media facilitates adult users to be proactive, active creators and sharers of online information rather than consuming only accessing and consuming online information. Virtanen (2015) noted that social networking platforms can help generate new reflections on indigenous traditions and knowledge. Libert (2010) advocated that linking online social networking sites through a hand-held device provides an avenue for small group interaction anywhere and anytime. Additionally, Parusheva et al. (2018) reported that educational benefit of using social media include:

- Enhanced communication between lecturers and students
- Increased opportunities for teamwork and networking between students
- Faster resource sharing
- Better students' access to study material
- Creating an alternative platform to the official learning management systems
- Presenting the students with technologies that can improve their success in job search (p. 172)

Taylor (2015) described social media can be used for instructional purposes to: 1) encourage contact between students and faculty; 2) develop reciprocity and cooperation among students; 3) encourage active learning; 4) give prompt feedback; 5) emphasize time on task; 6) communicate high expectations, and 7) respect diverse talents and ways of learning.

Overall, many educational benefits of using social media have been documented in literature that contributes to successful teaching and learning by providing additional opportunities for communications among students and faculty.

Usefulness and Impact of Using Social Media

Many educational studies (Dawson, 2006; DeSchryver, Mishra, Koehler & Francis, 2009) provided evidence for effectiveness of using social media technologies directly in the context of traditional education, addressed usefulness of social media in informal setting of education, and supported using social media as an educational tool to increase student engagement. According to Atanda (2018), there are four dimensions in which social media can lead to innovations in teaching and learning. They are:

1. Content accessibility: students are given opportunity to access instructional content relevant to their field of interest thereby adding value to what is learnt in the class;
2. Creation of content: apart from opportunity to access online content by the students, social media encourages them to create content which can be made available for others to access, comment and critique. This makes learners to be proactive;
3. Networking and connecting: social media provides platforms for easy connection among scholars, students, researchers and stakeholders in education. The introduction of information and communication technologies has reduced the entire world to a global village where individuals relate and interact;
4. Collaboration: social media facilitates functional collaboration between teachers and learners on instructional related matters. This collaboration provides opportunity to share expertise between teachers and students as well as among students (pp. 500-501).

Boulos, Maramba and Wheeler (2006) indicated that integrating social media tools has a positive impact on teaching and learning by allowing teachers to actively involve adult learners by creating knowledge, sharing, and collaborating in the learning process. Couros (as cited in Atanda, 2018) highlighted some of the impacts of social media on education, such as relatively free, cutting down on isolation, building tolerance and understanding of cultural diversity, amplifying passion and opening up of world of education. While exploring the use of social media tools, such as Facebook, for informal learning activities, Yakin and Gencel (2013) found that Facebook is an important social media tool preferred by the majority of students to fulfill their learning activities, networking, mentoring, learning from experts, information distribution, and even self-analysis activities. After Junco, Heiberger, and Loken (2011) explored the effect of Twitter on college student engagement and grades, they concluded that Twitter can be used as an educational tool to help engage students and to mobilize faculty into a more active and participatory role.

Social media facilitates effective knowledge transfer in formal setting as well (Atanda, 2018). When it comes to sharing practices, popularizing educational materials, sharing opinions and comments, the educational institutions, faculty and students more and more count on social media in formal education (Parusheva et al., 2018). Whittaker, Howarth and Lymn (2014) posited that these technologies used in learning promote a social constructivist educational approach which is student focused, highlighting open dialogue and collaborative construction of knowledge. Galy, Downey, and Johnson (2011) indicated that social networking sites (SNS) allow students and instructors to easily search and discover valuable information related to academic matters, and thus save considerable amount of time. When Kevin, Lori, and Bethany (2010) investigated the use of alternative social networking sites in higher educational settings as a tool for teaching and learning, they found social network sites can be used most effectively as a technological tool in higher education to improve communication and collaboration among students to support and enhance student learning. As a result, it is important for students and instructors to understand the impact of using social media on teaching and learning activities.

Current Use in Higher Education

There is a great potential in using social media in educational settings (Abdelraheem & Ahmed, 2015). Therefore, many researchers studied current use of social media, especially in higher education. There is a variety of reasons why social media is commonly used in higher education also. According to Atkins et al. (2017), there are five general reasons for using social media in higher education. They are: 1) research; 2) teaching; 3) professional development; 4) sharing and building networks and community, and 5) career advancement. Because of the multifaceted nature of roles in academia and social media in general, there is overlap between many of these as well (Atkins et al., 2017).

Apostolova (2013) indicated that social media can be used as an effective teaching tool in higher education because of its ease of use, ready availability, individual affordability and network effects. Gruzd et al. (2012) described that the five most commonly social media tools in higher education were wikis, nonacademic social networking sites (including Facebook), listservs, blogs and web-conferencing tools. Based on a study of Moran et al. (2011), YouTube and Facebook as most commonly used tools by faculty for their professional roles, 80% of U.S. faculty from higher education institutions indicated that they were using social media for at least some component of a course they were teaching, and 91% of U.S. faculty members surveyed used social media for either their classes or professional purposes or a mix of both. Veletsianos (2012) reported that higher education scholars who are very active on Twitter commonly shared questions and answers relating to teaching issues as well as student work through social media. He further stated, "We see here a new role for the instructor as an active network participant who connects students with his/her professional community" (p. 11). These all provided as examples of how social media can be used for teaching that overlaps with other purposes such as building networks and engaging in community.

Despite many promising indicators, some educators (Moran, Seaman, & Tinti-Kane, 2011; Roblyer et al., 2010) seem hesitant to integrate social media as a pedagogical tool too. For instance, Kirschner and Karpinski (2010) found that their Facebook users showed significantly lower GPAs and reported spending fewer hours studying per week compared to non-users. Lederer (2012) revealed that social media can be a distraction, in accordance with a common complaint among instructors that tools such as Facebook and Twitter can divert students' attention from class participation and eventually are disruptive to the learning process. Fodeman and Monroe (2009) reported that using Facebook in learning environment reduces the efficiency of lessons, lowers the productivity and takes too much time. Students in the study of Roblyer et al. (2010) also expressed their concerns about the use of social media in the classroom. They found 15% of students indicated that they would feel "uncomfortable" with the use of social media like Facebook for a class. These studies disputed Facebook's potential to serve as a teaching and learning tool. As a result, more research is needed to systematically investigate student perceptions of Facebook-based discussions in college courses, and a better understanding of student views and opinions regarding social media could help instructors develop better strategies for implementing and improving course discussions (Hew, 2011; Roblyer et al., 2010; Smith & Caruso, 2010).

ISSUES, CONCERNS AND CHALLENGES OF SOCIAL MEDIA IN TEACHING AND LEARNING

Learning does not always take place in front of a computer; therefore, it is essential that learners are able to access information whenever and wherever they want (Walton, Weller, & Conole, 2008). Social media provide opportunities for sharing social and emotional support, information resources and bonds with other people (Cheung, Chiu, & Lee, 2011). Because of the popularity of the online social networking, social media applications such as Facebook has provided learners opportunities to network, collaborate, and share resources for educational purposes.

Using social media is no more news in education (Atanda, 2018), and there is a move toward more use of social media in adult teaching and learning. However, issues or barriers still remain since the use of social media in education is not without challenges. These may include: privacy and security; time commitment; loss of control and monitoring; digital divide among students and between students and faculty; the variation in mobile services; the issues of grading and assessment; the need to integrate with learning management systems (LMS); faculty preferences towards LMS over social media; the need for institutional support to develop digital and pedagogical competencies; infrastructure; ethical issues; lack of awareness of social media as a teaching tool among faculty and students; the changing relationship between students and faculty; and the changing role of faculty (Manca & Ranieri, 2016; Sobaih & Moustafa 2016). Some of these issues, concerns, or challenges discussed in literature are presented below.

Pedagogical Concerns

"Good pedagogy does not require social media; however, social media in teaching demands a good pedagogy" (Orth, 2018, p. 132). Although collaborative, constructivist modes of teaching may be enhanced by social media, Orth (2018) pointed out that a holistic approach to social media adoption needs to address the educators' pedagogical intentions, teaching strategies, and training in social networking practices.

Communities of practice or personalized learning networks can assist students in better understanding their abilities and realizing their potential. Therefore, instructors need to adopt a teaching approach and a class environment that are explicitly open, networked, and connected; however, they should be cautious in how to use social media in teaching because deep reading and learning are not common among heavy Internet users (Carr, 2008). Orth (2018), thus, indicated the thoughtful educator should not be dependent on social media alone but seek opportunities to use it to create desirable difficulties for deeper learning objectives, such as critical thinking, evaluation, analysis, and creation, and social media is a venue for sharing results of these deeper learning activities. As Orth (2018) stated, "Ensuring that social media is not misused is not easy; it relies on educators encouraging students to engage in the work of inquiry, reflection, and feedback in an authentic community" (p. 132). In order to achieve possible learning outcomes, Chen and Bryer (2012) indicated,

…capacity building and training is necessary for faculty, so that they can understand the theory behind social learning and the limitations that are created through the erection of a wall between teacher and students. Similarly, university rules that permit or do not permit the use of social media for teaching need to be examined to ensure such rules are not artificially constraining the pure adoption of objective social technologies (p. 98).

Different Perspectives of Using Social Media

It has been empirically confirmed that behavioral intention influences technology adoption including social networking systems (Cheung & Vogel, 2013). By addressing different perspectives, educators can integrate social media into their classrooms, providing a more interactive, fun and collaborative environment to increase the motivation of students, and thus enhance the learning process (Akman & Turhan, 2018). For instance:

Male vs. Female

Like the study of Kim, Sin, and Tsai (2014) that revealed gender has some effect on social media use, Kimbrough, Guadano, Muscanell, and Dill (2013) also reported that the nature of mediated social interaction changes between genders after they analyzed the gender differences in online behavior. Akman and Turhan (2018) found that both male and female users agree social networking sites are useful in their learning activities and both users have a positive attitude towards the utilization of social media for learning. But, they found that there are differences between the male and female users' attitudes in terms of the ethical conduct of users in social networking sites for learning. Their study showed that male users agree that unethical conduct in social media increases the risks in the learning process, whereas the female users disagree. In addition, male users believe that ethical awareness is an important factor in the intention to use social learning systems, which does not apply to female users. They further reported that the awareness levels of social learning systems by both genders are high and do not affect their attitude to use such systems. To provide more insight into the development and utilization of social media, there is the need for future studies to research more on the empirical relationship between genders and learning processes influenced by social media like web 2.0 features (Huang, Hood, & Yoo, 2013), so that both genders feel equally comfortable in the actual usage.

Formal vs. Informal Learning

Some studies (Goodwin, Kennedy, & Vetere, 2010; Madge et al., 2009; Selwyn, 2009) reported that social media, like Facebook, emphasizing peer-to-peer interactions, can enhance "informal" learning experiences. Informal learning happens throughout individuals' lives in a highly personalized manner based on their particular needs, interests, and past experiences. This type of multi-faceted learning is voluntary, self-directed, and often mediated within a social context (as cited in Bull et al., 2008). McCarthy (2010) described that web 2.0 (and beyond) technologies like social media have not reached their fullest potential in education; but, some have contended that these technologies may not always be successful or adequate tools to facilitate "formal" learning or learning activities (Waycott et al., 2010).

Some research studies also claimed that there are serious risks to using social media in the formal classroom. For example, Waycott et al. (2010) believe that social media technologies are not always neither appropriate nor successful vehicles for teaching and learning activities. Therefore, Abdelraheem and Ahmed (2015) suggested,

…there is a need to establish measurements of the benefits or the effectiveness of the use of social media in the classroom that would provide guidelines to help educators employ those technologies in their lessons. Without additional research, these barriers will limit the use of social media in teaching (p. 67).

Student vs. Faculty

Numerous researches have been done from different perspectives between students and instructors on the acceptance and potentials of social media for learning. Research reported that students using various applications of social media became an essential activity in their lives for personal and learning purposes (Cao & Hong, 2011; Dahlstrom et al., 2011). They update their status; chat and send private messages; check friends' activities; post, view, tag, or comment on photos or videos; and play games (Junco, 2012). Given the popularity of Facebook, for instance, with college students, it has become an area of interest to researchers investigating its use in higher education. A study conducted by Valenzuela, Park, and Kee (2008) reported a positive correlation between Facebook use and student's life satisfaction, social trust, civic participation and political engagement. Lampe, Ellison, and Steinfield (2008) revealed students embedded it into their daily routines more and their positive attitudes towards the site increased. Students think educators do not know how to use social media, professional network, or other Internet resources which was directly correlated with the lack of incorporation of these tools in their teaching styles (Awan et al., 2018).

However, students are not the only ones contemplating academic uses of social networks, since faculty use of social networking sites for course-related purposes is also expanding (Junco, 2012). Arnold and Paulus (2010) found when social media is used for an educational purpose, students incorporate the technology into their lives in a way that may differ from the intentions of their instructors. Unlike students, faculty often report using social media for professional development, but they often do not use it for educational activities associated with classes (Seaman & Tinti-Kane, 2013). In a study of El Bialy et al. (2015), the majority of educators (79%) had presence on social networking sites (SNSs), only 33% used them in their teaching. It means that majority of faculty lack interest in using social media in education; this contrasts with findings on students' willingness to integrate technologies. Similarly, Tess (2013) reviewed social media in higher education classes and concluded that majority of the universities possess the infrastructure and support for the use of social media, but their instructors are not as adept at using the same for the purpose of instruction. Although the number of faculty who use social media in the classroom does not represent a majority, it still continues to grow annually (Seaman & Tinti-Kane, 2013).

Lack of Awareness to Adopt Social Media in Teaching and Learning

The reasons to use social media for teaching purposes are to increase students' motivation and involvement; to fulfil ways of collaborative and participative learning; to capitalize on students' familiarity with these tools; to improve the quality of teaching; to experiment with new tools; and to share content material with students easily (Manca & Ranieri, 2016). However, faculty's lack of efficacy in Web 2.0 technology and data overload were two main concerns that impeded social media use in higher education (Piotrowski, 2015). When considering teaching practices based on the use of social media, faculty in higher education should confront some issues relating to their previous experience with educational technologies, their expectations and their pedagogical beliefs and practice (Ajjan & Hartshorne, 2008).

Moreover, literature reported hardly perceived usefulness and low compatibility with current practices by faculty were the obstacles too. For example, Ajjan and Hartshorne (2008) found that majority of respondents have a positive attitude towards the adoption of social media as a teaching tool, but only a minority were using or planning to use these. Abdelraheem and Ahmed (2015) found that the use of social media in teaching as rated by faculty members was between the ranges of "rarely" and "sometimes," indicating a moderate level of usage of social media in teaching. This study also found there was a significant difference in the scores for educator and non-educator faculty members regarding social media usage in teaching in favor of educators.

Faculty's age or discipline may be another factor to influence their aptitudes and dispositions towards social media. For example, Moran et al. (2012) found that younger faculty use social media in their teaching more than older faculty do. Seniority is another key factor influencing social media adoption; they found that young faculty members (under age 35) use social media at much higher rates than older faculty do. Additionally, Dahlstrom (2012) found that adoption may vary across disciplines with faculty in the humanities and arts, professions and applied sciences, and the social sciences using social media more than those in natural sciences or mathematics and computer science. The survey study of Moran et al. (2012) reported that faculty who teach in the humanities and arts have the highest rates of use while those in the natural sciences the lowest.

Privacy and Security Concern as a Teaching Tool

Privacy is a main concern for using social media as a teaching tool (Bair & Bair, 2011; Debatin, Lovejoy, Horn, & Hughes, 2009; Lewis, Kaufman, & Christakis, 2008; Young & Quan-Haase, 2009). Research showed that both students and faculty are concerned about social media use for teaching and learning. Students dislike privacy invasions from faculty social media use, and they still prefer to use e-mails and course or learning management systems (e.g., Blackboard, Moodle) and face-to-face instruction (Dahlstrom, 2012). Many faculty members are afraid that social media applications take up too much time to setup and use, lead to plagiarism and privacy issues, and only contribute minimally to actual student learning outcomes; they often view the applications as redundant or simply not conducive to better learning outcomes (Moran et al., 2012). To minimize the problem of integrating social media into teaching and learning process, educators must be provided with professional development that demonstrates how to incorporate social media into their classroom effectively in order to promote student learning (Atanda, 2018).

One other concern would be the difficulty of protecting students and faculty on social media from other online security threats like account hacking, stalking, harassment, and reputational damage (Taylor, 2015). According to a survey conducted by Raine et al. (2013), 55% of Internet users between the ages of 18 and 29 have experienced at least one of these problems online, and majority of people have been stalked or harassed, and 11% further reported that online events put them into physical danger. Though a webpage or group may seem limited to a class, it could be fairly easy for anyone in class to access others' personal information. Beyond the class, linking through profiles, pages, and accounts can open each student's network of contacts to others in the class too. Therefore, Taylor (2015) stated,

Few instructors would knowingly expose students to these known risks. A precondition for faculty to engage students through social media in learning may be that they enter that space only if they can do so in ways that do not intrude on other privacies and offers reasonable security and limited risk exposure. Given the state of the platforms at this time, meeting these conditions does not appear to be readily possible. Given the current state of Internet security, instructors would be well advised to seek guidance from school legal and campus safety professionals to address privacy, Family Educational Rights and Privacy Act, and other safety concerns before incorporating SM into instruction (p. 44).

Collaborative Learning and Engagement

The increasing use of web 2.0 activities, such as social networking, wikis, and blogging, provides a viable avenue for cooperative learning proactively (Ajjan & Hartshorne, 2008). Yang and Chang (2012) found that blogs can help emphasize interaction and foster more positive attitudes toward academic achievement and online engagement. Atanda (2018) specified that the use of social media in teaching and learning allows collaboration and deliberation among teachers and adult learners, and both groups can seek clarification and add value to the content of the instruction. This is why researchers described social media as the interaction among people in which they create, share or exchange information and idea in virtual communities and network (as cited in Atanda, 2018).

Al-rahmi, Othman, and Yusuf (2015) demonstrated that collaborative learning and engagement through the use of social media have a positive and significant relationship with the group participants' interaction. Hemmi, Bayne, and Land (2009) studied social media use, including blogs, wikis, and Facebook, and found that it emphasizes collaborative forms of inquiry as well as group self-regulation. Helou and Rahim (2014) conducted their study in Malaysia examining the students' opinions regarding the influence of social media on learning, and concluded that they support the positive influence of social media on their performance despite the fact that they use this technology mainly for social interaction more than for academic purposes. Larusson and Alterman (2009) and Ertmer et al. (2011) also supported the positive influence of social media on the process of learning leading to a better level of performance. Many researchers (Junco et al., 2011; Novak et al., 2012) agreed that the social tools play a positive role in enhancing the performance of learners and encourage active collaborative learning at the level of higher education.

However, research also pointed out some concerns when students are collaborating about coursework on social media. For example, through the development of informal study groups, students are interacting with each other on social media around course content but without instructor guidance, supervision, feedback, or intervention (Selwyn, 2009). As Taylor (2015) stated, "Although this might be an opportunity for students to critique the class, assignments, the instructor, and evaluations, there may be limited meaningful critical analysis of course material and no instructor guidance" (p. 39). Therefore, continuous monitoring of class dynamic on the social platform is a key element to integrate social media into learning environments.

Interaction and Communication

Learning is social, and social media can help support activities that allow students to take ownership of their learning, reflect on the knowledge they are acquiring, and interact with their peers (Joosten, 2012). Students engaged through social media can create a virtual communitythat leads to better content learning (Tarantino, McDonough, & Hua, 2013). Since social media can be used as a tool to facilitate collaborative learning, it can strengthen the creative learning process (Shoshani & Hazi, 2007).

Social media tools and network sites have reached popularity with sites such as Facebook, Twitter, and YouTube (Boyd & Ellison, 2007). Moreover, the nature of these online tools has evolved from an emphasis on profile formation into a focus of communication and media sharing (Ellison & Boyd, 2013). Thilbaut (2015) stated by using social network applications, "teachers and students are able to draw on social networks not just based in a face-to-face communication, but also online, hence extending the co-presence communication any-time/any-where, and bringing a new dimension to teacher-student interactions" (p. 84).

Bull et al. (2008) indicated that social media can bridge the gap informally among students, faculty or lecturers in terms of communication. Klein (2008) reported that educators who used social network sites in education found improved test scores, writing and language fluency, and relationships built on social network sites between students and lecturers may improve communication and interaction, leading to a better teaching and learning environment. According to Acker and Miller (2005), learning grows through a rhythm of interaction and argument, clarification of discussions, presentation and critique, and social network sites provide both personal and collaborative public spaces to foster interaction and communication related to teaching and learning.

Research stated that students are more likely to communicate with their professors if they are Facebook friends with them (as cited in Apostolova, 2014). However, Lederer (2012) pointed out that social media discourages face-to-face communication by stating, "while real-time digital stream may create a safe harbor for students who are uncomfortable expressing themselves, students are missing valuable lessons in real-life social skills" (p. 2). Also, students who grow up with technology often learn to communicate with others through social media. Yancey (2016) pointed out, learning to communicate in writing in abbreviated terms through "texting, email, and social media… many come to college without a developed process for writing" (p. 278), or "the detriment of developing essential professional writing skills" (Yancey, 2017, p. 305). While using social media may be beneficial in teaching and learning, Yancey (2017) cautioned, "excessive dependence on social media could be deleterious" (p. 305).

Problem-Based Learning (PBL)

Awan et al. (2018) examined factors affecting the use of social media into PBL sessions. They found that the "Participation and Communication" element was highly influenced by introducing social media, because social media represents communication in essence. PBL relies heavily on communication and participation skills in the learners, and the addition of social media fulfills the requirement of meeting in between their assigned sessions when physical meeting is not plausible. Literature pointed out there are many advantages of integrating social media into PBL too. For example, it can promote learner's engagement and feedback, enhance the collaboration and professional development, and improve communication and knowledge (Barber et al., 2015; Shama, 2014). However, one concern of incorporating social media into PBL is that uninformed ideas can disseminate into the web without being properly peer-reviewed (Hillman & Sherbino, 2015). In addition, the discussion may overwhelm average students with less social media skills or students who are not very tech savvy (Awan et al., 2018). Therefore, Awan et al. (2018) proposed that ground rules and authentic references should be established, and continuous monitoring of class dynamic on the social platform is a key element to the success of PBL learning environment.

Learning Management Systems and Social Media

Social media are contemporary and efficient communication tools that educators cannot overlook, but one challenge is to choose the right platform, the amount and quality of the information shared to ensure optimal benefit and collaboration of the students (El Bialy & Ayoub, 2017). Many institutions use learning management systems (LMS), like Blackboard, as the platform that may be intended to close the technological gap between instructors and students, but actually these are not working well to maintain student contact, largely due to students' preferences for social media and text messaging (Joosten, 2012).

Taylor (2015) pointed out there is poor integration between social networking sites and platforms and LMS, with good reason. For example, LMS tend to support the traditional, existing academic structure, which seeks to protect academic material for ownership, copyright, and profit-based reasons, and tend to be highly ordered and structured, like classes because they are "course management" (Taylor, 2015). This is quite different from social media, which tend to be less-organized, free, open, mostly unsupervised, and unmonitored. In addition, the number and variety of social media platforms can cause mechanical issues with incorporating social media into coursework (Taylor, 2015). Camus et al. (2016) compared the effects of a Facebook-based and LMS-based online discussion forum on students' participation, achievement of learning goals, and overall course performance. They found that different forums can affect classroom dynamics and student learning in different ways. While Facebook may be better at fostering student participation and encouraging peer-to-peer dialogue, the university-sponsored LMS may be a more effective tool for encouraging students to develop coherent arguments and apply course content in other contexts. This study showed that platform of an online discussion assignment matters. As a result, instructors should consider the benefits and drawbacks of each platform before developing an online discussion assignment, and instructor's choice of platform should depend on course content, instructor's teaching preferences, and online discussion assignment goals (Camus et al., 2016).

Grading and Assessment

Chen and Bryer (2012) indicated that integrating informal learning on social media into formal educational environments brings a challenge to evaluation. Taylor (2015) also agreed there can be grading and assessment issues with incorporating social media into coursework. He stated,

As with all class-related assignments, there are questions about grading, especially if those assignments are mandatory. That students are notoriously reluctant to participate in activities that are ungraded and do not earn them points toward a final class grade, while at the same time not all students have access, or similar access, to SM, creates a quandary (p. 43).

Therefore, Chen and Bryer (2012) suggested to evaluate students' reflections on their learning via social media in the form of formative assessment, and when using social media as an optional tool inside and outside classes, it is required to provide students with alternative assignments if they choose not to participate.

Ethical and Professional Considerations

The ethical issue is another main concern related to the use of social media in teaching and learning. According to McCabe and Meuter (2011), integrating social media challenges both learners and teachers which may be due to the availability of technology, the knowledge and skills of users, organizational support, selecting reputable sites, and the issues of confidentiality and privacy. Since social media accounts are generally personal, not institutional, information shared on such accounts should be assumed to not be protected by the Family Educational Rights and Privacy Act (FERPA) or the Health Insurance Portability and Accountability Act (HIPAA) (Peck, 2013). In considering the ethics of social media, for example in healthcare, Milton (2014) warned that "there are illusions of personal privacy while potentially violating others' privacy and confidentiality" (p. 281). Therefore, when engaging in social media, Cleary, Ferguson, Jackson, and Watson (2013) pointed out some of important ethical practices to be aware of, such as: maintaining professional boundaries, confidentiality, and privacy, and inappropriate use of social media includes sharing or disclosing confidential communication. Teaching students appropriate personal and professional use of social media can be achieved by engaging students in ethical discussions regarding the educational use of social media and how to protect and maintain trust among users (Skiba, 2011).

Cyberbullying

Pomerantz, Hank, and Sugimoto (2015) examined the development and revision of social media policies throughout higher education, while considering the dynamic changes in social media realm, academic freedom issues, and the premises of inter-operability with policies at the unit and campus levels. They found social media to be a vital technology tool that promotes the voice of students and their control over their learning process. However, Lederer (2012) notified that cyberbullying can be used as a weapon for malicious behavior while social networking sites provide ways for students and instructors to connect. Social media makes it easier for students to bully or abuse their peers, or even their teachers (Hosler, 2019). According to the Cyberbullying Research Center's 2016 data report, approximately 34% of students reported that they have experienced cyberbullying in their lifetimes (Patchin, 2016). Some resources for teachers who want to prevent online bullying among their students include lists of warning signs, teaching materials for lessons in Internet safety, and even scripts for parents and teachers who want to approach the subject with their students (as cited in Hosler, 2019).

STRATEGIES AND RECOMMENDATIONS OF USING SOCIAL MEDIA

Social media can add a new dimension to current teaching strategies. With the expansion of widely available social media platforms, educators can use them to teach, reach out, and hear from students anytime. However, Lambic (2016) advocated that a distinction must be made between using social media like Facebook for educational purposes and for non-education purposes when researching the impact of social media on academic performance**.** This section provides some of strategies or guidelines for educational purposes drawn from current literature for better engaging students and stimulating academic dialogue with social media.

Understand the Opportunities, Challenges, Strengths and Weaknesses of Different Social Media Tools

Social media can be used to stimulate reflection and sharing comparably to traditional methods (Fischer et al., 2011). In order to better deliver visual and auditory content when, where, and how the learner is ready to learn, as shown in Table 1, Kind and Evans (2015) highlighted social media tools that may be most beneficial for adult learning in specific settings. As shown in Table 2, Kind et al. (2014) specified that the choice of social media tools should be guided by deliberate consideration of their individual strengths and weaknesses to achieve specific learning goals or objectives.

Identify the Goals for Using Social Media, and Select a Tool Based on Goals and Strength of Platforms Available to Support Educational Activities

According to Kind et al. (2014), before using social media, first thing to do is to think about the goals on what to do, learn, and share. It is important for both instructors and students to take responsibilities for their content posted on social media and be aware of what and whom to share the content with. In addition to being familiar with digital identity or online representation, educators can select an appropriate social media tool to start with based upon the goals and strength of platforms available to support educational activities. If the goal, for instance, is to understand how students use social media, Facebook, one of the most popular social networking sites, may be a logical choice. For those who want to further develop writing, blogging may be good. Kind et al. (2014) also suggested to consider access and level of support provided by any particular institution in choosing specific social media tools.

Table 1. Social media tools and opportunities and challenges for lifelong learning

Social media tool	Opportunities for lifelong learning	Challenges for lifelong learning
Blog and microblog	Links to additional references Blog authors provide summarized perspectives and reactions to latest peer-reviewed research or to current events Allows for comments and questions by readership which can facilitate future content and enhancements Typically searchable for specific content Opportunities for learners/educators to identify knowledge gaps and create new posts to share with specific groups or publicly Subscribers (often for free) and followers receive updates and links to newly posted content Educator to learner (or learner to learner) reminders to complete educational "assignments" or answer queries Open access and widely available in multiple settings and via many devices Provides platform for reflections and opportunities for personal improvement Rapid, crowd-sourced answers to clinical questions; or "question of the week" with learners Provides or links to formal CME opportunities	Credibility of information varies Comments may be subject to moderation Many distractors from key learning questions Must actively avoid breaching patient confidentiality at all times
Video feed	"Traditional lectures" available and searchable by learners and can be viewed multiple times, can be viewed at rapid speed or slowed down; abbreviated/summary versions available Video demonstrations of procedures and physical exam techniques Opportunities for learners/educators to identify knowledge gaps and create new videos to post and share Learners can influence future content via commentary Potentially searchable for specific content Subscribers (often for free) and "channel" followers receive updates and links to newly posted content	Variable video quality Variable content quality (ex. procedures and exam techniques) Credibility of information varies Interactions with learners limited to commentary Must actively avoid breaching patient confidentiality
Wiki and collaborative writing applications (CWA)	Collaborative body of information updated by multiple authors Active contributions by learners with potential for feedback Content often includes links to peer-reviewed or other credible citations Content-specific wikis draw interest and contributions from experts and learners	Credibility of information varies Information can be overwritten Must actively avoid breaching patient confidentiality at all times

Table 2. Selected social media tools, features, and rationale for use

Social media tool/feature	What it is	Strengths
Audience response system	Allows audience members to become participants by responding to questions (e.g. PollEverywhere)	Interactive polling; real time feedback; engaging; generates a community standard
Blog	Online journals with entries in reverse chronological order. (e.g. WordPress, Blogger, TypePad)	Share ideas, values, reflections; improve writing skills; social tagging; generate shared vocabulary
Curation	Gathering and then sorting, categorizing, and re-sharing digital content from multiple sources to create a unique presentation of that content (e.g. Scoop.it, Storify)	Aggregating and contextualizing vast amounts of content; efficiency
Location-based networks	Allows users to share current geographical location and location history (e.g. Foursquare)	Connectedness; finding those in close proximity with whom to collaborate
Micro-blog	Character-limited blogs resulting in brief, discrete postings (e.g. Twitter, Tumblr, Posterous)	Finding and sharing information; crowd-sourcing; social tagging; instant access to large groups
Podcast	A downloadable audio or video file (e.g. iTunes)	Information delivery; easy access; can be individualized
Recommender systems	Collaborative or content filtering systems to assist individuals or sets of people to see what similar social media users like or recommend, in order to help identify useful "consensus" information in a community (e.g. used by Amazon, Netflix)	Sharing preferences; allows users to see common "likes" and "dislikes"
RSS reader	Used to manage subscriptions to online news feeds from websites which offer syndicated content. Also called "aggregator" or "feed reader." (e.g. Google Reader)	Managing information
Social network	Platform where users communicate and share information online. Users create an individual profile, engage others in their network. (e.g. Facebook, LinkedIn)	Finding and sharing information, crowd-sourcing, popularity of platforms
Wiki	Website that can be edited by multiple people simultaneously. (e.g. Wikipedia)	Collaborative knowledge building, crowd-sourcing
Video chat	Allows for real time audio-visual communication among users at different locations. (e.g. Skype) If text only, called instant messaging	Synchronous across different locations; allows teaching, meetings and collaboration
Virtual world	Interactive environments where real users can interact in simulated situations, often using representational avatars and in 3D. (e.g. Second Life)	Safe practice; feedback; engaging way to learn

Observe, Establish Comfort, and Make Connections

Social media can foster rapid communication. When trying any new online community, Kind et al. (2014) suggested to observe for a while before joining. For example, understand the normative interactions existing on the platform, types of users and things to avoid. Reflect before posting can help instructors stay true to the goals. Make initial connections by finding some people who can serve as online role models, share posting with their followers, provide comments, and make suggestions. It is also better to think about whom to interact with, then join a community. When joining an online community, Kind et al. (2014) suggested to participate in a chat to communicate and interact with others on topics, possibly one-to-one, one-to-many or many-to-many, synchronously or asynchronously.

Apply Existing Social Media Guidelines and Develop Individual Guiding Principles

Educators need to know and apply guidelines related to, for example, institution, program, practice, school, and professional organization for the use of social media and licensure organization's recommendations for online behavior as well (Kind et al., 2014). After being familiar with these guidelines, instructors can determine the manner and extent to which they will implement them, and how to apply these. In addition to recognizing ''official'' policies, educators will best meet their own goals if they can develop their individual principles to guide through social media conduct. Personal guidelines will provide a rationale of online behaviors not only to friends and family, but also to students, colleagues, professional organization and employer (Kind et al., 2014). Also, it is important to recognize particular challenges to professionalism online, such as the public nature of interactions, the immediacy, the wide reach, concerns about authenticity, and the pitfalls of anonymity and misrepresentation (Chretien & Kind, 2013). Based on personal guiding principles about discussing work on social media, instructors might decide whether they want to post about work-related experiences only in a respectful, professional, reflective tone (Kind et al., 2014).

Engage, Learn, Reflect, and Teach

Social media meets the learner where they are (Kind at al., 2014); therefore, it is important to for educators to use social media to actively share credible information, correction misinformation, and respond to inaccuracies. Social media is one among many ways to ''flip'' the classroom (Khan, 2011). Students could watch relevant videos instructionally, share blogs reflectively, or disseminate information about what they have watched and learned, and then come together to discuss in person with instructors or experts. Instructors could engage in a social media forum with students, join their online network (with permissions), meet them where they are interacting, reflecting, learning, and are comfortable sharing. Instructors could share daily learning goals or encourage students to post their goals and comment on one another's posts. They could share links to articles regarding course content and facilitate discussion with prompted questions and responses. In addition, social media can be used to extend traditional ''office hours'' that instructors could use and set up ground rules regarding social media expectations for each student. In social media, students can work and cooperate together. A shared class blog with comments and discussion prompts can be used to stimulate reflection (Chretien et al., 2008). Even through mobile educational technology, social media can provide opportunities for students to become engaged in learning and the reflective process in resource poor environments (Pimmer et al., 2013).

Advance Academic Productivity by Expanding Professional Network

Traditionally, educators might learn about published works or disseminate their research at the conference meetings or through publications. Now, it is easy to share and get feedback from audiences through social media. People can simply connect with other educators and researchers even if they have never met. To reach out with any scholarly ideas and inquiries, educators can develop new collaborations by using social media. Collaborative research can be made more easily and efficiently by using social media tools. Educators can easily come together asynchronously or over a wide geographic region to engage in online networking and discuss works in progress, research findings, and new projects (Kind et al., 2014).

CONCLUSION

Social media is reshaping today's education system because of an unprecedented access to information and collaboration (Yu, 2018). Social media used as web-based instruction can facilitate learning anywhere and anytime. Being synchronous, instructor-facilitated, or asynchronous, this type of learning environment can not only facilitate a learner-centered approach, but also provide the adult learners opportunities to gain knowledge and skills.

Communication among younger adults drastically differs from the way communication takes place among faculty members, and social media, when used in an appropriate manner, allows for limitless opportunities to disseminate information. Educators have to recognize and acknowledge this gap and look into ways to reach the learners which are more familiar to them (as cited in Awan et al., 2018). In the meantime, educators need to adapt to this emerging pedagogical paradigm and move forward from being digital immigrants; otherwise, it is inevitable creating a wide gap between adult learners and educators.

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KEY TERMS AND DEFINITIONS

Blogs: Authors provide personal commentary on events, issues, and ideas, while allowing for interaction and the creation of new ideas on the web. Blogs typically contained dated entries, displayed linearly in reverse chronological order, and combined text, images, and links to other blogs and web pages.

Cyberbullying: Any bullying that takes place online, or using electronic technology.

Facebook: It is a popular free social networking website that allows registered users to create profiles, upload photos and video, send messages and keep in touch with friends, family and colleagues.

Informal Learning: Learning and engagement that occurs outside formal school settings.

Social Media: It is defined as a network where one must enroll themselves in the network and then interact with one another through discussion boards, by posting links, or by sharing files.

Twitter: It is a website where people can post short messages about their current activities or write a short message.

Web 2.0: A second generation in the development of the World Wide Web, conceived as a combination of concepts, trends, and technologies that focus on user collaboration, sharing of user-generated content, and social networking (Awan et al., 2018).

APPENDIX

Application Activities

Short Scenario: With social media being an integral part of college students' lives, you decide to incorporate social media into your teaching. Based on your understanding of the chapter,

Discussion Question: What particular issues, concerns or challenges do you expect for your class and students to use social media in educational setting?

Discussion Question: Do you plan to incorporate social media more toward to formal learning, informal learning, or both? Why?

Discussion Question: Which particular social media platform or tool would you like to adopt to your instruction? What features attract you most for your use and what is your major rationale for the selected tool?

Chapter 20
Online Learning and the Use of Audio Recordings for Career Exploration, Job Search, and Networking

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ABSTRACT

The use of online platforms in higher education as an alternative to traditional residential classrooms has grown dramatically in recent years. The integration of online technology into pedagogy technology is acknowledged as a useful means for addressing the characteristics of Generation Z, an age cohort for which technology is second nature. This chapter examines the efficacy of the use of audio recordings as an additional pedagogical tool for engaging students in both active learning and information dissemination on career opportunities and methods for career advancement. Specifically, the chapter reports on a case study in which active learning was employed in an online course – Retail Management – an undergraduate elective course taught in the marketing major at a large public institution. Audio recordings, labeled "Professionals on Demand (PODcasts)" were used to provide insights into career explorations, job searching, and networking. To conclude, directions for future teaching practice and research are provided.

INTRODUCTION

There has been a rapid growth in the use of online learning as an alternative to the face-to-face residential format traditionally used at colleges and universities. The statistics showed that the number and proportion of university students taking online classes has grown steadily, to a point where a third of all students now take at least one online course (Lederman, 2018). Pedagogical methods employing online technology are useful for meeting the diverse characteristics and learning preferences of college students. A big chunk of these undergraduates falls into a particular subgroup of adult learners and are

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members of Generations Z. This cohort is born roughly between 1995 and 2012, with the oldest being 24 years old in 2019. The Generation Z or Gen Z population is characterized by a high comfort level with technology that makes it second nature to them.

While Millennials, the generation cohort that precedes Gen Z grew up with the internet, their experiences were generally characterized by the technology's inherent limitations. That is, millennials owned desktop computers and their families typically invested in a limited number of the personal computers so they (millennials) were bound by the physical placement of the stationary computer. Generation "Z-ers," on the other hand, grew up with different types of mobile technologies that represented, in essence, a mini-computer in their pocket which gives them unlimited access to information. Communication has become increasingly instantaneous through a variety of social media, texting/messaging, and photo applications. In addition, the current generation of students are not only comfortable but often prefer to use web-based technologies for a variety of purposes, including entertainment, socializing, and instructional activities. This latter category is critical in that educators and researchers alike must recognize the implications of new technologies when teaching new generation of university students. Specifically, it is important to better understand how colleges can leverage students' favorable attitudes toward new forms of internet technologies while providing effective pedagogy and learning opportunities, both for classroom performance and subsequent job seeking.

This chapter examines the efficacy of the use of audio recordings as an additional pedagogy tool for engaging students in both active learning and information dissemination on career opportunities and methods for career advancement. Specifically, the primary objective of this chapter is to report on a case study in which active learning was employed in an online undergraduate elective course (Retail Management). The course is part of the marketing major at a large public institution and used audio recordings, labeled "Professionals-on-Demandcast (PODcasts)" to provide insights about the application of pertinent marketing concepts, career explorations, and networking. These goals are particularly critical because research shows that many students lack the knowledge of career destinations available to them, and moreover, are not using the career services available on campus (Fadula, 2018).

LITERATURE REVIEW

Online Delivery

Online and hybrid courses are commonplace and prevalent in higher education increasing (Allen & Seaman, 2017). For example, "Penn State was one of the first universities to offer online programs, launching the World Campus in 1998. Today, Penn State offers more than 150 online degrees and certificates to more than 14,000 students from around the globe" (Penn State News, 2018, para. 6). This trend is due to the growth potential for overall student enrollment while minimizing concomitant capital expenditure for new physical plant (dormitories and classroom buildings). Essentially, online programs can be cost effective especially when large online courses are taught by part-time or adjunct professors who are less expensive than tenure-track faculty.

Depending on who is questioned, online learning may have different meanings. Fundamentally, it refers to learning with the assistance of the Internet and using a personal computer, tablet, or mobile device. There are two primary forms of online coursework: fully online courses and hybrid (or blended) courses. These options vary in terms of percent of content delivered online, student interaction, communications, technology requirements, and pedagogical tools used. Hybrid courses, also referred to as "web-enhanced/assisted or blended" are typically defined as courses that combine elements of face-to-face instruction with aspects of distance learning (Allen and Seaman, 2010). There is no required formula for reduction of class times or use of technologies within a blended course. However, hybrid courses is dependent on the discretion of the instructor and subject matter (e.g. computer science, biology, English, marketing). The growth of online courses and overall use of the internet comes at an important time, as a new generational cohort, raised with computers as a part of their every-day life, are entering college in large numbers.

The students who populate college campuses today are part of a generational group called Generation Z. These individuals were born roughly between 1995 and 2012, with the oldest being 24 years of age in 2019. Their chronological age and the higher educational institution they are attending recognize them as adult learners. For these adults, "Course/curriculum delivery has become strongly linked to technological advances" (Schreyer Institute for Teaching Excellence, 2007, p. 2). Whether they are enrolled in online or residential programs, these adults or "Z-ers" want technology completely integrated into their personal lives. Consequently, mobile devices, social media, blogs, podcasts, and YouTube videos, are synonymous with this generational group. These personal technologies or digital tools are also part of their social and learning environment. In education, technology is both necessary and fitting due to students' reliance on technology.

Gen Z-ers want to use technology to consume information differently – meaning that for them "technology has blurred the lines between home and work; study and entertainment; public and private" (McDowell, 2016, para. 7). As a group, they "crave regular and technology-enhanced learning opportunities and look for educational opportunities that use visually enhanced methods of teaching" (Cook, 2015, para. 6). The bottom line is that they expect their educational experience to include technology as part of the design and delivery of coursework. Recognizing this trend, higher education administrators are sponsoring initiatives to help faculty better understand the learning preferences of Gen Z and adapt innovative strategies and experiential programs to meet their needs and help them succeed in their academic programs and beyond (What Gen z trends tells you about today's students 2018). Faculty, as professional role models to college students, are encouraged to adapt advancements in technology and learning innovations into their classrooms (Kukulska-Hulme, 2012). Some universities offer grants to faculty to integrate experiential learning opportunities into their classrooms. As an example, the Association to Advance Collegiate Schools of Business (AACSB) incorporates experiential learning (or learning by doing) into its mission statement: "We educate and empower minds to learn by doing, adapting, and reinventing business – the right way" (Penn State Behrend, 2019). Institutions of higher learning understand the importance of online learning and address it in their mission and vision statements thus making it a priority.

Online Learning Activities

The year 2004 marked the beginning of Web 2.0 and other emerging web technologies, creating limitless online learning activities, allowing users to interact online in authentic and unique ways. The Internet allowed for the development of "e-tivities" such as blogs, wikis, social networking, social bookmarking, web applications, and podcasts (Rogerson-Revell, 2015; Christensson, 2008; Salaway, Caruso, & Nelson, 2008). These applications (blogs, wikis and social media) have innovative and novel functionalities that offer Internet users a way to share their stories. Consider these Web 2.0 technologies:

- Blogs are similar to a diary or journal in that they allow users to write about topics that are of interest to them. Blogs are located on a website and can be set for public or private access.
- Wikis are websites that allow site visitors to collaborate, add and edit content directly through their web browser without being skilled in HTML code (Techopedia, n.d.).
- Social networking refers to the social platforms such as Facebook, Twitter, and Instagram, which allow users to form communities through connections made online. Posts can be used for personal or business purposes, and allow for the sharing of text, video, audio, and photos.
- Social bookmarking offers a way for Internet users to organize and bookmark their favorite online content such as pages, posts, photos, videos, etc. (e.g. Pinterest).
- Web applications are computer programs that utilize web browsers (e.g., Chrome or Safari) to perform tasks and activities over the Internet (Ndegwa, 2016).
- Podcasts are "a type of digital media, usually audio (but may also be in video format), that is available in a series of episodes or parts that are streamed or downloaded by the end user over the Internet" (Techopedia, n.d., para. 1). As such, podcasts require an internet-ready device such as a smartphone, tablet or computer. In simplest terms, they function as a "radio show" on the Internet; however, they are pre-recorded so that the user can listen from any location.

Podcasting has also become very popular entertainment and educational tool for the general population because of the widespread usage of Internet - in particular, among the younger generations. For example, Apple offers thousands of free podcasts through iTunes – "From automotive to news, fitness to pop culture, there's a podcast (or more) for everyone" (Apple, 2019, para. 1). Naughton (2016) also reported "in the last few years dozens of major broadcasters, magazines and news organizations have rolled out large-scale podcast operations of their own" (para. 2).

Podcasts and other Web 2.0 tools have seen a rapid expansion in higher education due to "their ease of use and the opportunity they present for low or no-cost instructional innovation" (Diaz, 2010, p. 58). Podcasts represent an example of technology-enhanced learning. As the cost of textbooks continue to rise, instructors are looking for alternative modes of delivering information. Researchers have studied the use of podcasts as an active learning method, for the purpose of increasing student engagement and learning (Nataatmadja & Dyson, 2008; Armstrong, Tucker, & Massad, 2009; Seo, Curran, Jennings, & Collins, 2010; Goldman, 2018).

There are numerous guides available on podcasting and content delivery (far too many to review in entirety in this chapter). As a highlight - in 2007, Bard Williams wrote one of the first guides for educators. Lusnia and Delgado Ponce de Leon (2011) contended that the best way for educators to learn podcasting is to immerse themselves in the process – i.e., "learning podcasting by doing podcasts" (p. 1481). Now there is a great deal of "how-to" support provided online for anyone interested exploring podcasting. For example, consider Rachel Corbett from Australia. She is a writer, podcaster, and founder of the "Podschool"– an online podcasting course that teaches interested individuals what is required to develop successful podcasts (c.f. https://podschool.com.au/). She offers a quick primer on podcasting options including: interview podcasts, solo podcast, panel podcasts, conversational podcasts, and storytelling podcasts. The key issue is picking the best style for podcaster - the developer, creator, or educator; and matching it to the content, which you desire to present (Corbett, n.d.). Another option is provided by National Public Radio (NPR) who offers downloadable curriculum guides for educators on teaching with podcasts ("Teaching podcasting…," 2018).

There are numerous benefits of podcasting in education. Researchers report that listening to podcasts help students learn content and retain information. They add clarity to difficult concepts by showing what to focus on. Bolliger, Supanakorn, and Boggs, (2010) shared student feedback about podcasts that it "humanizes [sic] the online learning process" (p. 718). Gray (2017) and Armstrong et al. (2009) suggested that numerous educational benefits to podcasts including:

1. Flexibility (24/7 access)
2. Listening is easier for students as opposed to reading or watching
3. Encouraging engagement with the course and material – such as student created podcasts.

While many teachers have positive experiences in using podcasts as an additional pedagogical device, some instructors have resisted the utilization of podcasts in their classroom due to a variety of factors, including their lack of technical skills (Seo et al., 2010) and the time investment required to create the podcasts (Lin, Zimmer, & Lee, 2013).

The research on podcasting as an instructional strategy suggests a variety of uses adopted by educators in both online and residential formats. In a study on residential undergraduate biomedical science course, Smith and Morris (2014) examined the use of lecture audio recordings. Of the 131 student respondents, 93% perceived the podcasts to be important or very important to their studies, with 90% stating that concentration in lectures was improved as a result of access to podcasts. Supanakorn-Davilla and Bolliger (2014) studied the use of course podcasts by 25 online university instructors. The authors found that 80% of these instructors used podcasts for one to four semesters. Reviewing a total of 203 podcasts, the authors categorized their instructional purposes, noting that the most prevalent uses for podcasts included: Lectures (24/203 = 12%); Topic introductions (20/203= 10%); Key concepts (17/203= 8%); and Welcome messages (17/203=8%). Interestingly, the least common use for podcasts was for interviews (2/203 = 1%) and guest speakers (5/203 =3%). Although, Supanakorn-Davilla and Bolliger (2014) did not ask for feedback from students, they did investigate instructors' reactions to the podcast instructional technology. Their feedback was extremely positive with comments such as "amazing," "personalize the learning environment," and "great assets." Finally, podcasts allow for student-created content. That is, podcast technology allows students to research topics, develop scripts, and employ media (visual or audio) to create short presentations on relevant topics. "Creating" is identified as the highest level in the Bloom's taxonomy of learning (Bloom, 1956), suggesting that podcasting is not only an effective device for imparting knowledge but also the act of developing podcasts is itself a powerful learning device. Moreover, podcasts are a Web 2.0 technology that works well with the current generation of college students, comfortable with social networking and self-created digital media.

Student Engagement and Motivation

Part of an educator's job is to encourage students to engage in self-motivated learning. Educators are required to not only to show students an activity or tool (e.g., IBM's statistical package for social sciences - SPSS) but also to explain how to use it, and why the effort is worth it. Student motivation thus refers to students' desire to engage in and pursue educational goals (Reeve, 2006). It is the drive that students use to accomplish desired results. Unsurprisingly, many scholars have studied how to use motivation to improve learning (c.f., D'Souza & Maheshwari, 2010; Reeve, 2012; Phuntsho, 2017). Of particular interest in these investigations has been the link between student engagement and student motivation.

It has been generally acknowledged that engagement is the sine qua non condition for students' academic success. Student engagement refers to the time, effort, and perseverance students devote to their academic experience (Jennings & Angelo 2006; Lee 2014). Put another way, "student engagement… makes learning possible, as it is difficult to imagine learning a foreign language or mastering a musical instrument without considerable engagement" (Eccles & Wang, 2012, p. 162).

There has been a great deal of research on the concept of student engagement and how it relates to student motivation. This issue is significant because it can shape the way instructors and pedagogy scholars investigate technology or other phenomena and their impact on the classroom, student responses, and their academic and career success. Nayir (2017), for example, has argued that students need to be motivated to learn. In his research with vocational students, he found that critical components of active learning include both interest and engagement. As such, students must be highly motivated to participate in the learning process. Nayir's viewpoint is supported by the Eberly Center at Carnegie Mellow University's stance on student motivation. They suggest that instructional content needs to be relatable to students' "goals, interests, and concerns" (p. 1). When students can relate to the content, they are more likely to be committed, intrinsically motivated, as well as spend time to learn. Reeve and Lee (2014) also supported the contention that "changes in motivation precede corresponding changes in engagement" (p. 527). Their argument is predicated on the belief that in order to increase student engage (positive change), concomitant positives changes in motivation are necessary.

Based on the research, students are more successful in the classroom (learning is enhanced) when they are both motivated to receive the material and engaged by the way course content is delivered. As a result, the challenge facing researchers and classroom instructors alike is to identify the pedagogical tools that will enhance the educational experience, all the while maintaining perspective on the ultimate goal. Thus, the objective is to make the course as "career-valuable" as possible for students, who are, naturally, seeking to leverage their classroom learning into job offers and career opportunities. One critical method for achieving these goals is to pursue active learning devices as part of instructional design in the form of podcasts.

The classic work of Chickering and Gamson (1987) defined active learning as, "any kind of activity that promotes deep levels of engagement between a learner and the material to be learned" (p. 75). Since their seminal work was published, numerous scholars have confirmed the validity of the active learning model for enhancing student learning and altering the passive nature of the traditional college lecture hall. For example, Kean (2016) interviewed ten instructors who taught in both online and traditional face-to-face formats at a large public research institution in northeast United States. Her findings reinforced the need for promoting active learning in order to move students to deeper levels of engagement with coursework. A synthesis of literature show that classroom environments and/or pedagogical methods that focus on active learning techniques are more successful at engaging students in the learning process, improving retention and higher levels of learning, as identified by the Bloom's (1956) taxonomy.

What are these necessary conditions for engagement? Ma, Han, Yang, and Cheng (2015) examined the requirements for student engagement in an online learning environment. Specifically, they studied the relationship between students' learning behavior patterns and learning outcomes. Relying on analytics provided by their web-based learning platform, the authors examined multiple variables measuring student engagement, including:

1. The number of times students logged into the course
2. The number of students viewing learning materials

3. The number of students making reflection notes
4. The number of students completing and uploading assignments.

Their results showed that students' viewing activities and their engagement in course content positively impacted the completion of their learning tasks and assignments. In addition, completing learning tasks (such as writing a reflection paper) positively affected students' learning. The authors encouraged instructors to use "a variety of methods and tools to design and plan effective learning activities to enhance students' learning…so that student have greater participation in interaction activities and more positive engage in their academic work" (p. 32). By diversifying instructional approaches through quality course design, instructors can address different learning preferences and increase student engagement.

In higher education, we know that "students possess inner motivational resources that classroom conditions can support or frustrate" (Reeve, 2006, p. 225). Effective instructional design and the inclusion of technology are two such conditions in an online environment that can have a positive impact on student engagement and motivation. Cinkara (2013) studied online tools available such as podcasts, wikis, and learning management systems that enhance distance learning/teaching environment - and specifically, improve students' success in learning a language online.

Research supports the use of podcasting as an effective active learning device. Podcasts can enhance instruction and student comprehension of content. Also, educators can use podcasts to support students to learn about different careers paths. More importantly, podcasts can be motivating. For example, Bollinger et al. (2010) collected data from fourteen online courses at a research university in the United States to study the impact of podcasting on student motivation in online coursework. Their results demonstrated that overall, participants were positively motivated by the use of podcasts integrated into their online courses. However, there were statistically different levels of student motivation based on gender, class standing and prior experience in the online environment, suggesting that students who were "newbies" to the online platform struggled somewhat with the technological process of accessing the podcasts and needed additional training or support. While these findings are intriguing, it is important to remember that this study was conducted nearly ten years ago; that is, it examined a generational cohort less embracing of the variety of social media and technology than that of Generation Z. Given the greater "tech savvy" nature of modern college students, it is not unreasonable to expect that they would not have the same challenges with podcasting.

Career Exploration

In the past far too many college students (and even subsequent graduates) had little idea of their career choice or the training required to be successful in a particular field (Van Ness & Trogman 2017). Today colleges and universities - and even the students themselves - seem to be more job-focused. Consequently, higher education institutions are creating initiatives to ensure students have the opportunity to explore career options while still in school or for some adult learners when they return to school after a period of time in the workforce. With the experiences of the 2008 recession still fresh in the minds of administrators, parents, and students alike, there has been a significant shift in student enrollment toward majors that offer clear links to future careers such as STEM (Science, Technology, Engineering, and Math) professions (e.g. nursing) and business (Wright, 2017; Selingo, 2017). Given high levels or college student loan debt and a competitive job market, university students have naturally begun treating the college experience as a step toward the long-term employment in a competitive marketplace. According to Helix Education, an enrollment growth company, adult learners (including Gen Z) look to higher education to help them compete in the job market and earn a higher paying job. Specifically referring to Gen Z, Van Hazelen (2019) states: "Generation Z students are pragmatists who want tangible outcomes from colleges – all at an affordable price."

From the online perspective, "seventy-three percent of the students report job and employment goals as a reason for enrolling" in online courses (Online Education Trends, 2018, p.3). An issue facing online instructors is how to effectively and efficiently integrate career exploration into an online platform. From a review of the literature it seems that any exploration of guest speakers used in online learning platforms is missing. Podcasting provides a perfect medium to conduct interviews with industry professionals and allow student to explore various career options available to them. Given the time and distance constraints of online learners, providing students with exposure to the workplace via online would be very worthwhile.

Podcasts and Careers

Podcasts are an effective tool for career exploration and career building in the online learning environment. Using podcasts as a career tool is even starting in middle schools, such as the podcast series dedicated to middle school career exploration developed by The Association for Career and Technical Education (2019). Podcasting career benefits extend far beyond middle and high school into higher education and post-college graduation. For example, Apple offers a Mastering College to Career podcast series that is hosted by a career expert. The series is geared to adult learners who are interest in career-oriented topics such as networking, interviewing, resume writing, and student loans are discussed (Botero, 2019).

In general, podcasts offer ideas to listeners who may be looking for a job, want to change careers, or are just looking for inspiration. For Americans pressed for time, podcasts offer a mobile alternative that pairs well with most activities where reading may not be an option, including commuting to and from work or school, exercising at a gym, and so on. According to Salm (2017), "Podcasts are a great way to keep up with the times, challenge yourself to grow in your current role or help yourself get out of a rut and into a career you love" (para. 2).

Gen Z, Careers, and Podcasts

Podcast listening in the target demographic for higher education (18-54-year-old) has risen 15 percent since 2013, with a growth of 22% to 24% per year (Edison Research and Triton Digital, 2018). In particular, the tech-savvy Gen Z and millennial generational cohorts are driving the "podcasting revolution" (Hargrave, 2019, para. 1). That is, due to their enthusiastic embracement of technology, with over half of all podcast listening occurs in this younger audience (Hargrave, 2019).

In addition, Gen Z is also very career-focused with personal achievement, whether educational or professional, as one of the things most central to their identity (Barna Group & 360 Institute, 2018). "While they recognize the value of education, they want assurances the money they invest will lead to a career and a better life — and want their schools to be partners in their success. That optimism carries through to their outlook about the future and career aspirations, expecting to be better off than their parents" ("What gen z trends….," 2018, para. 10).

In a recent report on under-employment, Sigelman, Taska, Restuccia, Braganza, and Bittle, (2018) contended, "a bachelor's degree has been, and continues to be, the clearest and most accessible path to a good job and middle-class wages. Over the course of a lifetime, the average college graduate makes $1 million more over a career than a worker with just a high-school diploma. Yet that powerful advantage only pays off if graduates find college-level jobs" (p. 9). As such, majors in humanities have taken an enrollment hit when compared to business and engineering due to the latter groups' graduates' greater success in the job market (Wright, 2017). The focus on securing employment after obtaining a bachelor's degree has changed the primary of objective of higher education. Selinger (2018) explained that there is a shift in the purpose of higher education from just "developing learners" to ensuring recent undergraduate obtain jobs.

Fully aware of their students' intentions of finding good paying careers after graduation, universities have long invested in career development centers, hired career counselors, and courted companies to come on campus for career days, with the objective of encouraging networking and finding internships and full-time job openings for students. In an effort to make their students more attractive as employees, universities recognize that the more their educational experience includes real-world challenges and career skills, the more employers will seek them. Consequently, some institutions encourage faculty to include a professional development component into their coursework - that is, providing students the opportunity to see how what they have learned in the classroom applies to the workplace.

Guest Speakers and Careers

One type of professional development option available to faculty is to include guest speakers into their teaching. Guest speakers have been a common phenomenon in residential education – throughout primary, secondary, and higher education. At the college level, guest speakers have been used for many years across a variety of disciplines – but, more so in the applied disciplines such as Hospitality and Tourism, Business, Communications, Criminology, Medical education, and Psychology (Lee & Joung, 2017; McCleary & Weaver, 2009; Bertleson, 1987; Borden, 2017; Merkle & Clay, 2017; Cloud & Sweeney, 1988; Payne, Sumter & Sun, 2003; Mackey & Courtright, 2012; Seifert & Smith, 1974; Glenwick & Chabot, 1991).

Writing about his experiences as an adjunct professor at Villanova University's School of Business, Borden (2017) observed that guest speakers provide students with real world perspective of the workplace. Guest speakers provide students with insights into the practical skills and knowledge that are pertinent to a given business and industry. The author goes on to explain that guest speakers can serve as "role models" (p. 1) to students and help to generate interest in specific occupations. In support, Riebe, Sibson, Roepen & Meakins (2013) suggested that when faculty prepare guest speakers effectively, they (guest speakers) can help to provide meaningful connections to the world of business or work as well as support and promote active teaching and learning. Notably, guest speakers "can reinforce the significance of key employability skills for future career success" (p. 55).

Moreover, Lee and Joung (2017) identified students' perceptions of guest speakers used in hospitality and tourism courses at a large, public university in the southwestern United States. They found that "students are eager to learn about strategies for career success and current issues [in the marketplace]" (p.300). In general, guest speakers offer students firsthand industry experience and tips on how to be successful in the "real world" (McCleary and Weaver, 2009).

PURPOSE

This purpose of this pilot study was to explore how course design and pedagogical delivery using digital tools such as podcasts or streamed audio/video recordings will impact the career interest and exploration of undergraduate adult students in an online learning environment. Podcasts are presented as a perfect option for allowing online students to explore the various career paths available to them.

METHODOLOGY

Podcast were included as a pilot study in the course design of online marketing elective – MKTG 327 (Retailing) at a large land-grant university in the northeastern part of the United States. The prerequisite for this course is Introduction to Marketing. Students enrolled in the retailing course are typically juniors and seniors (third- and fourth-year students) who are majoring or minoring in Marketing. These students are classified as adult learners. Their chronological age and the higher educational institution they are attending recognize them as adults.

One section of the course was offered during one semester (Fall 2018) with 38 students - 18 males and 20 females. The pilot study was exploratory in nature. It was the first step in planning a full research project on how course design and pedagogical delivery using digital tools impact the motivation, engagement, career interest, and career exploration of online learners.

The course content and pedagogy were designed to increase connections between the student and the material being learned, ultimately driving higher student motivation, engagement, and career exploration outcomes. The syllabus for the course included a PODcast Series (Professionals on Demand) in Retail Industry. Five guest speakers from a wide array of careers in the retail industry were invited to be part of the PODcast Series. Seven podcasts were recorded (two professionals recorded two podcasts). The presentations were recorded in either digital audio or video format and embedded throughout the course. The length of the five audio recordings ranged from three minutes and twelve second to eleven minutes and nine seconds; (for an average of 7 minutes). The two video recordings were roughly three and a half minutes long (3 minutes, 21 seconds and 3 minutes, 40 seconds). Students were encouraged to watch/listen to all recordings, but no data was captured to track listening data per student. The grades were assigned only to the PODcast assignment for written reflection papers. The PODcast Series was intended to broaden the students' learning experience, help them explore careers in retailing and expand their knowledge base. There were two learning objectives associated with the podcasts:

- Students will be able to explore retailing career opportunities for college graduates.
- Students will be able to learn how course content is the foundation for skill sets required in retail job openings.

  The professionals showcased in the podcasts held the positions listed below. Three of the five professionals were alumni from the university that offered the course.

- Senior Director, Planning at a large corporate fashion retailer in New York, NY
- Senior Manager, Payroll and Staffing at a large corporate fashion retailer in New York, NY
- Senior Business Analyst, Strategic Inventory Analytics at a large corporate sporting goods retailer in Pittsburgh, PA
- CEO and Creative Director at an online jewelry retailer in New York, NY

- Regional President (for 8 states) at a large cellular corporation in Kansas City, MO.

The podcasts were placed in the following lessons of the course:

- Careers in Retailing
- Retail Customer Behavior
- Competitive Issues to Watch
- New Media Elements (Social and Digital Media)
- Pricing: Retail Math

Podcast Assignment

Students were required to submit type written reflections on two of the recordings from the PODcast Speaker Series. Student submissions were evaluated based on four criteria: (1) primary takeaways (what was learned), (2) influence on career interests and options, (3) format and proofreading, and (4) submission length. A grading rubric was used to grade reflections papers and was worth a total of 20points. The PODcast assignment was worth 40 points or 6.3% of the 630 points for the course. The first submission was due by the end of Lesson 4 (one-third of the way through the course). The second submission is due by the end of the first week of Lesson 9 (two-thirds of the way through the course). Before choosing a speaker to reflect on, students were asked to review the complete list of recordings.

FINDINGS AND RECOMMENDATIONS

A pilot study was conducted on the use of podcasting for career exploration among adult students enrolled in an undergraduate business course. Students were asked to complete two reflection papers based on the podcasts included in the course. Sixty-five reflection papers were submitted in total. Some students failed to submit one or both required assignments (33/38 or 87% submitted Assignment #1 and 32/38 or 84% submitted Assignment #2). The assignments were presented at the beginning of the semester with the following due dates: Assignment #1: September 23rd and Assignment #2: October 27th.

Data provided by Vimeo, a video streaming service utilized through the university, showed that students played the set of seven podcasts 135 times (7 times in August, 93 times in September, and 35 times in October). "Play" is defined as anytime a student or course participant opened the page and pressed the "play button" for the recording. Students who played the recording may or may not have listened to the whole recording. In fact, data shows that across the set of seven recordings, students listened to the recordings 54 times from start to finish, or 1.64 per active student. Students voiced no technology issues streaming the recordings from this platform, which supports the industry statistic that this age group is extremely comfortable with this genre of digital media – since over half of all podcast listening occurs by this younger audience (Hargrave, 2019).

Content analysis – a form of qualitative research – was used to review and analyze the data. It was used to "systematically transform a large amount of text into a highly organized and concise summary of key results" (Erlingsson & Brysiewicz 2017, p. 94). For the purposes of this exploratory study, the instructor reviewed and took notes on each reflection paper. Relying on the methodology employed by (Nogueiras, Iborra, & Herrero, 2016), one hundred thirty-one papers were reviewed utilizing a thematic analysis. Of interest were the students' comments about how the podcast recordings influenced their career interests and options. Nine themes or categories emerged from the notes taken to describe the students' thoughts, comments, or feelings from viewing/hearing the recordings (See Table 1).

Overall, as Table 1 demonstrates, student feedback was very positive. The PODcast series appears to have been successful in achieving both learning objectives: 1) Explore retailing career opportunities for college graduates, and 2) Learn how course content is the foundation for skill sets required in retail job openings. These results reinforce the existing literature that argues that most online learners have clear employment reasons for enrolling in coursework. In addition, the results show students' motivation to network with professionals in the field – also supporting their driving force to find employment when graduating.

Several students expressed their gratitude for having the opportunity to listen to professionals from the retail industry. They felt that the guest speakers offered excellent advice to them on the skills needed to be successful in a future retail career. According to their written comments, the podcasts convinced several students that retail job opportunities were worth exploring. In fact, several students mentioned learning about jobs/positions that they never knew existed. Other students expressed that they had no interest in pursuing a retail career and the recordings did not sway them to reconsider. Specific comments are listed in Table 1 within each of the nine categories.

Limitations and Future Implications for Teaching Practice and Research

This chapter illustrates a pilot study of the use of audio recordings as an additional pedagogy tool for engaging students in both active learning and information dissemination on career opportunities and networking. These goals are particularly pertinent because research shows that many students lack the knowledge of career destinations available to them, and moreover, are not using their university's available career services. As with previous research on this topic, students' reaction to the podcasts was generally very positive (See Table 1); however, it is important to point out that not all students participated in the assignment. The syllabus stated that each student was required to complete two reflection papers. There were 38 students enrolled in the course; therefore, a total of 76 submissions were expected. Only 65 (or 86%) of the assignments were submitted. Eighty-seven percent and 84% of the class submitted the first and second reflection papers (respectively).

Reflecting on the assignments and construction of the PODcasts, the question included; why was student participation lower than expected? Were the podcasts too long? Were the job categories not of interest to the students? Were the students not interested in career exploration and networking in the retail industry? Were insufficient points allocated to the podcast assignments? There is some extant research on the relationship between episode length of each podcast versus the time spent listening (TSL). According to a podcasting blog, the average listener goes through 62% of a podcast under 5 minutes long versus only 22% of recordings over an hour ("How long should my podcast be?" n.d.). In this pilot program, the average length of the audio recordings was seven minutes within the range of three to 11 minutes. It is possible that the length of the recordings was too long to keep students engaged, particularly in that other researchers recommend short educational podcast formats (Hartfield, 2011; Clark, Taylor & Wescott, 2007). Therefore, one takeaway from this PODcast pilot test suggests, the shorter the better and ensure you have hooked your audience in the first five minutes.

Content is another issue. An ongoing dilemma for educators is how to make content come alive and create student viewing excitement. Future research could filter time spent listening by career interest.

Table 1. Themes from the reflection papers

Themes/Categories	Student Comments from the Reflection Papers
Self-Awareness	• "You have to know what you like and like what you do." • "You have to do what is best for your style and have to own it." • "Know what you are good at." • "This recording really opened my eyes." • "Being introverted is not a bad thing." • "Think about what kind of work best fits your style."
Inspirational	• "Profound impact on my career goals and what I want to do after graduation." • "Inspired me to look more deeply into retail career options." • "The speaker was extremely enlightening." • "The speaker showed me that my dream is not out of reach." • "There can be success after challenges. Empower yourself – that is a great step."
Informative	• "Motivated me to look beyond what I know and consider possibilities throughout all levels of marketing." • "In nine short minutes, it gave me a broad range of information." • "I love her opinions about the retail industry and the advice she has to offer." • "The importance of a home-work life balance."
Entrepreneurial	• "Sound advice and an admirable template for the small business I hope to start." • "The speaker's talk about her own exclusive online company gave me hope that there are other ways to make a living other than a corporate job." • "Speaker was not afraid to start her own business and kept her brand tailored to her customers."
Never Knew of Job	• "I had no idea that a position like this even existed." • "No idea retail offered so many different types of jobs."
Networking/LinkedIn	• "I want to connect with XXX on LinkedIn." • "I am going to send XXX a LinkedIn request." • "I wonder if XX could help me get a job"

Since this course was an elective in the marketing program, students have the option to take the course or not, suggesting a priori that the students who self-select into the class might have higher initial interest in the subject. However, a limitation with this pilot study is that with a limited set of online electives available, students may take the course with little or no interest in pursuing careers in the retailing industry. As such, students would have less interest in participating in the podcast assignment. Future research should attempt to link students' initial motivation to sign up for an on-line elective to their engagement in the PODcast experience.

Another limitation noted in this pilot study was the lack of analytics to acquire individual student information and time spent listening to each podcast. Working with instructional designers, future research needs better analytics to capture this information and tie it to individual podcast information to assess the successful podcasts in terms of characteristics (e.g., length, topic, etc.). In addition, instructional tools are needed to allow investigation and enforcement of student viewing patterns; that is, metrics that could be embedded into the podcasts (e.g., quizzes) that would hold students accountable for listening to each podcast. If fragmented viewing is a regular pattern of student behavior with PODcasts, some consequence (such as a quiz or reaction paper) that requires full viewing should be implemented to resolve this concern. Further, point values should be integrated into the podcast series so that students are awarded points based on the number of podcasts that were listened to. The total point value associated with the podcasts and refection assignments need to be evaluated and compared to the total points in the class. For students to take these assignments seriously, there needs to be enough points associated with them. In the current project, the assignment was valued at less than 7% of all total points for the course. Possibly, the low point value could account for some of the non-participation and lack of interest on the part of some students. Finally, assessments must be added to measure: 1) students' pre-post interest in the marketing field and 2) the helpfulness of the podcasts on students' career exploration. Without these assessments the success of using podcasts or streamed audio/video recordings to enhanced online students' career interest, job searching, and networking remains unknown.

CONCLUSION

Higher education is experiencing a movement toward the normalization of online learning (Lederman 2018). It is recognized that course delivery for adult students is closely tied to technological advances. As such, it is time to investigate the use of additional pedagogical tools for engaging traditional undergraduates as well as adult learners in both active learning and information dissemination using online platforms. This pilot study looked specifically at the use of audio recordings in an online marketing course to encourage the investigation of career opportunities. The outcome of the PODcast series was successful in exploring retailing career options and identifying the key skills necessary for positions in the retail industry.

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KEY TERMS AND DEFINITIONS

Generational Cohort: a group of individuals born within a specific time period who have similar attitudes and preferences.

Generation Z: A generational group born between the years of 1995 – 2012.

Hybrid Course: A course that includes both residential and online learning.

Podcasting: A series of episodic recordings (audio or video) that a user can download to listen to at any time.

Student Engagement: The degree to which students are involved and interested in their own learning and the associated tasks and activities.

Student Motivation: The degree to which students are driven to accomplish a goal(s) associated with learning.

Web 2.0: Second generation of the World Wide Web that offers users enhanced interactivity.

APPENDIX

Application Activity

Having read the chapter about how podcasts can be used to motivate students and increase student interests and engagement. In particular, PODcasts were used to expose students to different career paths and provide connection between instructional content and business and industry. Consider and discuss the following questions:

1. Are there differences in student engagement with podcasts based on gender, class standing, or prior experience with online classes?
2. What are students' expectations about the benefits received from listening to guest speakers via podcasts?
3. Suggest ways of improving the effectiveness of guest speakers via podcasting.
4. How can podcasting be used beyond career exploration and networking to improve instruction in online learning?
5. How would you integrate podcasts in your teaching and learning practices?

Chapter 21
Benefits and Disadvantages of Utilizing Gamified Learning in Higher Education:
A Systematic Analysis

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ABSTRACT

The chapter presents the results of a systematic analysis of published works on utilizing gamification in higher education. The analysis sheds light on the positives and challenges of using gamification in education. The author investigated the studies that tackled the use of gamified learning in various educational environments and contexts. Although the literature has focused on the general use of gamification, previous research did not highlight other positives and negatives that may result from the use of gamified learning in the classroom. In addition, there was minimal focus on the role of gameplay elements in promoting and/or hindering the use of gamification in higher education. Results of this systematic analysis showed that the use of gamification in higher education is associated with three main elements: pedagogy, design, and behavior. Benefits and challenges of utilizing gamification in the classroom are discussed in light of those elements.

INTRODUCTION

Gamification is defined as the use of game design elements in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011). Bogost (2015) provided a more detailed definition of gamification as "the process that involves the adoption of simple, repeatable, scalable feedback systems such as points, levels, badges, and other rewards" (p. 223) Gamification is a relatively new field when it is associated with education. The adoption of game elements and gamified application in education started in 2010 (Deterding et al, 2011). Nevertheless, the elements that constitute the gamification concept are not new. Ranking in gamification has been a game element that allows players to monitor their progression

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by observing a leaderboard that displays their position in the game. From a social perspective, social comparison theory predicts that individuals compare themselves to others in order to validate opinions, make judgments, and reduce uncertainty. Thus, badges and ranks have long been used in the military. Besides, readings from the English literature show that Shakespeare in the 18th century referred to the use of ranks in plays like Macbeth.

Because of its potential to shape users' behavior, gamification has been utilized in different fields such as management, training, and marketing. Businesses are eager to create gamified or loyalty programs to motivate shoppers and users to gain more badges and points to obtain certain discounts or shopping privileges. Such programs are considered examples of successful gamified mass-market products. Google Maps provides another example in which users' ranks increase as local guides when they give reviews to places, take photos of locations, and answer questions about businesses and receive votes for their answers. In education, online educational platforms - such as khanacademy.org - use game elements to better engage users. The more courses and lessons that users complete, the more badges they earn. Players race against time to solve problems correctly. Each answer is immediately scored right or wrong. Correct answers get happy faces and accumulate points. Mistakes get round yellow sad faces, but the user/player still has to get the answer right before progressing to the next problem. The positive feedback builds on itself cumulatively, so the stakes increase with each correct answer. Instead of fading or zoning out, users get more engaged and determined as their streak increases and they have more to lose. Therefore, gamification within Khan Academy context is used to develop users' motivation and have them measure their progress in learning and practicing mathematics.

The definitions of game-based learning in empirical and conceptual research have mostly been instrumental. Every definition has covered one of the purposes that games is used for in learning and education. Therefore, the nature of gamification and education has remained equivocal and broad. Coffey (2009) has linked game-based learning to instruction and described it as an instructional method that incorporates learning materials with the goal of entertaining and engaging learners. This description has partially been challenged by Hamari, Shernoff, Rowe, Coller, Asbell-Clarke, and Edwards (2016) who defined game-based learning as an instructional method that has a sole purpose of educating and training. Thus, they perceive game-based learning and gamification as a form of serious play that is developed more for education rather than entertainment or leisure. This serious play could be achieved by the design of competitive activities that challenge the learners and help them acquire new skills. Similarly, Erhel and Jamet (2013) stated that the activities must have clear learning objectives that promote learning and cognitive skills.

Game elements has also been associated with learning skills. Kim, Park, and Baek (2009) suggested that gaming and learning skills are overlapping and both are simultaneously used by learners to gain knowledge. In using gamification within educational contexts, learning and gaming strategies are the primary factors behind the high achievements in both learning and gaming. This implies that higher scores in learning and gaming require better problem-solving abilities, which require, in turn, well-chosen strategies for both learning and gaming (Kim, Park, & Baek, 2013).

The learning environment has been another angle through which gamification was described. Qian and Clark (2016) described digital game-based learning as the environment that incorporates game content and game play. Both have the purpose of enhancing knowledge and skills. Besides, this gaming environment has problem- solving activities that give the learners a sense of achievement. Furthermore, Huang, Huang, and Tschopp (2010) added that digital game-based learning should be a student-centered environment that helps students achieve the learning goals.

This chapter presents the results of a study of the published works on the application of gamification to education, which aims to shed light on the merits and challenges of using gamification in education. The chapter focuses on gamification and education; specifically, the utilization of gamified learning within higher education. Through a systematic analysis of the benefits and disadvantages of gamified learning in higher education, the author investigated the studies that tackled the use of gamified learning in various educational environments. Although the literature has focused on the general use of gamification to promote motivation and engagement in the classroom, previous research did not focus on other positives and negatives that may result from the use of gamified learning in the classroom. In addition, there was a minimal focus on the role of gameplay elements in promoting and/or hindering the use of gamification in higher education.

BACKGROUND

The background in this chapter incorporates two essential sections that are related to gamification: a generic view about gamification in education and gamification as an embodiment of Bloom's taxonomy in education. A trend in the literature shows that games and learning are discussed from general and specific perspectives. Hence, this section starts with a discussion of the impact that gamification have had, and continue to have, on pedagogy. It then elaborates on the linkage between gamification and Bloom's taxonomy in building up and assessing educational learning objectives.

The Impact of Digital Games on Pedagogy in the Classroom

The impact of games on learning and education has been significant. According to researchers, it includes the impact on learning and assessment (Gee, 2005; Moline, 2010; Prensky, 2011).

The use of games specifically for educational purposes has been examined by many researchers in different fields related to the learners and the learning process. In terms of learners and their use of games, the literature demonstrates that the use of digital games (i.e. video games) can increase learners' enjoyment and engagement during the learning process (Gee, 2005). Learners are also able to gain critical thinking skills and experience-based learning (Gee, 2005; Prensky, 2011).

Prensky (2011) found that digital game-based learning is beneficial to students because it focuses on learners' enjoyment and engagement as well as the intermixing of learning and interactivity into a newly digital and entertaining medium. Guerro (2011) concurred with Prensky's claim by stating that sports games, war games, and even games like Grand Theft Auto simulate real-world experiences. Through such games, players must think critically and solve problems without realizing they are learning. Guerro (2011) took the example farther by stating that the Massive Multiplayer Online Games (MMOG) genre of videogames has more educational potential because it necessitates that students do more than just sit passively and listen; rather, it promotes critical thinking. As Guerro noted, "These virtual settings anticipate advanced online learning worlds that can be dedicated to distinct subjects, populated by single users and teams, and pedagogically structured for deep and rapid experience-based learning" (p. 12).

Game – elements, in general, affect the learning process by promoting constructive and critical learning. Students develop constructive learning through being placed in actual experiences (emotionally, physically, and intellectually), such as role-playing scenarios/situations (Lebedeva, Makarova & Tatarko, 2013). For example, board games as well as some genres of Massive Multiplayer Online Games

(MMOG) focus on the process, rather than the outcomes of learning by encouraging the player to gain the required skills that enable the player to complete the required mission successfully (Chan, 2012).

Experiential use of game elements (badges, leaderboards, ranks,etc) necessitates that gamers use communication and analytical skills as they interact with others who are also playing the game. Moline (2010) found that a constructivist-learning environment exists in some digital games, such as Lineage. In this game, an apprenticeship relationship is formed whereby the more experienced veteran players help a new player by demonstrating successful performance and pointing out important contextual aspects. The veteran player will also teach the new player how to handle certain situations and model what kind of person they should become in order to successfully complete the game. Once the new player is self-sufficient, the veteran player allows the player to play on his or her own.

Games in the classroom also promote critical learning that occurs when one experiences the world in new ways and forms new affiliations (Rehm & Leichtenstern, 2012). Games implement critical learning when they allow a learner to be part of a world that offers him/her new opportunities for safe competition and growth. This gives the player the opportunity to express him or herself and interact meaningfully with other participants in the pre-designed environment (Gee, 2005). Because members are distributed throughout the world, they have an expanded network of friends and colleagues and are able to form new affiliations (Walsh, 2010). However, Guerro (2011) warned that such new affiliations may impede critical learning due to distance, group size, and cultural differences. In fact, if successfully created, the gamified world can be successful in promoting critical learning because it can attract a more diverse and larger group of individuals in terms of skills, backgrounds and other personal differences (Gee, 2005).

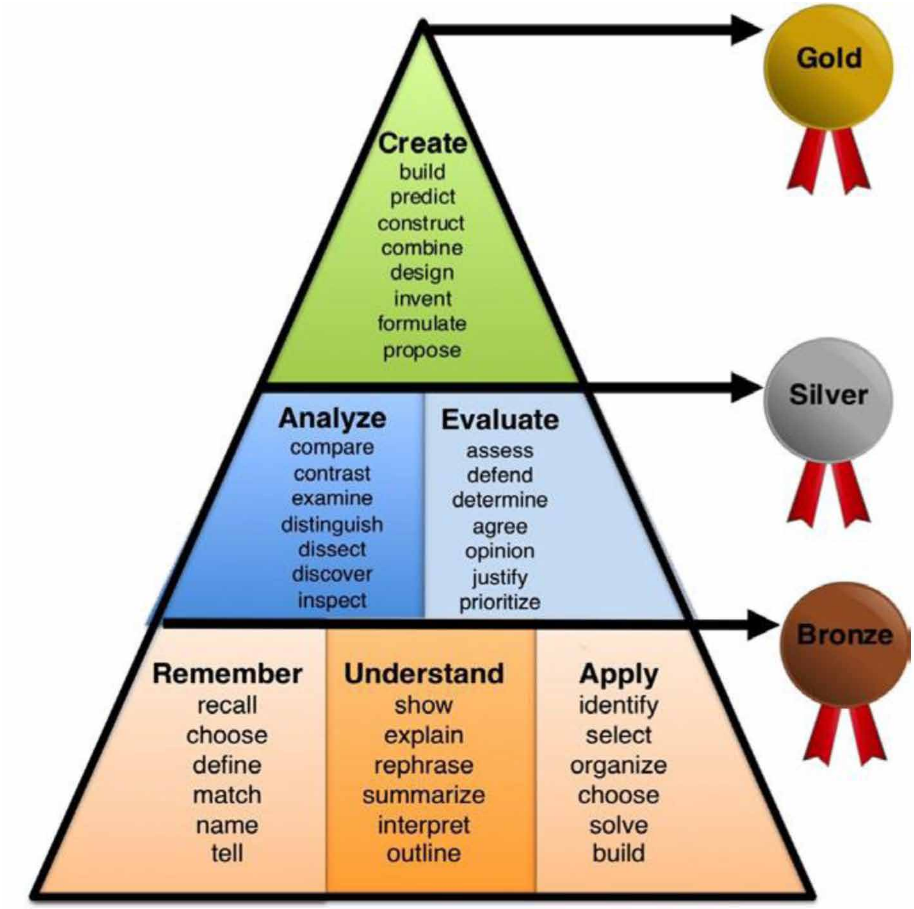
Researchers have also found that gamified learning has an impact on assessment by increasing a player's performance in exams (Chen, 2010; Gee, 2005). Competitive and digital games were examined by research in relation to educational assessment. In one study, Moline (2010) examined the impact a physics computer game had on learning, investigating if collaborative and competitive games affected learning and social practice. Two 8th-grade classes served as the control group and three classes served as the experimental group. The experimental group played the physics game Supercharged (Moline, 2010). The results showed that the experimental group performed better on exams after playing the game than the group that did not use the game. Therefore, the author recommended that gameplay promoted deep learning, hypothesis testing, strategizing, and appropriating content as a tool for play. Squire, Barnett, Grant and Higginbotham (2004) established that students in an experimental group who played the simulation-game Supercharged! better mastered the abstract and conceptual knowledge related to electromagnetism than those in the control group who learned through guided discovery-based science methods. The researchers attributed these learning gains to replay for testing new hypotheses afforded by the simulation game.

Gamification and Bloom's Taxonomy

Anderson (2009) linked gamification and the concept of rewards to Bloom's taxonomy framework. This linkage shows that gamification functions as a substantial factor that may enhance students' critical thinking and help students go beyond superficial learning and develop deeper understandings of topics. The revised Bloom's taxonomy use action verbs to mark different levels of cognition. Categories within the framework move from simple to more complex thinking, shown in Figure 1.

Lower level thinking skills (remember, understand, apply) are generally used to form a foundation for higher order thinking skills (analyze, evaluate, create). Therefore, this foundational level is linked

Figure 1. Revised bloom's taxonomy ranked by gaming levels



to the Bronze badge in gamified learning activity. On the other hand, the Gold badge is associated with the highest learning skills that are related to design and creation. The role of the teacher is to scaffold students through this framework to develop complex thinking skills by offering them gamified instructions and activities that are aligned to the medal ranks as shown above in figure 1.

Systematic review and study design

The main research questions behind this study were:

- Research Question 1: What benefits does gamified learning contribute to the learning environment in higher education?
- Research Question 2: What are the disadvantages that may result from the use of gamified learning in higher education?
- Research Question 3: How do gameplay elements add to the benefits and disadvantages of utilizing gamified leaning in higher education?

The author used a systematic review to examine the aforementioned research questions. Greenhalgh, Robert, Macfarlane, Bate, and Kyriakidou (2004) defined systematic review as a review of the literature according to an explicit, rigorous, and transparent methodology. This study examines the existing work in the field of gamification in higher education in terms of peer-reviewed articles and conference papers published and indexed from January 2013 until January 2019.

METHODOLOGY

Google scholar has been used as the main academic platform for searching for articles. It has been used because it is a generic platform that is synchronizing results from various databases of different disciplines. The initial research resulted in 27,000 entries. In Google Scholar, the following conditions were used to further limit the amount of unnecessary duplicate entries: "peer-reviewed" and "from January 2013 to January 2019". Since Google Scholar is a general-topic database, only the results which had more than 3 reported citations were included into this analysis to maintain the relevance of the entries. In addition, the following key words were used: "Gamification*", "higher education*", "Game-based learning*", and "Gamified learning". As a result, the amount of papers was reduced from 27,000 to 6,100. Then, the researcher focused on articles with original empirical research and excluded articles that provide a literature review, systematic review, or mapping design because they lack original experimental work. A total of 1700 conference and journal articles were found in the database searches. These articles were first reviewed by the title, keywords and abstract. In the first round of review, articles that did not discuss gamification or were written in other languages than English were dropped from the study. After the first round, 1250 articles were selected for an in-depth review and comparison against the Inclusion and Exclusion Criteria.

During the data collection some random inspections of the search engine accuracy was conducted by taking a list of references from one paper and seeing if snowballing this reference list yielded objects which were not on the dataset. Systematic approach on following snowballing found that all the selected articles were part of the dataset.

Inclusion and exclusion criteria:

During the preliminary review, the following inclusion and exclusion criteria were applied to the remaining articles. The inclusion criteria in this study included the following topics:

- Gamification in higher education
- Papers with at least three recorded references were included to the analysis to maintain relevance to the field of gamification and education.
- Peer-reviewed articles
- Published between 2013-2019

The excluded criteria included:

- Literature surveys with no original research (study reports),
- Papers not written in English,
- Papers that were not peer-reviewed
- Papers not considering gamification as a primary topic

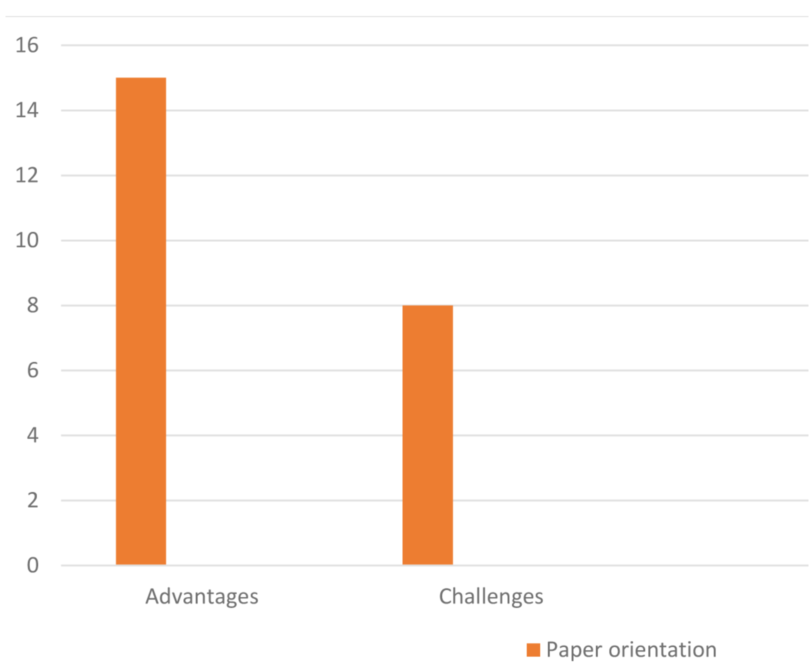
After this final round of filtering and application of the aforementioned exclusion/inclusion criteria, a total of 23 articles were selected to be included in the systematic literature review.

RESULTS

Analysis of the 23 articles revealed mixed results regarding the use of gamification in Higher education. Fifteen research papers reported on the advantages of gamification in higher education, while eight research papers highlighted challenges that were related to the use if gamification in higher education (figure 2).

Thematically, the articles tackled three major concepts in examining gamification and education. The concepts discussed in the article focused on design elements, pedagogy, and behavior. 17% of research papers investigated the impact of game elements – such as leaderboards, badges, ranking, coins, and Power up elements – on students motivation or learning effectiveness. Gamification in relation to pedagogy was the most dominant theme of the articles as 48% of the research papers tackled the relationship between gamification and pedagogy in terms of content, learning outcomes and achievements, learning activities and styles, and teaching performance or approach in classroom. Research papers that investigated the impact of gamification on behavior in terms of motivation, enjoyment, and attitude represented 34% of the dataset. All the papers that dealt with design elements reported positive results regarding the role of game elements in influencing the learning/teaching environment. On the other hand, research papers that examined gamification from a pedagogical perspective reported mixed results. Some of them (five articles) reported a negative impact of gamification on pedagogy, while others (six articles) postulated that gamification had a positive impact on pedagogy. Positivity and negativity are mainly related to the

Figure 2. Research papers about gamification advantages versus challenges



effectiveness of students' response to, interaction, and engagement with classroom dynamics in terms of instruction, rapport, and collaboration. Research papers about gamification and behavior were mostly positive with five articles findings showing the merits of gamification and three articles focusing on challenges of gamification. "Behavior" in these articles referred mostly to students' behavior in the classroom during instruction time in terms of engagement and rapport with the teacher and the subject matter.

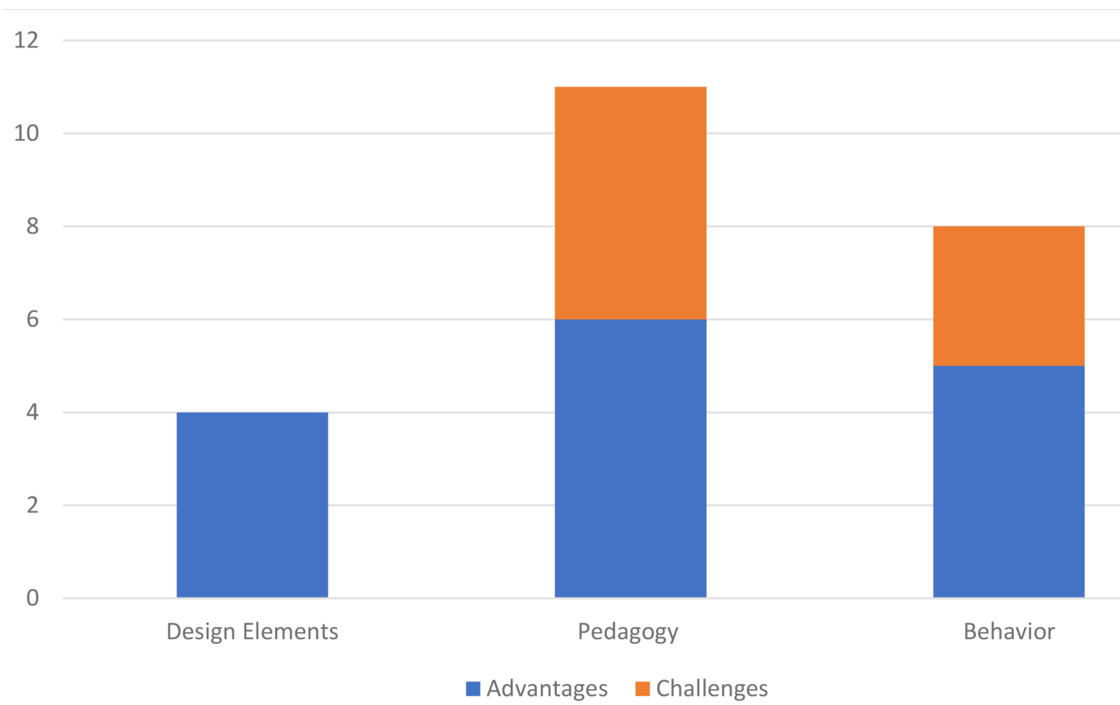
DISCUSSION OF RESEARCH ARTICLES

The systematic analysis of the research papers that examined the advantages and challenges of using gamification in higher education shows that there is a variety of stances regarding the application of gamification in higher education classrooms. The initial analysis of the 23 articles attempted to answer the aforementioned research questions.

Research Question 1: What benefits does gamified learning contribute to the learning environment in higher education?

Results showed that benefits of gamification were related to gaming elements or design, pedagogy, and behavior. In terms of game design, the research papers found that game elements such as point systems and badges have positive impact on students' motivation, competence and participation in classroom. Lamb, DiFiori, Jayaraman, Shames, & Feeney (2017) found that the use of point system increased stu-

Figure 3. Thematic distribution of the research papers



dents' motivation and performance. Similarly, Sailer, Hense, Mayr, & Mandl (2017) found that badges, leaderboards, and performance graphs positively affected competence, need satisfaction, and contributed to an increase in students' perception of task meaningfulness. Similarly, in a two-year study, Hamari (2017) reported that badges have positive effects on the user's behavior in interacting with others (social interaction) and the gamification platform. Additionally, Denny (2013) postulated that badges have a highly significant positive effect on the quantity of students' contributions, without a corresponding reduction in their quality, as well as on the period of time over which students engaged with the game.

Regarding pedagogy, research papers have reported on the impact of gamification on pedagogy in terms of students' performance, learning style, and classroom activities. El Tantawi Sadaf, & AlHumaid, (2018) found that gamification had a positive impact on developing academic writing skills. Through a four-month intervention, results showed significant increase in students' performances as their scores increased by 44% compared to initial assessment that students have undergone before the intervention. In this intervention, badges, leader boards and a storyline were used as gameplay elements to motivate students to complete educational tasks. Students are ranked on the leaderboard based on the points they gained out of pursuing or completing the academic tasks. Similarly, DomíNguez, Saenz-De-Navarrete, De-Marcos, FernáNdez-Sanz, PagéS, & MartíNez-HerráIz(2013) reported that students who completed the gamified experience got better scores in practical assignments and in overall score, yet these students performed poorly on written assignments. Such findings indicate that gamification works better when it is linked to practical assignments, yet it is not that effective when it is associated with written-based assignments

Besides, gamification has been linked to learning styles. In global learning style, for example, learners prefer to develop an initial 'broad brush strokes' understanding of a topic before developing a more detailed understanding of a topic. They may absorb material without necessarily seeing connections and then suddenly 'get it'. They are more likely to solve complex problems quickly or put things together in innovative ways once they have grasped the 'big picture' view, but may have difficulty explaining how they did it. Buckley and Doyle (2017) found out that gamification is well-perceived by students who have active or global learning styles. This finding was confirmed by Tsay, Kofinas, and Luo (2018) who discovered that gamification is a beneficial educational tool that helps to create a student-centered learning environment. The study evaluated the use of gamification to facilitate a student-centered learning environment within an undergraduate Year 2 Personal and Professional Development (PPD) course. In addition to face-to-face classroom practices, an information technology-based gamified system with a range of online learning activities was presented to students as support material. The implementation of the gamified course lasted two academic terms. The subsequent evaluation from a cohort of 136 students indicated that student performance was significantly higher among those who participated in the gamified system than in those who engaged with the non-gamified, traditional delivery, while behavioral engagement in online learning activities was positively related to course performance, after controlling for gender, attendance, and Year 1 PPD performance. The gamified course design advocated in this work may have significant implications for educators who wish to develop engaging technology-mediated learning environments that enhance students' learning, or for a broader base of professionals who wish to engage a population of potential users, such as managers engaging employees or marketers engaging customers.

Learning activities are more functional when they are gamified. Jagust, Botički & So (2018) reported that gamified activities contributed to increased student performance levels in math learning. In this study, three different types of gamified learning activities—namely competitive, collaborative, and adaptive—in mathematics classes have been examined. The participants used tablet computers and digital learning lessons for learning mathematics. The study included a non-gamified and competitive, adaptive, and collaborative gamified conditions, which were integrated into lesson plans. The collected log data were used to calculate the changes in performance levels through the dimensions of task completion and time under each condition, and the data were further analyzed and compared across conditions. The quantitative analysis results were triangulated with interview data from the students. Significantly higher performance levels appeared in a gamified condition combining competition, a narrative, and adaptivity with individual performance game elements. Although the highest performance levels appeared in conjunction with the most incorrect attempts by the students, the total number of correct attempts was unaffected.

Furthermore, gamification has contributed to the effectiveness of flipped classroom and out-of-class activities in terms of motivation and work quality. Huang et al. (2018) explored whether gamification could be used as a strategy to motivate students to participate in more out-of-class activities without forfeiting quality of work. The researchers applied crucial aspects of five motivation theories to propose a goal-access-feedback-challenge-collaboration (GAFCC) gamification design model. They implemented and tested this theory-driven model in two quasi-experimental studies involving postgraduate students. Collective results from the two experiments revealed that (a) the GAFCC class completed significantly more pre- and post-class activities than the control class and (b) the GAFCC class produced higher quality work than the control class. Participants' perceptions of gamification were also collected through interviews, and reported in this study. The researchers found that gamification has a positive impact on outdoor learning activities.

Gamification has a positive impact on students' behaviors. Research findings showed that 90% of students developed motivation and enjoyment of classes that used gamified environment, especially when badges are used (Kingsley & Grabner-Hagen, 2015). In this study that measured students' perception about gamification in the classroom, Kingsley and Garbner-Hagen (2015) surveyed, observed, and interviewed 47 students in grades 5 and 6. Students have used iPads to complete educational tasks on 3D gamelab. Results showed that more than 90% of the participants loved the idea of earning badges. Badges as a game element has increased their motivation and satisfaction about the course Urh, Vukovic & Jereb (2015) also found that the use of gamification as part of e-learning courses in higher education had a positive impact on motivation, knowledge acquisition, engagement, and learning effectiveness. Similarly, teachers have positive attitude in applying gamification in the classroom (Martí-Parreño Seguí-Mas & Seguí-Mas, 2016). Also, gamification may also be used by educators to classify students in the class according to their behavior and performance. In a timespan of three years, Barata, Gama, Jorge, & Gonçalves (2017) observed students in the classroom in terms of educational achievements and behavior. Then, students have been clustered according to their gamified educational achievement. This study has used gamification and game elements to identify six types of students in the classroom based on their educational behavior. the achievers, the underachievers, the disheartened students, the late awakeners, the regular students, and the half-hearted students. Barata, Gama, Jorge, & Gonçalves (2017) found that through gamification in classroom, students can be classified into five types of students:

1. *Achievers* were characterized by having the largest and steepest experience (XP) accumulation curve, reflecting their struggle to be the best and collect every badge they can get their hands on.
2. *Underachievers* were characterized as having the lowest XP accumulation curve and occupying the bottom of the leaderboard, which made them the furthest from the ideal student.

3. *Disheartened* exhibited an XP accumulation behavior less linear than any of the student types previously described, by performing similarly to the Achievers initially but then falling into a tier of their own, with performance levels between those of the Achievers and the Underachievers.
4. *Late awakeners* were characterized as having an XP accumulation curve situated between that of the Achievers and the Disheartened students, and they shared the middle of the leaderboard with the latter student type. These students presented significant differences in terms of final grade, number of badges, and amount of explored achievements and XP earned from achievements, and these features presented slightly above average scores which suggests that they were more proactive than the Disheartened and the Underachievers, but less than the Achievers, even though the differences were not significant.
5. *Regular* were characterized by an XP accumulation curve situated right below that of the Achievers, and also by steadily placing on the top half of the leaderboard over the term.
6. THalf-hearted were characterized as accumulating XP at a rate lower than the Regular students, but higher than Underachievers, thus occupying a region in the leaderboard between these two student types.

This section of the discussion addresses *research question 2 What are the disadvantages that may result from the use of gamified learning in higher education?* The exploration of the 23 research papers showed some disadvantages associated with the integrating gamification in higher education. Those challenges were mainly related to pedagogy and behavior.

From a pedagogical perspective, the systematic analysis found that gamification may have a negative impact on students' motivation and summative performance. Hanus and Fox (2015) found out that the use of badges and leaderboards not only decreased the intrinsic motivation of the students, but also affected the students' test scores negatively. In this study, the researchers tested students across two courses, measuring their motivation, social comparison, effort, satisfaction, learner empowerment, and academic performance at four points during a 16-week semester. One course received a gamified curriculum, featuring a leaderboard and badges, whereas the other course received the same curriculum without the gamified elements. The researchers in this study found that though students from each course started at the same levels of intrinsic motivation, satisfaction, effort, social comparison, and empowerment, over time students in the gamified course tended to decrease in motivation, satisfaction, and empowerment relative to the non-gamified course. Further, in decreasing intrinsic motivation, it can affect students' final exam scores. Although the game mechanics the researchers used in this study were aligned with learning objectives; the badges were designed to promote additional learning and engagement, students in the gamified classroom were less intrinsically motivated and in turn earned lower exam scores than those in the non-gamified classroom. This suggests that giving rewards in the form of badges and coins, as well as encouraging competition and social comparison via a digital leaderboard, harms motivation. Similarly, in a year-long study, Tomaso (2014) reported that using gamification as part of the teaching activities in the class has a weak positive impact on students.

In relation to assessment, Attali and Arieli-Attali (2015) reported that the use of badges and point-system did not have an impact on the accuracy of answers to math questions. The study examined the effects of points, a basic element of gamification, on performance in a computerized assessment of mastery and fluency of basic mathematics concepts. The first study, with adult participants, found no effect of the point manipulation on accuracy of responses, although the speed of responses increased. In a second study, with 6 and 8 grade middle school participants, we found the same results for the two aspects of performance. In addition, middle school participants' reactions to the test revealed higher likeability ratings for the test under the points condition, but only in the first of the two sessions, and perceived effort during the test was higher in the points condition, but only for eighth grade students. Similarly, De-Marcos, Domínguez, Saenz-de-Navarrete & Pagés (2014) reported the same results concluding that gamified courses help with content that emphasizes skills, yet gamification does not help students get enough knowledge depth. In this study, the researchers made an experiment that aimed to compare two educational approaches, gamification and social networking, in terms of students' achievement, participation and perception. Results suggest that the proposed instruments improve students' performance on practical assignments related to skill acquisition. When it came to written examinations that primarily assessed knowledge, results suggested that traditional e-learning approaches were the best option and provided a good basis to get the best results in terms of academic achievement. The researchers argued that both experimental instruments overemphasized skill acquisition, resulting in poorer scores on knowledge acquisition. As for participation scores, the social networking group of students that actively participated got the best results. This may be logical since social networking promotes collaboration and participation. Conversely, students of the gamified group got lower participation scores, suggesting that this approach may emphasize competition over collaboration and sharing, thus reducing participation of students.

Although the aforementioned research praised the impact of gamification on students' behavior in the classroom in terms of engagement and participation, there was minimal negative impact of gamification on behavior in terms of motivation and performance of students. The results of a study made by Mekler, Brühlmann, Tuch, & Opwiset al (2017) showed that game elements such as points and leaderboards did not contribute to the quality of students' performance neither their intrinsic motivation. In this study, the researchers conducted a 4X 2 between-subject online experiment. The independent variable were three of the most common game elements: points vs. leaderboard vs. levels vs. plain condition without any game elements, as well as participants' causality orientation (autonomy vs. control oriented). The dependent variables were user performance (amount of tags and tag quality), intrinsic motivation and satisfaction of autonomy and competence needs. Performance was measured by tracking the amount of tags generated per participant. Intrinsic motivation was assessed with the Intrinsic Motivation Inventory (IMI). Thus, Mekler, Brühlmann, Tuch, & Opwis (2017) reported that the use of gamification has no impact on students' intrinsic motivation as well as performance. This finding confirms Hans and Fox's (2015) research results. In addition, the perceived enjoyment and usefulness of gamification declines with the use. Moreover, ease of use of gamification is shown to decline with age (Koivisto & hamari 2014). Counterproductive effect of gamification was another challenge that was investigated by researchers. Diefenbach and Müssig (2018) found that gamification may function as a tool that makes students disoriented by focusing on the gameplay and ignoring the knowledge behind this gameplay.

The systematic analysis of the research papers that addressed *research question 3: How do gameplay elements add to the benefits and disadvantages of utilizing gamified leaning in higher education?* revealed that game elements contributed positively to the learning environment. Badges, leaderboards, graphs, and point systems relatively increase students' motivation, performance, and involvement with the course (Lamb et al. 2017; Hamari et al. 2017; Sailer et al. 2017 & Denny, 2013).

On the other hand, other studies have found that badges and leaderboards may influence students' motivation negatively due to the novelty effect (Hans &Fox, 2015). This means that students after a while may feel less motivated to continue with the gameplay because they are already familiar with the game elements and mechanics. Conversely, Tomaso (2014) did not attribute the decline in motivation to the novelty effect that stems from using gamification in the class. He stated that the decline in intrinsic motivation may result from the poor design of the game elements.

RECOMMENDATION FOR FURTHER STUDY

The current systematic analysis revealed that more research is required to examine the use of gamification in social science and humanities disciplines. A qualitative research approach is needed to provide an in-depth investigation of using gamification in education. Besides, more substantial empirical research is needed to investigate the use of gamification for particular types of learners. This would inform instructors who are interested in gamifying their courses and help them in deciding what game elements to use in their specific context.

CONCLUSION

The goal of this systematic review of the literature was to examine the directions and tendencies of conducted research on the challenges and advantages of using gamification within learning environments. Concerning the limitations of the review, the number of research studies that were investigated may not be sufficient to draw in-depth conclusion regarding the effectiveness of using gamification as part of instructional and educational courses whether in e-learning or face-to-face courses. However, the current systematic review provided a glimpse of the directions of research in tackling the efficiency of gamification as an educational tool in light of authentic empirical research that has examined this area.

The study revealed that there are many publications that explore the use of gamification in education, but the majority of the articles described specific learning subjects (i.e. medicine, math, computer scienceetc) that may not provide inconclusive results to be applied to other contexts related to humanities and social science. In agreement, Dicheva, Dichev, Agre, & Angelova (2015) mentioned that most empirical studies on gamification do not include a proper evaluation, which makes it difficult to conduct a meta-analysis of the results of these studies and speculate on general reasons for their successes or negative results. However, the review of literature showed that a general consensus that gamification has the potential to improve learning in terms of outcome and motivation if it is well designed and used correctly.

The study also shows that gamification is mostly used in learning environments related to science and scarcely used in humanities and social science. This exclusivity of science disciplines in using gamification leads to a conclusion that the learning environment in science courses may play a substantial role in applying gamification. Also, the technological infrastructure and instructional frameworks are two major factors that impact the utilization of gamification in the classroom. In addition, the review of the literature implies that gamification works best for practical and hands-on learning rather than theory-based or knowledge-based learning.

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KEY TERMS AND DEFINITIONS

Badges: Visual representations of achievements and can be earned and collected within the gamification environment.

Game Play: Free movement within rigid structure. In game play, free movement stems from the strategies that the player adopts during the game in order to meet the winning condition of the game.

Gamification: The use of game elements within non-gaming context.

Leaderboards: Leaderboards rank players according to their relative success, measuring them against a certain success criterion. As such, leaderboards can help determine who performs best in a certain activity, and are thus competitive indicators of progress that relate the player's own performance to the performance of others.

Learning Outcomes: The objectives that students should achieve by the end of the instructional period.

Pedagogy: The method and practice of teaching, especially as an academic subject or theoretical concept.

Performance Graphs: They provide information about the players' performance compared to their preceding performance during a game.

Systematic Review: review of the literature according to an explicit, rigorous, and transparent methodology.

APPENDIX

Suggested learning activities

The following learning activities can effectively be used to enhance the learning experience of the learners.

1. Activity 1: Semester-Long gamified activity
   The following activity can easily be tailored and used in theory-based or production classes.
   - About the game..!
     This game will start from the very first day of the semester until the very last day. It is important to note that this game manual is NOT a syllabus. Therefore, participating in this game is completely voluntarily. If there is a conflict between any of the game instructions and the syllabus, priority goes to the syllabus. Besides, the game is intended to boost your grade and help you enjoy the class. To be part of the game and included in the game leader board, you need to collect as much PSU bill notes as you can. Also, you need to successfully proceed from one stage to another. Some of the stages give you an advantage or an advanced rank on the leaderboard. The game has two modes: individual and group. The points that you will achieve as an individual can be transferred to your group. However, you have the right to keep your points to yourself. Your performance in this game will help you boost your grade, get bonus points, and most importantly learn more about the course content. The official currency for this game is the XYZ currency and each player will start the game with 100 XYZ. Also, you will have game ID card that will show your rank on the leaderboard.
   - XP system
     XP refers to the points that you will achieve or earn when a milestone is achieved.
     1000 XP (submitting assignment on time)
     1500 XP (participate in class discussion)
     2000 XP (score A in a quiz or assignment)
     2000 XP (Summarize the class content in 60 seconds exactly)
     2500 XP (Submit assignment two days earlier)
     3000 XP (Answer a challenge by other group)
     3500 XP (Answer a challenge by your instructor)
     4000 XP (Answer the monthly grand challenge question)
     4500 XP (Report anonymously on another player who is using his/her phone)
     5000 XP (Read a book about any of the class topics and present it to class in 10 minutes)
     5500 XP (Teach other students a new concept related to class subject)
     6000 XP (Teach the public something new related to what you have learned in the class and collect 100 views/likes)
   - Stages
     Stages reflect the progress of each student. Certain stages are linked to achievement badges.
     Level ONE = 10.000 XP
     Level TWO = 30.000 XP (Earn Badge A)

Level THREE = 40.000 XP
Level FOUR = 50.000 XP (Earn Badge B)
Level FIVE = 100.000 XP
Level SIX = 200.000 XP (Earn Badge C)
Level SEVEN = 300.000 XP
Level EIGHT = 400.000 XP (Earn Badge D)
Level NINE = 500.000 XP (Earn Badge E)
Level TEN = 600.000 XP (Badge F)

- Market place

  The marketplace is where students can trade whatever XYZ bills they have for better opportunity. Also, the marketplace is where students might be penalized by paying out some of the XYZ bills for a negative attitude they demonstrate.
  Attending class on time = +50 XYZ/day
  Being late = -25 XYZ/day
  Absence = -50 XYZ/day
  Participating in class = +10 XYZ/time/day
  Silent All class time = - 10 XYZ/day
  Side talk = -20 XYZ/time/day
  Playing with phone or computer = -100 XYZ/time/day
- Price List

  The price list provides an optional menu that students may use to get some rewards or advantages. To obtain these rewards, students must have enough balance of the XYZ currency.
  (100 XYZ) = 1000 XP extra
  (200 XYZ) = extra challenge question
  (300 XYZ) = extra 60 seconds to summarize the class content
  (500 XYZ) = New book
  (700 XYZ) = extra day to submit assignment
  (1000 XYZ) = Extra grand challenge question

2. Activity 2: Classroom management

   In this semester-long activity, the teacher sets a leaderboard with certain milestones. The leaderboard will include milestones related to attendance, participation, and attention. As for the attendance, all students are awarded 10 points on the leaderboard if they are all present in the class on time. However, the whole class loses all the points if only one student shows up late. Regarding participation, all students awarded 10 pts on the leaderboard if more than 50% of the class participated in the discussion. Otherwise, the class loses all the points if few students participated in the discussion. Attention is measured by the ability of students to stay focused without being distracted by their phones or computers. If one student is caught checking his/her phone, the entire class will lose 10 Pts. Throughout the semester, the class may go up and down the leaderboard based on their collaborative effort. If the class managed to finish the semester with certain number of points, it would be entitled to receive bonus points.

   The purpose of this gamified activity is to encourage students collaboration and positive behavioral attitude by students. This attitude is maximized by students' ability to collaborate. The more they help each other adopt positive attitude and commitment in the class, the more points they get and therefore reflected on their grade. Also, this activity is based on the use of leaderboard that can be shared with students in the beginning of each class to demonstrate where the class stands. The sharing of the leaderboard will promote motivation among students to succeed as a group.

3. Activity 3: Assessment-based rewards

   This is a gamified stock market that is based on currency/money bills that the teacher will create specifically for the class. The bills will have different values. Values will be linked to the assessment plan that the teacher includes in the syllabus. When a student achieves good grades in a certain assessment tool, he/she is offered a high-value bill to keep. At the end of the semester, students will count the total sum of the bills they have collected during the semester. The top two or three students will be offered bonus points at the end of the semester.

   The use of bills is meant to imitate the badge system in gamification. Earning badges has a positive impact on students' motivation. Provided that the teacher will link the badges (artificial money bills) to the class assessment plan, those bills are expected to encourage students to perform well in exams and other assessment tools.

Chapter 22
Gamification in Adult Learning

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ABSTRACT

Various methods and technological tools have been utilized to meet the unique needs of adult learners. One of the recent methods is gamification, in which game elements and mechanics were utilized within a non-gaming context. This chapter reviews the literature and presents an overview of gamification implementations to develop systematic understanding of how gamification can be integrated into the adult learning process. An electronic search of articles from 2009 to 2019 was conducted, and 23 studies were reviewed in detail. The study shows gamification has mainly been utilized within the workplace environment and in the health education. The principle investigated constructs were satisfaction, motivation, engagement, and knowledge acquisition. Although the reviewed papers reported promising results in terms of utilizing gamification for adult learning, further research is needed.

INTRODUCTION

Demographic changes and the aging worldwide population, especially in developed countries, have become important issues for today's modern world. This change has led to significant challenges in many areas, including education. Education and training in the workplace and lifelong learning have gained recognition, so that researchers, practitioners, and policymakers are searching for more effective and efficient teaching methods. Various emerging technologies have been investigated for their potential affordances to meet this emerging demand in adult education. These technologies have created new opportunities for the teaching of adults as their affordances are consistent with the principles of adult learning (Knowles, Holton, & Swanson, 2005). Online learning, mobile learning, and game-based learning have been gaining popularity among organizations that deliver adult education programs.

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The utilization of digital games for educational purposes is not a new phenomenon, but their application within adult learning contexts has recently become more popular. Thus, the effectiveness of games and gamified learning for adults is an area that needs scientific study and exploration. Gamification is a relatively new phenomenon that is derived from the design techniques and mechanisms of digital games. Some researchers have proposed a broad definition of gamification as; the method of using game elements and mechanics in non-gaming contexts (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011). In addition to this generic definition, Kapp (2012) proposed a more specific definition as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (p. 10). Gamification uses a wide range of game elements which are categorized as mechanics and dynamics. Badges, points, virtual rewards, and levels, etc. are some of the most commonly used examples of game mechanics. Dynamics, on the other hand, are abstract concepts that emerge from a player's interaction with game mechanics. Achievement, reward, and competition are examples of game dynamics. Unlike digital games, gamification is not limited to a specific technology or environment such as immersive or simulated 3D environments. Rather, gamification is a method that can be integrated into a wide range of real-world scenarios to transform entire learning processes into game form by utilizing game mechanics. The increasing popularity of gamification has led researchers and practitioners to apply this method to a variety of domains such as corporate training (Hamari, Koivisto, & Sarsa, 2014; Sailer, Hense, Mandl, & Klevers, 2017), marketing (Dicheva et al., 2015), health and wellness (Seaborn & Deborah, 2015), as well as education and training (Hamari et al., 2014; Lee & Hammer, 2011; Muntean, 2011). Even though the application of gamification in education has been still an emerging trend, current research shows that this method can be particularly effective in fostering motivation, engagement, and knowledge acquisition (De Sousa Borges, Durelli, Reis, & Isotani, 2014; Dickey, 2007; Domínguez et al., 2013; Grünewald, Kneip, & Kozica, 2019; Su & Cheng, 2015).

The question of whether gamification is an appropriate method for adult education requires special consideration. Various technologies have been utilized to support the needs of adult learners, with many organizations offering online and mobile learning solutions both within formal and informal settings in order to increase productivity. It is important to underline that educational researchers and practitioners need to carefully consider the unique characteristics and needs of adults while designing and implementing technology-based learning methods and techniques. Adult learners' background, characteristics, and goals differ significantly, thus traditional learning methods, which are developed mostly for children, may not be all that effective for the education of adults (Illeris, 2010). Several theories and methods have been designed in order to understand the nature of adult learning processes and to provide guidelines for designing and delivering effective educational programs (Merriam, 2010). Adult learning theories emphasize the importance of learner-centered, self-directed, flexible and experience-focused approaches. As Knowles et al. (2005) state, technology provides many learning opportunities based on the autonomous and self-directed principles of adult learning. Therefore, well-designed technology-supported gamification tools and techniques have the potential for resolving issues related to adult learning, and thereby increased learner motivation, engagement, and productivity (Grünewald et al., 2019).

A significant amount of the research into gamification has been conducted in the context of higher education and within formal learning environments. However, a systematic understanding of how gamification can be integrated into adult learning environments is still lacking. Therefore, the purpose of the current study is to review the current gamification and adult learning literature, and then to investigate how gamification applies within adult learning context to better understand the tendencies and emerging trends in this field.

A systematic literature review was therefore conducted by searching for specific keywords in major electronic databases. The identified articles were analyzed based on domain, employed research methodology, and investigated variables. The findings of the current study aimed to provide an overview for researchers to better understand how gamification was utilized in the adult learning context. Furthermore, key findings related to the appropriateness of gamification activities for various domains as well as adult learner characteristics were also discussed in the study. Practitioners, instructional designers, and trainers may benefit from these findings while designing and implementing gamification methods and techniques in adult learning contexts. Moreover, application activities were added at the end of the chapter to be discussed and replied for a better understanding of the implications of the gamification approach in different adult learning settings.

BACKGROUND

In this section of the chapter, an overview of related definitions and the existing literature was presented. First, adult learner characteristics and adult learning theories were discussed. Then, recent developments in the use of technology tools in adult learning were presented. Finally, gamification's definition, its implications for adult learners, and its affective and cognitive affordances were discussed.

Adult Learning

An adult is a person who was able to take responsibility for his own actions (Mezirow, 2000). Unlike children, adults have extensive prior experiences, goals, additional responsibilities (such as family and work), financial commitments, and external constraints. Another difference is that adults are expected to be socially responsible, make their own choices, and to act autonomously within given social contexts (Mezirow, 2000). In the educational context, adult learners' backgrounds and qualifications vary greatly, which has an impact on their confidence and motivation to attend and to complete education or training programs (McGivney, 2004). Additionally, the modern workplace shapes adults' thoughts and behaviors, which significantly differs from the traditional classroom-based learning environment (Hsu & Hamilton, 2010).

Adult Learning Theories

Adult learners have different characteristics and priorities that need to be considered by instructors while delivering educational programs (Cercone, 2008). Mezirow (2000) defined the goal of adult education as "to help adults realize their potential for becoming more liberated, socially responsible, and autonomous learners–that is, to make more informed choices by becoming more critically reflective … in their engagement in a given social context" (p. 30). Traditional learning theories and methods, which were mostly developed for the educating of children, may not be as effective for adults (Illeris, 2010). Several adult education theories and models have been proposed to explain how adults learn, and to provide guidelines for educators in facilitating the learning process. According to Merriam (2010), the three fundamental theories of adult education are; andragogy, transformational learning, and self-directed learning.

Andragogy, probably the best-known adult learning theory, was introduced by Knowles (1968) in order to address the unique needs of adults in the learning process. The principle idea underpinning the theory is that there are significant differences between children and adults, particularly in terms of their learning characteristics. Rather than describing the process of learning itself, andragogy provides a set of principles, also known as assumptions, and which are based on the characteristics of adult learners, to guide the learning process (Merriam, 2001). The five assumptions that construct the foundation of andragogy are that adult learners; (1) take control and direct their own learning, (2) use prior life experiences as resource of learning as well as for building self-identity, (3) become ready to learn or need to learn as their social role changes, (4) prefer problem-solving orientation and want to know how certain information will benefit them, and (5) are motivated by internal rather than external factors.

The second well-known and more recent theory is the Transformative Learning Theory, which was strongly influenced by Mezirow (1996)'s work. The main focus of the theory is the cognitive process of adults in meaning-making. According to Merriam (2010), the foundations of transformational learning are adults' experiences and making sense of these experiences. When humans learn their attitudes and beliefs change, and this leads to a transformation in their perspective of seeing the world. Therefore, "a perspective transformation is key to transformational learning" (Merriam, 2010, p. 30).

Self-directed learning (SDL) is another central theory that explains adult learning process. This theory suggests the locus of control in the learning process lies with the adult learner, who takes responsibility for initiating, managing, and monitoring their own learning (Garrison, 1997). As Garrison (1997) puts it; "Taking responsibility to construct personal meaning is the essence of self-directed learning" (p. 30). Self-directed learners take responsibility for defining their own learning needs and goals, for locating the appropriate resources, deciding upon the most effective learning method, and for evaluating their learning process. SDL's emphasis on the importance of learner control and independence has led this theory to become popular, and not only within informal learning settings, but also in state schools and universities (Merriam, Caffarella, & Baumgartner, 2007).

The theories discussed here, as well as other theories related to adult learning or models, help researchers and educators to better understand adults as learners. There is no single model or theory that can be used as a reference as the adult learning process is both a complex and constantly changing phenomenon (Cercone, 2008). All of the developed theories emphasize learner-centered approaches, self-direction, flexibility, and the importance of experience. The principles provided guide instructors to design better learning experiences, not only in traditional face-to-face classrooms but also in technology-supported and e-learning environments.

Adult Learning and Technology

Technological tools have created many opportunities for designing effective learning environments. Today, e-learning and mobile learning have become indispensable for many higher education institutions and organizations. Many researchers have investigated the effectiveness of various technologies such as e-learning, mobile learning, and also game-based learning in the context of adult education. For adult learners, technology should not be approached with bias or fears. As Knowles et al. (2005) underlined, technology provides many learning opportunities, which is particularly consistent with the self-directedness principles of adult learning. It also allows for learner autonomy, flexibility, and collaboration. Huang (2002) argued that online technologies can be effective for adult learners to construct meaningful and authentic knowledge.

Accepting and embracing the possibilities of technology-based learning might be more challenging for adults (Kasworm & Londoner, 2000). However, the increasing popularity of online programs, MOOCs and mobile-based educational apps shows that adults are ready to benefit from technology in the context of learning. It is important to note that technology itself does not guarantee the success and effectiveness of technology-based learning. The employed instructional strategy rather than the technology itself is the main factor that makes the difference in adult learning.

Educational games and gamification are other methods that need to be investigated for their affordances in the context of adult learning. Although game-based learning has amassed extensive literature, the use of gamification in adult education is an area in need of further investigation. In a recent study, Grünewald et al. (2019) explored the potential of gamification in the workplace for promoting employee engagement, with the authors proposing that gamification's wide range of tools and techniques can be a potential solution to the issues faced by adult learners.

Gamification

Despite the growing popularity of gamification among researchers and practitioners from diverse areas, the term is still relatively novel. Several definitions of gamification have been proposed by researchers, yet no single, well-established definition has been agreed upon. The broad consensus in the literature is that gamification is the method of using game elements and game mechanics in a non-gaming context (Deterding et al., 2011; Werbach & Hunter, 2012). Kapp (2012) defined gamification as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (p. 10). Similar definitions were proposed by other researchers with a focus on; service and marketing (Huotari & Hamari, 2012), engagement and problem-solving (Zichermann & Cunningham, 2011), and instruction (Deterding et al., 2011).

Gamification is a relatively new phenomenon that is derived from digital game design techniques and mechanisms. Digital games can be classified into two broad categories: entertainment games and serious games. Digital games have been an indispensable part of many people's daily lives, especially millennials, serving as a form of regular electronic-based entertainment. Even though entertainment games' primary purpose is not based around education, their various features have also been utilized for educational purposes. For instance, Massively Multiplayer Online Games (known as MMOGs) such as World of Warcraft and Minecraft have found use within education. However, serious games, on the other hand, do not have significant entertainment components but have well-planned educational goals that are designed based on real-world problems (Ulrich & Helms, 2017). These types of games aim to promote educational outcomes by leveraging interactive and graphically-rich environments. Most of these games have a realistic and immersive 2D or 3D environment which allows users to interact with objects within the environment and also with other users. Furthermore, digital games can be played on various platforms such as personal computers and mobile technologies such as tablet computers and smartphones. This variability provides a level of flexibility for players to choose the technological platform that is most convenient for them. Unlike entertainment and serious games, gamification does not require a simulated or immersive virtual environment. Gamification components can be integrated into any real-world scenarios using technological tools. Finally, even though digital games and gamification share common goals in the educational context, they also differ in certain aspects. For instance, while digital games are only used as a tool for specific learning goals, gamification transforms the entire learning process into a game by applying game elements and gaming principles.

Gamification is an umbrella term that includes various components that are applied in practice. Several gamification researchers (Bunchball, 2010; Hunicke, LeBlanc, & Zubek, 2004; Werbach &

Hunter, 2012) have proposed frameworks to outline these components and its fundamental principles. The simplest framework, proposed by Bunchball (2010), divides gamification elements into two main categories: mechanics and dynamics. Another popular framework is the Mechanics, Dynamics, and Aesthetics (MDA) (Hunicke et al., 2004) framework. Different from the former, this framework adds the component of aesthetics. Despite the minor terminology differences, the frameworks each categorize commonly used gamification elements as concrete, abstract, and visual components. Mechanic components are concrete elements which define the rules and algorithms of a gamified environment. These rules and their logic are integrated by game designers in order to promote the motivation and engagement of players. In gamified applications, points, badges, leaderboards, and levels are some of the most commonly utilized mechanics (Hamari et al., 2014). Dynamics are the more abstract concepts that emerge from a player's interaction with the mechanics. Status, competition, rewards, and emotions are some of the examples of game dynamics. Based on the objective of a gamified application, game designers might place more emphasis, or even eliminate, some of the mechanical elements. For instance, in a gamified environment where competition is not the desired element, mechanics that trigger competition, such as leaderboards, can be removed.

Most gamification applications are developed within digital platforms; however, that does not mean that this method is limited to digitally technological environments. In fact, gamification can be integrated into face-to-face activities and also the traditional classroom environment as well. However, due to their ease of management and their interactivity, online tools are mostly used for gamification. In online gamification platforms, game elements can be set up easily, and users can view their status and that of other users.

Gamification and Adult Learning

Recently, gamification has gained in popularity as an effective learning method that promotes engagement and motivation. Games, in general, are popular in children's education as an effective means to make learning more fun. However, creating entertaining activities should not necessarily be limited to children, as adults can also enjoy meaningful games as well. Games have the potential to be an important motivating and engaging factor in adult learning (Demirbilek, 2010). Similar to games, gamification can also make the learning experience more enjoyable, and thereby increase learners' interest, and can be used as a method of providing feedback (Muntean, 2011). Kim, Song, Lockee, and Burton (2018) defined this method in the educational setting as; "Gamification in learning and education is a set of activities and processes to solve problems related to learning and education by using or applying the game mechanics" (p. 29). A critical aspect to note is that gamification's effectiveness depends on the way it is implemented (Hamari et al., 2014). Instructional activities need to be planned wisely in order to successfully embed game elements into instructional objectives. Gamification strategy and selected gamification elements should be appropriate for learning objectives and for the context. Furthermore, learner characteristics are a significant factor for the effectiveness of gamification (Buckley & Doyle, 2017). Therefore, before designing gamification activities in the adult learning context, instructional designers need to analyze the adult characteristics and appropriateness of the learning environment and then make their decisions accordingly.

An extensive body of literature has explored the benefits and challenges of gamification in education. It has been reported that gamification is an effective method to promote affective components such as engagement (Çakıroğlu, Başıbüyük, Güler, Atabay, & Yılmaz Memiş, 2017; Da Rocha Seixas, Gomes, & De Melo Filho, 2016; Leaning, 2015), motivation (Hakulinen, Auvinen, & Korhonen, 2013; Hoogveld & Paas, 2002; Neeli, 2012; Su & Cheng, 2015), and attitude (Yildirim, 2017). Furthermore, it has been shown to have a positive effect on student achievement (Çakıroğlu et al., 2017; De-Marcos, Garcia-Lopez, & Garcia-Cabot, 2016; Su & Cheng, 2015), and learner participation and collaboration (Knutas, Ikonen, Nikula, & Porras, 2014; Li, Dong, Untch, & Chasteen, 2013; Moccozet, Tardy, Opprecht, & Leonard, 2013). These findings have important implications for integrating gamification into adult learning in order to support effective and cognitive development.

Gamification's Affective and Cognitive Affordances

Motivating adults is crucial for the effectiveness and completion of an educational program. One assumption of andragogy is that adults are self-directed and motivated by internal factors more than external factors. This assumption indicates that adults are highly motivated learners in the first place. Although this can be true in cases when adults willingly elect to attend courses or training and when the time period of the program is short, in most cases adults may be required or forced to attend in such programs or face attention loss after a certain period. According to McGivney (2004), adult distance education students are more likely to leave long-term programs before their completion due to many reasons such as personal factors, lack of familial support, and also financial considerations. In the same study, it was stated that motivation is a major factor in the persistence of students to complete such programs. A similar problem exists within organizations for the training of employees (Grünewald et al., 2019). Demirbilek (2010) argues that one of the challenges of adult learning is to sustain their interest and engagement due to adults' shorter attention spans and distractions that might cause early-leaving from the learning program. Therefore, it is important to find and implement effective methods of promoting motivation in adult learners.

A significant amount of gamification research has focused on the learner and their motivation and engagement (De Sousa Borges et al., 2014; Marti-Parreño, Méndez-Ibáñez, & Alonso-Arroyo, 2016). Several studies have reported that gamified learning has the potential for promoting motivation, engagement, and positive attitudes towards learning (Denny, 2013; Domínguez et al., 2013; Yildirim, 2017). Even though these results were reported from a higher education context, Grünewald et al. (2019) argued that gamification features such as rewards and competition had the significant potential of making education and training in the workplace more fun and exciting, which could subsequently lead to improved performance and engagement, and thereby higher rates of educational program completion. It can be argued that gamification elements such as badges, points, and rewards are extrinsic motivators; however, in gamified activities learners experience significant enjoyment, positive feelings, autonomy and a sense of belonging (Sailer et al., 2017). Thus, well-designed and meaningful gamification can be an effective method for fostering both intrinsic and extrinsic motivation (Grünewald et al., 2019). Meaningful gamified activities mean that the game elements used are relevant to the user and also appropriate to the learners' characteristics (Nicholson, 2012).

The major driver of integrating gamification into learning environments is its effectiveness in terms of affective constructs (Dickey, 2007). In addition to affective aspects, a significant amount of gamification research has focused on the cognitive outcomes of this method (Marti-Parreño et al., 2016). Gamification has the potential to improve knowledge acquisition and retention (Grünewald et al., 2019), high-order thinking skills and also test performance (Kim et al., 2018). Previous research has reported that gamification can positively affect learning performance and academic achievement in various domains including engineering education (Barata, Gama, Jorge, & Gonçalves, 2013; Codish & Ravid, 2014), science education (Su & Cheng, 2015), ICT (Çakıroğlu et al., 2017; Domínguez et al., 2013), and nursing education (Brull, Finlayson, Kostelec, MacDonald, & Krenzischeck, 2017).

Cognitive tasks typically require significant levels of effort which might, therefore, lead to frustration and low motivation of learners. Gamification has been utilized by many researchers and practitioners as a possible solution to improve cognitive engagement and learning performance. The purposes and methods of using gamification in cognitive training and assessment were explored in a systematic literature review study by Lumsden, Edwards, Lawrence, Coyle, and Munafò (2016). In their study, the researchers identified 33 studies which implemented gamification in various cognitive domains and, based on the results, they concluded that working memory and general executive functions were the main research focus of gamified training and assessment. Furthermore, they argued that well-designed gamification applications have the potential to develop cognitive engagement and can be used for cognitive assessment.

In an experimental study conducted by De-Marcos et al. (2016), the researchers compared students' learning performance in traditional, gamified, and social gamified form (integrating gamification into social network platforms) within an undergraduate course. The results revealed that supporting learning modules with gamification boosted learning performance. In another study that was conducted with 107 undergraduate engineering students, Su (2016) reported that gamified teaching reduced the cognitive load of students and enhanced their learning motivation, which led to increased learning achievement. Another similar study conducted by Ibanez, Di-Serio, and Delgado-Kloos (2014) reported that gamification had a moderate effect on students' learning performance in a programming course. Finally, studies conducted within an e-learning setting showed promising results; in an experimental study, Brull et al. (2017) argued that in gamified e-learning training, learners used and retained more knowledge when compared to other forms of the same training without gamification elements.

Although the majority of the studies presented were conducted within the higher education context, some researchers focused on gamification's affordances in the K-12 setting as well. Turan, Avinc, Kara, and Goktas (2016) conducted a quasi-experimental study with sixth-grade students, comparing a gamified course with its traditional counterpart. It was reported that the gamification group outperformed the traditional group in terms of achievement, while the cognitive load of the gamification group was found to be higher. The researchers discussed that gamification's competitive features have the potential to cause a high cognitive load. They further suggested that game designers and instructional designers need to be cautious when implementing gamification in order to avoid cognitive overload.

Despite extensive research reporting results in favor of gamification, it is also important to remain cautious about the limitations of this method. Some researchers have argued that gamification might not be an effective method for all learners, as some learners might not like commonly used game elements such as badges and leaderboards (Hakulinen & Auvinen, 2014; Hamari, 2013; Hanus & Fox, 2015). In their study, Codish and Ravid (2014) reported that game elements were effective for introverts but less so for extroverts. In some studies, it was reported that although students enjoyed the gamified forms of courses more than their traditional form, no significant difference was found in terms of learning performance (Attali & Arieli-Attali, 2015; Leaning, 2015). Furthermore, prior student performance could have an impact on the effectiveness of gamification. Abramovich, Schunn, and Higashi (2013) reported that gamification was effective for low-performing students, while no significant impact was found for high-performing students. Finally, Hanus and Fox (2015) underlined the novelty effect of gamification, arguing that learners were likely to be more excited and motivated when introduced to gamified activities for the first time; however, these positive emotions could then decrease as they gain familiarity with the method. Based on the discussed findings, it is important to note that researchers and instructors need to exercise caution when applying gamified instruction as characteristics of learners, content, and learning environment are some of the major factors affecting the gamification method and its effectiveness of promoting effective constructs and learning performance.

METHOD

A comprehensive overview of the current literature was provided in this exploratory narrative literature review. A narrative literature review is a comprehensive analysis with a qualitative emphasis based on the current knowledge of a specified topic (Allen, 2017). The aim of this literature review was to summarize and present the various research ðndings, and to identify research gaps within the existing literature from a qualitative perspective rather than conducting statistical analyses.

Inclusion criteria for articles specified a discussion of “adult learning and gamification.” In this respect, electronic searches for articles from Science Direct, Web of Science, ERIC and Springer Link were performed from 2009 to 2019 using the keywords; “gamification & learning,” “gamification & education,” “gamification & training,” “gamification & adult learning,” “gamification & adult education,” “gamification & adult training.” The initial inclusion criteria were: (1) research with a focus on adult learning and gamification; (2) research published in English; (3) journal articles; (4) research published between 2009 and 2019.

From the keyword searches performed in the selected databases, a total of 2.815 articles were returned. After eliminating duplicates, conference papers, review articles, editorials, discussion papers, examinations, and book chapters, the search resulted in a refined total of 1.109 publications. Figure 1 illustrated the steps the authors followed during the review process.

As a second step, the titles, abstracts and main textual body of the articles were reviewed based on the inclusion criteria and a final tally of 23 articles were selected for analysis within the current study. In several studies, although gamification was used as a term, there was no significant gamification approach found within the articles themselves. In this respect, it was essential to define gamification properly before eliminating further articles.

Gamification is the method of utilizing game mechanics and aesthetics in order to promote engagement, motivation, and learning (Kapp, 2012). Moreover, the aim of the current study was to review articles about studies that applied the gamification approach with adult learners as they had different characteristics and priorities. According to Mezirow (2000), the goal of adult education is to help adults to realize their potential, become critically reflective and become autonomous learners. Adult learning is purpose-driven, self-directed learning which relies upon a readiness to learn as well as internal motivation. In order to narrow the scope of the study to adult learning only, formal learning settings such as K-12 education and higher education were excluded whilst reviewing the articles. Studies which mainly focused on self-directed adult learners in non-gaming environments including companies, healthcare organizations or massive online learning environments were purposefully selected for review. Articles found to be in disagreement by either researcher were further evaluated by both researchers in order to reach a consensus and achieve 100% agreement.

RESULTS

This section summarize and analyze the key ðndings from the selected 23 articles that were found to be related to both gamification and adult learning. Previous research related to adult learning revealed that gamification has been implemented within different settings including companies for their employees, healthcare organizations for patients or residents, or within private homes for self-directed learners. The results were discussed in three categories (see Figure 2). While 10 studies were found that utilized a gamification approach within corporate training (companies), eight of the studies were in healthcare settings, and five studies were related to other settings (e.g., private households, museums, aquariums etc.).

Studies Using Gamification Approach in Corporate Training

The results showed that of the 23 articles, 10 studies focused on employees' or customers' learning, performance, satisfaction or engagement in a corporate setting. Interestingly, although gamification has been used as an approach in educational settings for almost 10 years, articles related to gamification in corporate training were found to have only been published in the selected databases since 2017. Of the 10 articles, five focused on the effectiveness of gamification in corporate training (Alcivar & Abad, 2016; Armstrong & Landers, 2017; Brull et al., 2017; Dadaczynski, Schiemann, & Backhaus, 2017; Kwak et al., 2019), two studies focused on creating a gamification platform or framework (Abedi, Shamizanjani, Moghadam, & Bazrafshan, 2018; Clegg, Orme, Owen, & Albores, 2018), and one study was performed as a content analysis (Mohd, Ali, Bandi, & Ismail, 2019). The number and research purpose of studies in the area of corporate training are presented in Figure 3.

Figure 1. Review process

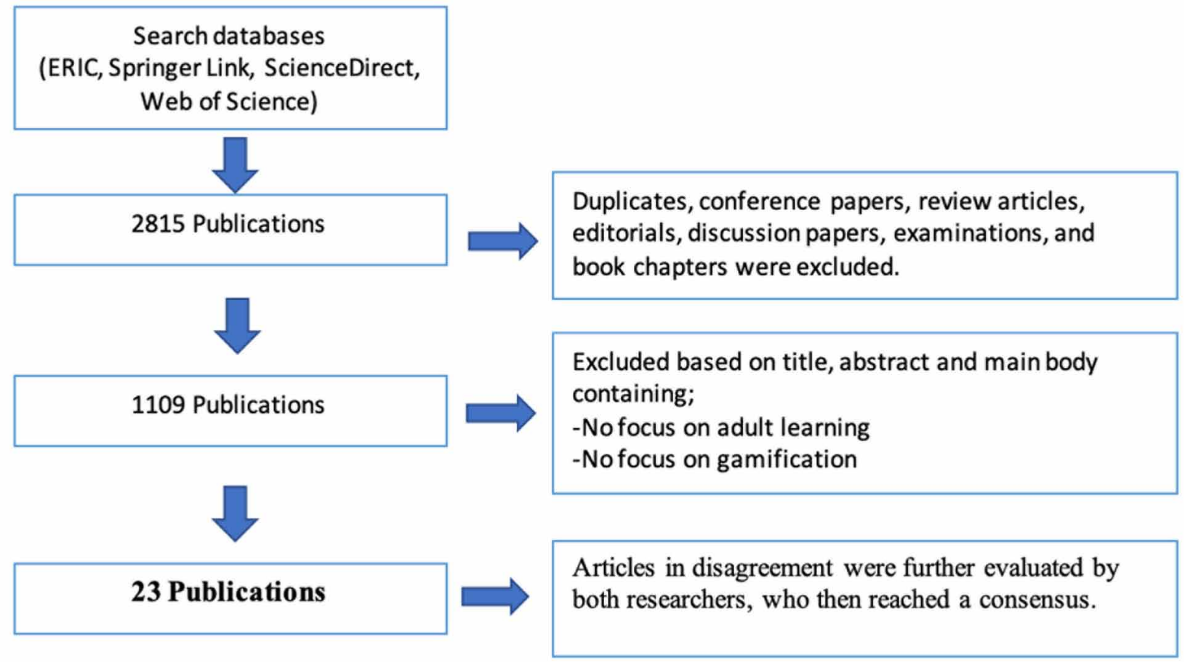
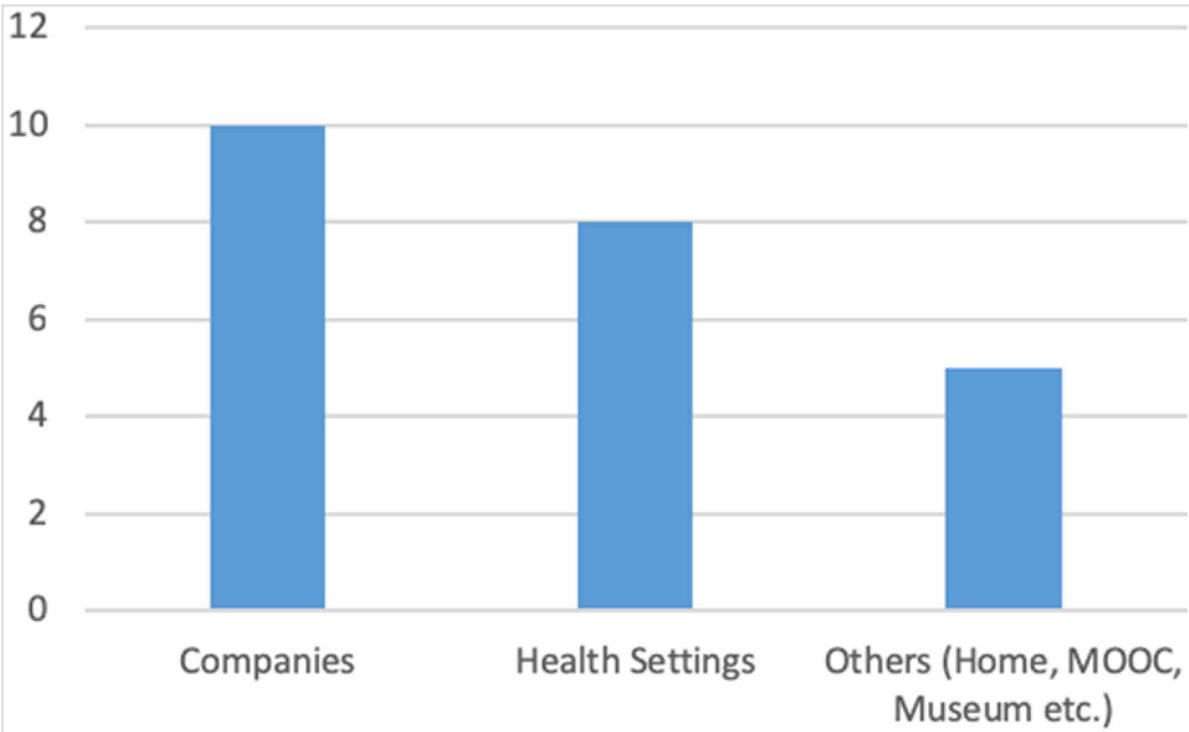


Figure 2. Gamification approach implementations



When the studies' research methods were taken into account, five used quantitative research methods, three used qualitative methods, and two studies used mixed methods (see Figure 4). Of the 10 corporate-training studies, the focus was found to mainly be on knowledge/performance improvement using the gamification approach. Satisfaction, participation, engagement, and enjoyment were other dependent variables studied in the reviewed gamification studies (see Figure 5).

The results of the reviewed studies were summarized as follows. In the study of Armstrong and Landers (2017), 273 participants were trained by a module created by an e-learning vendor for the purpose of improving knowledge regarding laptop security practices. While both gamified and control groups were involved in e-learning environments, the gamified group experienced a game fiction/narrative e-learning environment. In the gamified platform, a theme, setting, resolution, and plot were integrated for simple stories. The study's results showed that the participants were significantly more satisfied with the training enhanced with game fiction than those in the control group, but there was no difference in their declarative knowledge.

In the study of Brull et al. (2017), the primary aim was to explore the effectiveness of didactic, online modules, and gamification teaching methods, during the orientation of new employees. The gamification group experienced content which was combined with gamification elements that included avatars, quests, points, and challenges. The results showed that the gamification group outperformed both the didactic and the online module groups in their post-orientation scores.

In another experimental study, Alcivar and Abad (2016) investigated the effectiveness of gamification on Enterprise Resource Planning (ERP) Systems training in terms of user learning and user satisfaction. In the study, a custom gamification platform was developed on the WordPress platform using plugins.

Figure 3. Research purposes in workplace training

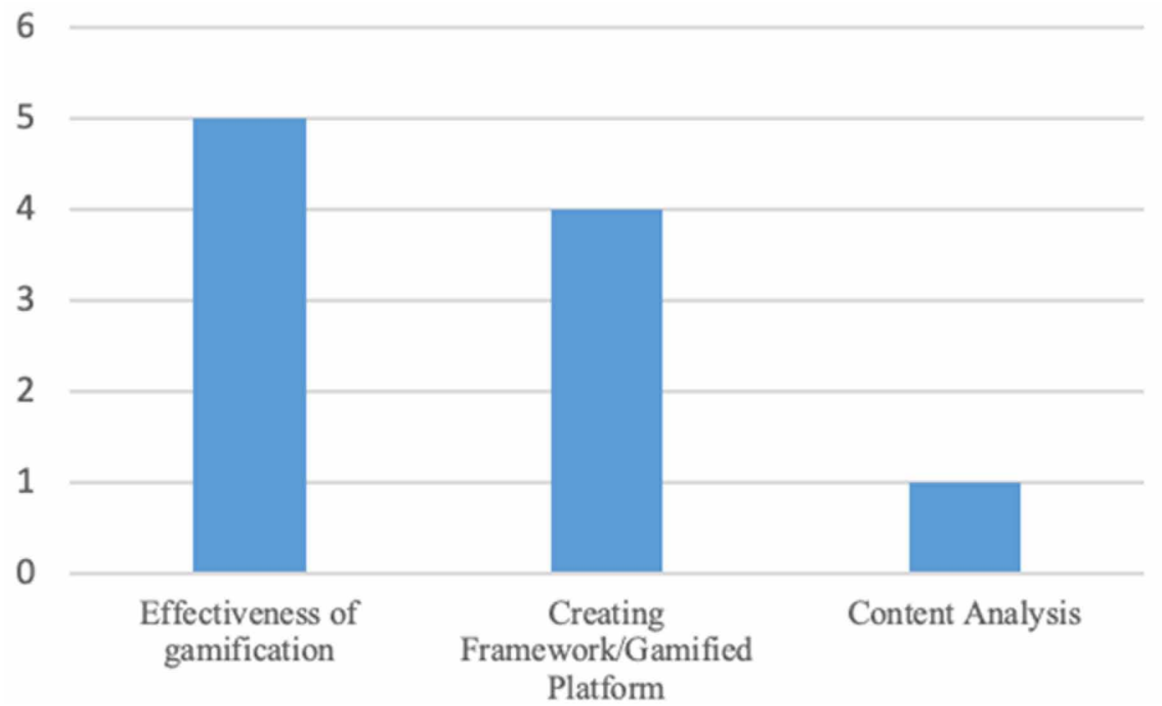


Figure 4. Research methods in workplace training

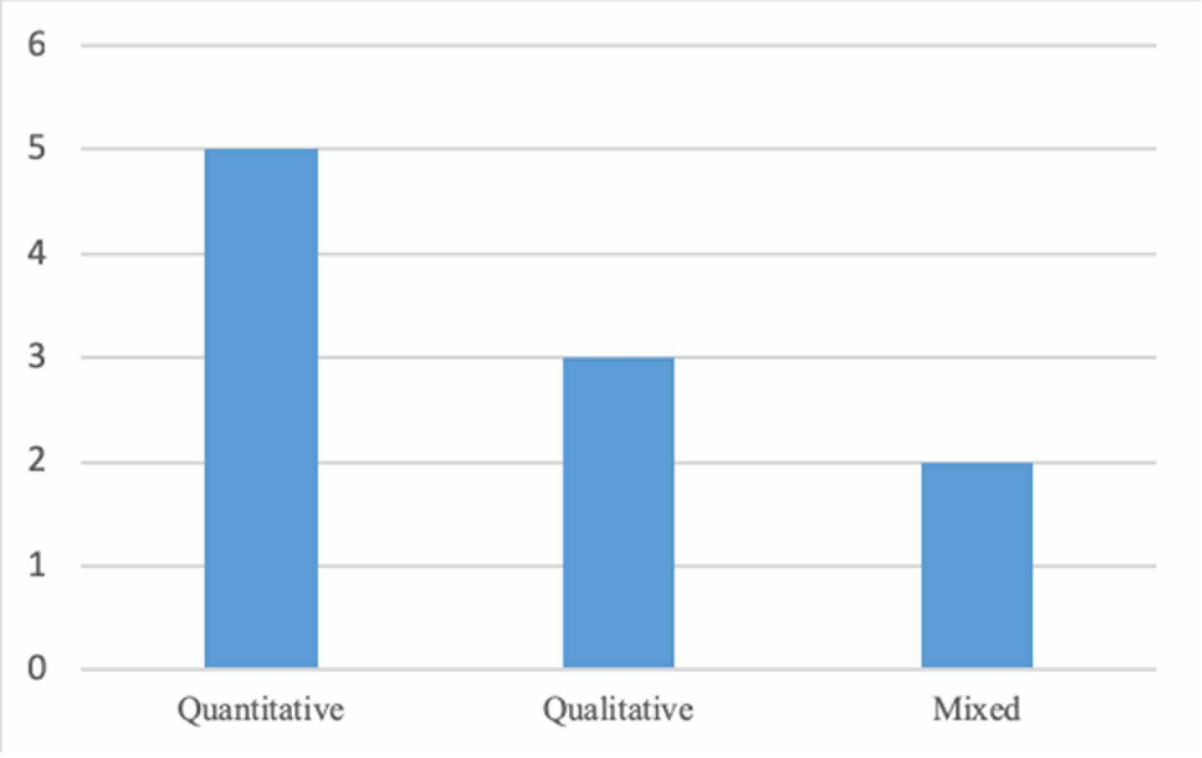
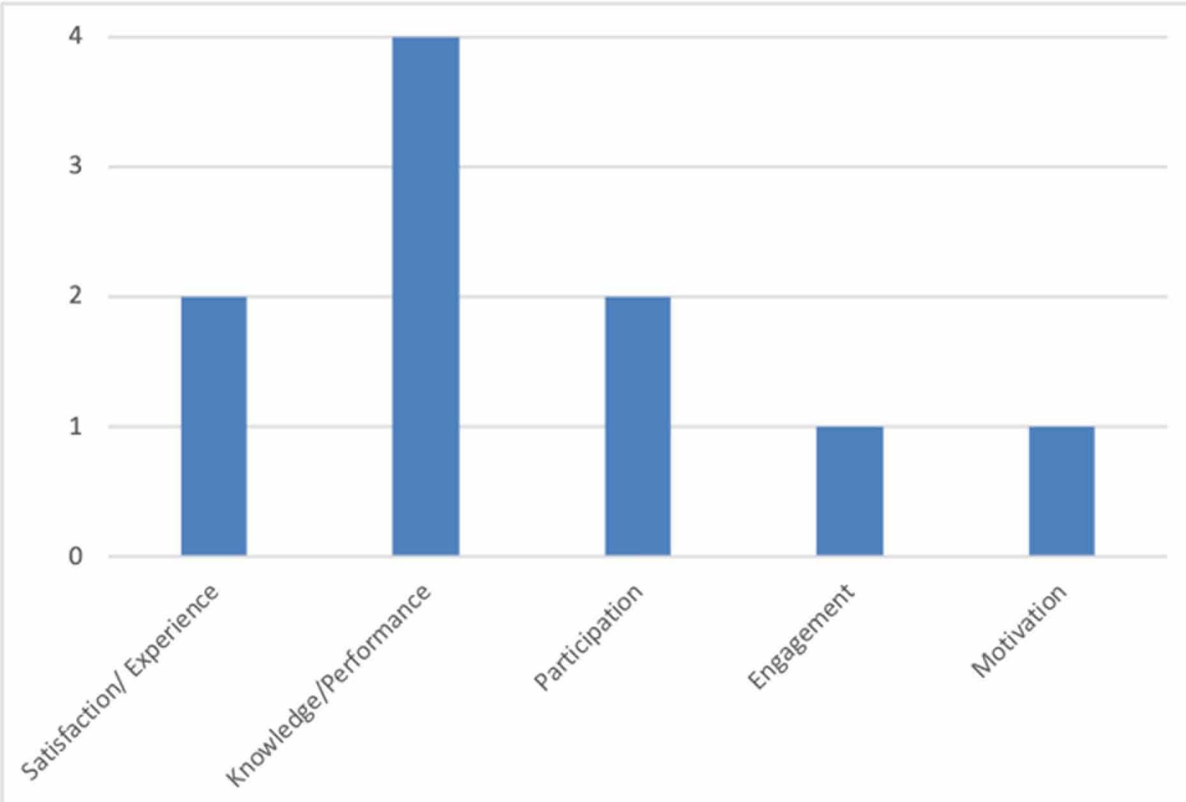


Figure 5. Dependent variables in workplace training



The results showed that participants who trained using the gamified system showed better performance than those who trained using a conventional, non-gamified platform. Interestingly, although gamification has been used to increase employees' learning or to support their training (Alcivar & Abad, 2016; Armstrong & Landers, 2017; Brull et al., 2017), in the study of Kwak et al. (2019), team-based gamification was supported with teams playing against each other. The findings showed that team-based gamification elements (e.g., leaderboard) and social groups (e.g., team cohesion) played an important role in the human information processing within the context of team-based gamified training.

In the study of Dadaczynski et al. (2017), the aim of the study was to explore the effectiveness of a tracking-based online gamification platform on enhancing physical activity in a worksite setting. A mobile gamification platform called *Healingo Fit* was used, and the study's results showed that participation in the mobile gamified platform led to an increase in the participants' walking activities by approximately 30% when compared to a baseline in the worksite setting.

In the studies of Clegg et al. (2018), Miller, Grooms, and King (2018), Foster and Warwick (2018), and Abedi et al. (2018), the conceptual design of gamification or gamification platforms were created. Clegg et al. (2018) proposed a gamification approach to enhance customer service in times of disruption. The authors proposed a gamification approach and drew guidelines to facilitate interaction between staff and passengers and to build understanding.

In the study of Miller et al. (2018), a gamification strategy was developed and evaluated with the aim of increasing employee motivation. The system had a gamification approach that included leader boards (digital and physical), bonus prizes and challenges came together under a theme of space exploration. Promising results were found in terms of customer satisfaction and performance of the IT Service Desk.

In another study, content analyses were performed in exploring the differences in existing gamification genres such as simulation games, role-playing games, action games, and strategy games for enhancing identification training in the Malaysian construction industry (Mohd et al., 2019).

Studies Using Gamification Approach in Health Settings

Health-based studies using a gamification approach for adult learning can be separated into two categories. While several studies focused on learning and performance improvement of trainees, residents, nurses, medical staff, and Emergency Department faculty members and physicians, other studies focused on health improvement or the learning of patients or older adults in order to improve their quality of life. Interestingly, although gamification has been used as an approach in K-12 education for almost 10 years, articles related to adult learning in the health setting only found to have been published in the selected databases since 2016.

When the research purposes of the health-related studies were examined, six of the eight studies explored the effectiveness of gamification, whilst two of the studies focused upon creating a gamified framework or platform (see Figure 6). Five of the studies used a mixed methods design in which both quantitative and qualitative research methods were embedded, and three studies employed quantitative research methods (see Figure 7).

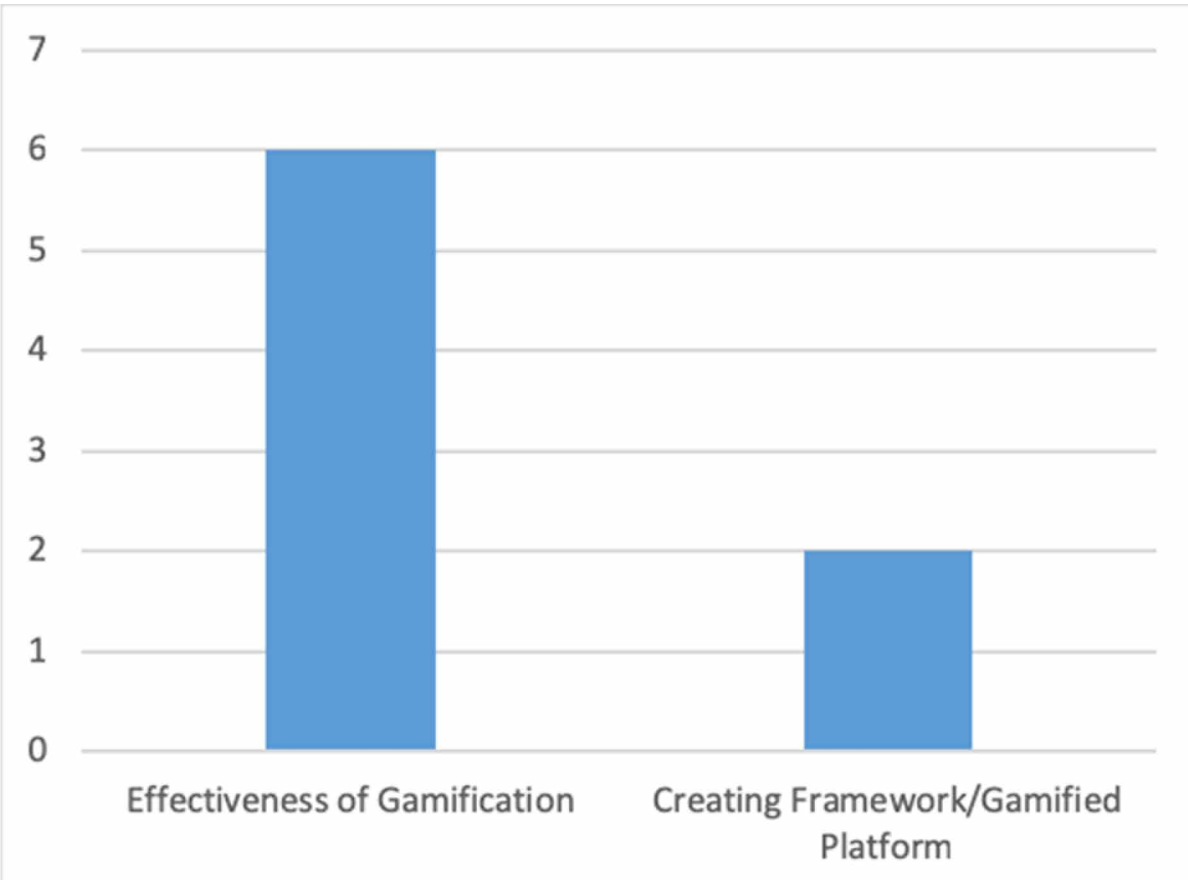
When studies focusing on the effectiveness of gamification were taken into account, Janssen et al. (2016) created an online learning platform which included gamification components that focused upon key safety and quality issues experienced by physicians in the area of medical oncology. While some participants did not express any effect of the gamification, some of the participants found that the competitiveness and excitement of competing with teams to be affective factors that contributed to their learning process.

Pesare, Roselli, Corriero, and Rossano (2016) developed a Smart Learning Environment to increase adult learner engagement and motivation by using gamification and game-based learning approaches for medical and paramedical staff. Two simulation games of clinical cases were developed and then evaluated. The study's results showed that the games enhanced the students' motivation and also their knowledge acquisition.

In another study, an immersive learning experience was developed by using gamification theory and a recently popular game called "escape room" in order to support resident trainees to identify priorities in patient safety (Zhang, Diemer, Lee, Jaffe, & Papanagnou, 2019). The study's results showed that the participants became engaged during the immersive learning experience.

Tomaselli, Papanagnou, Karademos, Teixeira, and Zhang (2018) conducted a study to investigate whether gamification can be a successful pedagogical approach to enhance learning cost consciousness for emergency medicine residents. The researchers created an interactive session that was based on a popular game show called "the Price is Right." It was reported that the responses given by the participants were generally positive and this study found out that gamification can be an effective way to enhance cost-conscious care knowledge of EM residents.

Figure 6. Research purposes in health studies

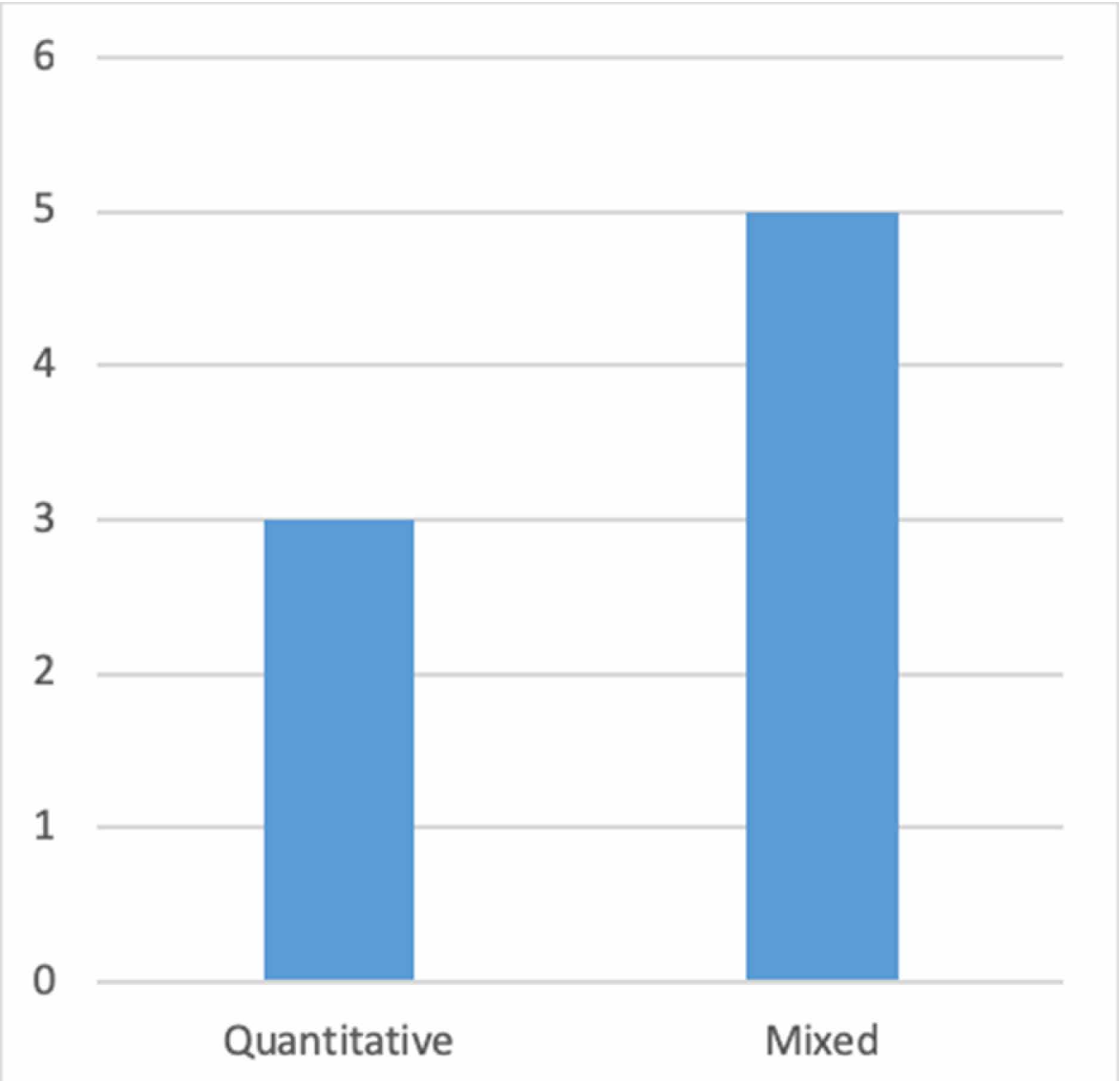


In the studies reviewed under the healthcare category, dependent variables were mostly the satisfaction and experience of learners. Moreover, knowledge/performance, engagement, motivation, and the health improvement of learners were also investigated as dependent variables (see Figure 8). The studies' results generally showed promising results in favor of the use of the gamification approach.

When gamification framework or gamified platform studies were taken into account, researchers created a fitness smartphone application (app) integrated with tracker wearable technology with a user-centered approach in order to promote fitness training for mature adults within the home environment (Steinert, Buchem, Merceron, Kreutel, & Haesner, 2018). The app resulted in health improvements in the participants' duration of daily physical activities and balancing abilities. While evidence-based training was found to be very motivating, badges were not perceived as a good approach in the motivation of older adults to make them engage in training and physical activities.

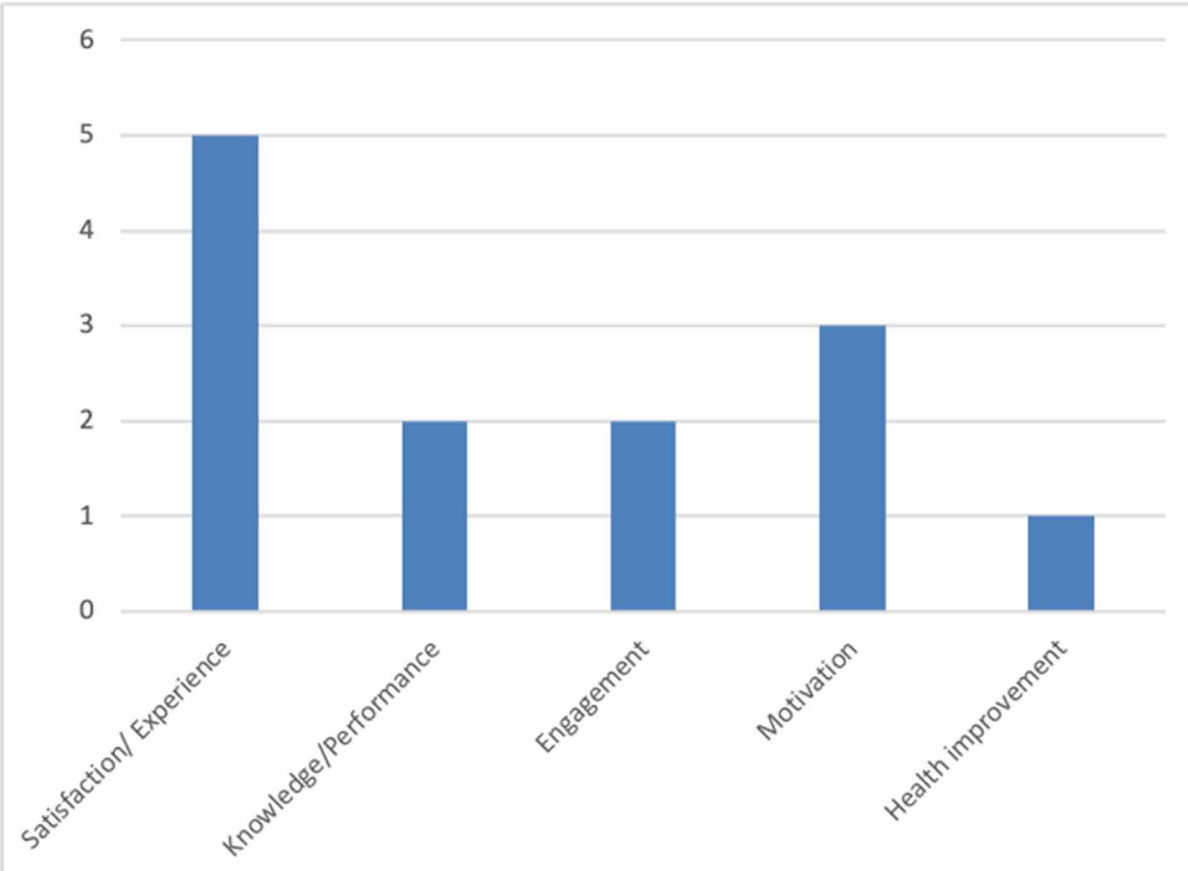
In the study of Klaassen et al. (2018), the researchers designed and evaluated a platform that supported young patients in the self-management of diabetes by using educational game playing and feedback for motivation purposes. A platform was designed that took into account the principles from healthcare, persuasive system design, and serious game design. A total of 14 patients participated in the study. The Pergamon, a gamifying platform, was used which integrated an educational gaming approach with

Figure 7. Research methods in health studies



coaching. In this platform, the activities related to self-care were gamified and the participants rewarded according to their performances in the game. The virtual coach followed users' physical activity levels, their food intake, as well as other activities recommended by their healthcare professional. The system also issued reminders and motivational messages when a user forgot to follow the recommendations put to them. The participants found the games too complex due to design-based issues. The target audience of the games seemed to be younger audience, and it was therefore recommended that they should be redesigned for a more mature audience. In this respect, it is imperative to create gamified learning environments in accordance with the age and other characteristics of the intended participants.

Figure 8. Dependent variable in health studies



Other Studies Using Gamification Approach

The gamification approach for adult learners has been used in various domains and learning environments. In the five studies reviewed, the participants were private householders, massively open online learners, citizens, self-directed adult learners, or visitors to museums or aquariums. In the study of Wemyss et al. (2018), the aim was to investigate the effectiveness of integration of individual gameplay elements and social interaction on electricity savings at the household level. In their study, a smartphone app which was developed based on a gamified approach was used and then evaluated. Both gamified structures (collaborative and competitive approach) reduced the electricity consumption. The intervention was therefore seen to succeed in changing the electricity consumption behaviors of the participants.

In another study, Chang and Wei (2016) explored and identified engaging gamification mechanics for massive open online course (MOOC) learners. Interview results showed that the five most engaging game mechanics were; virtual goods, leaderboards, problem-solving games, trophies, redeemable points, and badges.

In a study by Won and Kim (2018), the purpose was to explore how to implement self-directed English learning using gamification approach on Social Networks Sites (SNS). A Facebook-based gamification app was used and users' Facebook comments, online surveys, reading and listening questions, and interview protocols were used in the collection of the study's data. In total, 52 adults participated in the study. Researchers found out that the use of SNS within an English class can be supported by implementing a gamification approach.

Lastly, Tan (2018) investigated the willingness of aquarium visitors to play a game which is for enhancing marine animals knowledge to increase visitors` attitudes toward these animals and to motivate them to visit the aquarium. A total of 225 survey responses were collected from individuals who visited the aquarium at least once within the three years preceding the study. The results showed that the gamification approach was able to satisfy the visitors' motivation to learn and get pleasure from their visit.

In summary, the reviewed studies showed that gamification could be used in different settings with different sets of adult learners including householders, mature adults, and visitors to museums or aquariums. When gamification techniques were properly employed and especially by taking into account the learners' characteristics, abilities, and desires, promising results were reported in terms of adult learner participants' knowledge gain, motivation, engagement, and satisfaction. Moreover, the studies showed that the gamification approach was maintained through the use of avatars, points, quests, game-fiction, narrative games, as well as competitions and challenges. However, a more specific gamification approach should be applied that takes into account the adult learners' abilities, desires, and characteristics. Instructional activities need to be well-planned in order to successfully embed game elements into instructional objectives. Gamification strategy and selected gamification elements should be ensured to be appropriate for both the learning objectives and the context. Therefore, before designing gamification activities within an adult learning context, instructional designers need to fully analyze the target adult learners' characteristics, and also the appropriateness of the learning environment to the target learners, and then make decisions accordingly based on their findings.

DISCUSSION AND CONCLUSION

In recent years, gamification has gained popularity as a learning strategy in promoting the engagement and motivation of learners. Gamification has become popular as an effective method in K-12 education and higher education (Çakıroğlu et al., 2017; Da Rocha Seixas et al., 2016). However, game-based learning also has the potential to be an effective learning strategy for adult learners, too. Although gamification has been used in learning settings for almost 10 years, gamification has only begun to be popular for adult learners in recent years.

Adults are self-directed learners and motivated mostly by internal factors. However, in the studies reviewed in the current research, motivation and participation problems affecting adult learners mostly occurred and were investigated within health organizations and the workplace setting (Kwak et al., 2019; Tomaselli et al., 2018). Despite adult learning theories underlining the importance of adults' self-directed and autonomous characteristics, in some cases, adults may be required compulsorily to attend learning programs in connection with their profession, or their motivation may diminish after a certain length of time. The reviewed studies showed that gamification can be used in order to promote the motivation and engagement of employees, and other adult learners in such situations. However, these findings need to be considered with due caution; in most of the reviewed studies, the intervention duration was only short-term, meaning that the effect of the gamification may differ for longer interventions. Furthermore, gamification was considered as a "new method" by the participants of the reviewed studies. As a new method, gamification might lead to increased motivation and engagement due to a certain level of novelty effect (Hanus & Fox, 2015). In the context of adult learning, long-term interventions are needed in order to investigate whether the revealed effects are due simply to the novelty effect.

In the reviewed studies, the effectiveness of gamification on engagement, motivation, knowledge gain and satisfaction of learners has been explored and promising results were found (Alcivar & Abad, 2016; Armstrong & Landers, 2017; Brull et al., 2017). Similar results were also reported from higher education and K-12 education contexts (Denny, 2013; Domínguez et al., 2013; Su & Cheng, 2015; Yildirim, 2017). In the corporate setting, gamification has been chosen to promote employers' motivation and engagement levels in training activities (Armstrong & Landers, 2017; Brull et al., 2017). In health settings, gamification has been integrated into learning for two purposes. While several studies focused on learning and performance improvement of trainees, residents, nurses, medical staff, Emergency Department faculty members, and physicians, some studies focused on health improvement or the learning of patients or mature adult learners to improve their quality of life.

Virtual goods, points, leaderboards, problem-solving games and badges were all used as game mechanics within the reviewed studies and were also found to be the most commonly utilized mechanics throughout the literature (Hamari et al., 2014). However, in the study of Klaassen et al. (2018), the participants revealed that the games were "overly complex" due to certain design issues and should be made more straightforward to play. The game was much more appropriate for younger audiences. Learner characteristics were a significant factor for the effectiveness of gamification (Buckley & Doyle, 2017). Therefore, before designing gamification activities in the adult learning context, instructional designers need to analyze the characteristics of the adults and their environment and make decisions accordingly.

Gamification is a broad term used to define various game elements and mechanics. One important point was that most of the reviewed studies considered gamification as a single method. Previous research investigated students' perceptions of various elements of gamification based on qualitative data (Aldemir, Celik, & Kaplan, 2018). It was revealed that students had different perceptions of various game elements. Considering the fact that adults have different characteristics raised an important question of which game elements can be used for adults and which of them are effective. In adult learning studies, there has been no discussion documented regarding the appropriateness and effectiveness of game elements or game mechanics. Therefore, researchers need to provide details about the implemented gamification components and their effect on the learning process.

Despite the extensive research showing results in favor of gamification, it is also important to remain cautious about its limitations. Some of the researchers argued that gamification might not be an effective method for all learners as not all may like the commonly used gaming elements such as badges and leaderboards (Hakulinen & Auvinen, 2014; Klaassen et al., 2018). Steinert et al. (2018) created a fitness smartphone app in order to promote fitness in mature adults. While evidence-based training was rated by older adults as "very motivating," the awarding of badges did not seem to be a welcomed approach. Although most of the reviewed studies focused on the effectiveness of gamification, creating gamification frameworks especially for adult learners is a significant untapped research topic that should be explored in the future.

FUTURE RESEARCH DIRECTIONS

Although gamification has gained in popularity as a learning strategy in recent years, gamification for adult learners is a relatively new research area that requires focus to be applied incrementally. Especially, both instructional designers and practitioners could use gaming elements in learning settings in order to promote the motivation and engagement of adult learners. In this respect, creating a unified gamification framework for adult learners is one of the required research areas worthy of being explored. Additionally, the current study's findings have shown that various platforms and technological tools were used to utilize gamification for adult learners. Limited discussions were presented regarding the platform to be used, but further research could be conducted in order to compare the affordances and limitations of specific platforms. For instance, researchers might compare gamification based on mobile applications with those of traditional online learning platforms to reveal the benefits and limitations of these platforms. Finally, guidelines for designing effective gamification activities for adult learners would help researchers and instructional designers in their future implementations.

The results of the current study have shown that gamification as a learning strategy has been mainly used in health organizations and the workplace setting. Implications in different settings and using its benefits to promote learners with different characteristics could be another future research direction. Further research is also needed in order to investigate the effectiveness of this method for various adult learning platforms such as MOOCs and m-learning applications.

Another important future research area could be to investigate gamification elements for adult learners. While some of the elements such as points and leaderboard encourage competition, elements such as stories and narratives provide increased immersion. It can be argued that all gamification elements and mechanics might not have the same effect on adults. Thus, future research should investigate the effectiveness of these components, as well as their interrelated nature. Such findings would provide an invaluable guideline for instructional designers in designing a more effective learning experience for adults.

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APPENDIX

Application Activities

Discussion Question 1

You are an instructional designer at a bank. You have been asked to prepare a learning platform for the human resources department in order to teach a specific subject with gamifying elements. What steps would you take to plan for the gamifying elements? Design a flowchart showing each of your steps.

Discussion Question 2

Think about game elements and mechanics that can be used in learning environments in order to motivate and engage adult learners. Discuss which game elements and mechanics you would like to use and explain the rationale for your decision.

Discussion Question 3

Discuss how the learning environment with gamifying elements might differ for adult learners and young learners.

Discussion Question 4

Gamification as a learning strategy has been used in corporate training, health organizations, museums etc. Discuss other learning settings that are different from formal education environments in which the gamification approach can be utilized.

Discussion Question 5

Adults are self-directed and motivated by internal factors more than external factors. Gamification has several elements (badges, leaderboards, points etc.) which are external factors. In this respect, discuss how gamification shows promising results for adult learners and which game mechanics and elements need to be taken into account for adult learners motivated by internal factors.

Chapter 23
The Impact of User Experience With Technology on Course Expectations:
How Ubiquitous Computing Has Trained Students to Be Consumers of Media in the Classroom

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ABSTRACT

Technology seems to be here to stay and academics are encouraged to incorporate it into their classrooms. Yet, little has been written about the human side and how the widespread use of technology by students changes the expectations of their effort, the instructor's approach, satisfaction with the learning experience, and the students' ability to apply what they have learned to future coursework or their life. This chapter reports research that informs this topic, synthesizes the current literature as it pertains to technology and pedagogy, and correlates this information with what is known about the development of metacognition during learning in adults. The chapter ends with some helpful approaches.

INTRODUCTION

The challenges presented to instructors in the classroom has changed a great deal over the recent past, especially with the proliferation of mobile phones which has impacted the generation that grew up with them. This concern has mixed support. Many researchers believe that this generation, or as they are called, digital natives, learn differently, engage differently, and process differently. However, the empirical evidence suggests that there is no difference between this digital native generation and previous generations, only an additional distraction from the mobile phones. In this chapter, the literature on both sides

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of the digital nativism argument will be discussed, followed by a discussion of the underlying issues and how to address these in the classroom. Currently, there are strong feelings amongst researchers on both sides of the argument. Rather than support one side over the other, instructors should address the deficits through backward course design; how to address these deficits will also be discussed.

BACKGROUND

Digital Natives

Classroom instruction has changed dramatically over the past two decades. Many of the readers remember what it was like before mobile phones. Many readers in the future may not have experienced a traditional lecture before mobile phones. In order to understand the context of the digital nativism argument, it is necessary to keep the previous way of teaching in mind.

In 2002, Dr. Jones taught a psychology class at the University of Arizona. Dr. Jones was a veteran research psychologist who knew intimately how different theories came into existence and what the controversies were at the time of their inception. The lectures were like watching a scientific soap opera complete with plot lines, experiments gone awry, experiments succeeding, and careers launched into scientific super stardom. Occasionally, there would be an example shown on the overhead projector. The recitation of his lecture notes was the in-class activity. The students were not given a copy of the notes; you were to make your own copy when listening to the lecture.

Apparently, only a few students enjoyed the class. As the school newspaper rustled while students read it, Dr. Jones, continued lecturing without pause. The effort to ignore the school newspaper and attend to Dr. Jones rewarded students with a rich understanding of the topic. In the current digital age, students seem different, and instructors feel pressure to change their teaching. Current students, digital natives, have grown up with technology and are the first generation not to know what life was like before technology. There has been much written about digital natives.

According to Mustapha and Kashefian-Naeeini (2017), the cohort called Gen Z or also called Digital Natives, DN, were born between 1995 to 2012. Other researchers such as Holmes (2011) state that anyone born after 1980 is a DN. Flanigan and Kiewra (2018) state that 1984 is the cutoff point. Regardless of the exact date, the important part is that DNs are now adults who do not remember what it was like before technology was commonplace, i.e., before mobile phones. People who are part of this generation were exposed to mobile phones and other technology as a part of everyday life. Their parents, friends, and schools all encouraged the frequent use and dependency on digital devices. They were taught to check their email on a regular basis, keep a digital calendar, participate in social media, and read the news on-line. Many elementary schools included special computer courses and technology equipped classrooms in order to ensure that their students would not be left behind during this digital revolution. The digital revolution wasn't going to repeat the mistakes of the past industrial revolution with people trying to catch up. Schools were tasked with educating students with the best technology that they could afford to provide.

Flanigan and Kiewra (2018) and Smith (2012) report this strong embrace of technology has changed education as a whole. Frand (2000) conveys the then current thinking: "Until the nature of the educational relationships change in the classroom and at the institutional level, we will not realize the full value of the computer, communication, and information technology investments that we are making today" (Frand, 2000, p. 24). Indeed, this is reflected in the number and types of research published in pedagogical journals. Since 2007, Psych Info reports that over 3,000 scholarly journal articles, over 2,000 dissertations and theses, and over 550 books have been written on technology and teaching. Google Scholar reports over 1.6 million results. That is quite a literature search. While it is tempting to criticize this dependence on technology, the bigger question is whether technology has fundamentally changed us, and if so, what can we learn from this change as we move forward?

Many authors embrace the idea that people born in this generation differ from previous generations. Prensky (2001), Tapscott (1998), Howe and Strauss (2000), and Smith (2012) claim that the DNs are naturally adept at new technology. These authors also claim that Digital Immigrants or DI are less adept at understanding new technology. While this dichotomy is attractive, the point of this chapter is to outline the issues presented and recommend strategies that benefit all students. Understanding the argument that Prensky (2001), Tapscott (1998), Howe and Strauss (2000), and Smith (2012) propose is critical to understanding how technology has impacted this generation of students and how to address these impacts through teaching strategies.

The Digital Native Argument: This Generation Is Fundamentally Different

Prensky (2001) stated, "today's students think and process information fundamentally differently from their predecessors. These differences go far further and deeper than

most educators suspect or realize" (p. 1). With nearly five hours a day on mobile devices (Lepp, Barkley & Karpinski, 2014), hundreds of text messages a week (Wentworth & Middleton, 2014), and hundreds of minutes on social media per week (Junco & Cotten, 2012), the belief that DN would be more adept at technology has strong face validity. Smith (2012, p. 6) states several traits attributed to the premise that digital natives are different:

1. **Possessing new ways of knowing and being.** A persisting claim within digital native discourse is that there is an urgent need for educational institutions (administrators, educators) and parents to recognize and adapt to digital native learners who possess new learning styles or different ways of knowing and being. This viewpoint sees current problems with education as a part of old ways of schooling (i.e., old ways of being and knowing), often associated with digital immigrants.
2. **Driving a digital revolution transforming society.** Another dominant claim is that there is a pressing need to acknowledge and accept a digital revolution transforming society. Many argue that this revolution is especially evident within and important for higher education.
3. **Innately or inherently tech-savvy**. Within digital native discourse, students are seen as innately or inherently tech-savvy, desiring and using digital technology in all arenas, as opposed to older educators who lack the tech-savvy skill.
4. **Multi-taskers, team-oriented, and collaborative.** Net generation students are often said to be multi-taskers, team-oriented, and collaborative.
5. **Native speakers of the language of technologies.** Purported as native speakers of the language of technologies, digital natives are often seen as having unique viewpoints and abilities, especially regarding their unique aptitude for the language of technology.
6. **Embracing gaming, interaction, and simulation.** According to digital native claims, gaming, interaction, and simulation (i.e., multi-linear, visual, virtual environments) are both embraced by and well-suited to the Net generation.

7. **Demanding immediate gratification.** The Net generation is often portrayed as demanding immediate gratification, with short attention spans and no tolerance for delays.
8. **Reflecting and responding to the knowledge economy.** Proponents of digital native notions often present a strong relationship between needs of the Net generation and the knowledge economy (i.e., students as consumers, demanding customer satisfaction), specifically within the context of the Information Age.

The Digital Native Argument: This Generation Is Not Fundamentally Different

However, other authors doubt that these assigned traits exist in any greater frequency than they would without technology. In other words, while these traits may be emerging in this generation, they would emerge with or without digitization. Flanigan and Kiewra (2018), Switzer and Ralph (2013), and Smith (2012) question the construct of DN. They claim that DNs are not different and are not technologically better off than previous generations.

The reason for the contrary premise is that DNs do not seem to know how to use the technology any better than anyone else. As Kirschner and De Bruyckere (2017) state: "...it appears they [digital natives] do not recognize the enhanced functionality of the applications they own and use and that significant further training in how technology can be used for learning and problem-solving is needed… the range of software used by them was very limited and that, for example, social media was used as a passive source of information reception and not as a tool for actively creating content, interacting with others, and sharing resources (p.7)." In 2011, the Higher Education Academy in York, UK, stated, "there is no evidence that there is a single new generation of young students entering higher education and the terms Net Generation and Digital Native do not capture the processes of change that are taking place (Jones, Shao, & Keynes, 2011). The assumption that DN possess talents related to tech as a benefit purely of their birth year stems from assumptions about the types of cognitive and behavioral traits ubiquitous computing would confer upon its users.

It was assumed that having an unlimited potential for networking worldwide would encourage users to create a vast knowledge repository and professional network. Flanigan and Kiewra (2018) claim that the introduction of technology has impacted the DN but with a fierce inattention span, diminished concentration, self-control issues connected to novelty and mental health, fear of missing out, inappropriate trust in technology and loss of trust in others, loneliness, anxiety, and increased passive consumption. One of the most striking impacts of technology is the new phenomenon of cyber-slacking.

A typical example of cyber-slacking is the story of Eric,

As Dr. Sousa organizes her materials before starting class, she notices Eric and many other students using smart phones. To avoid the phones being a distraction, Dr. Sousa asks students to put their phones away and reminds them of her "no cell phone" policy. Like most of his classmates, Eric slips his phone into his pocket. Several minutes into class, Eric feels the familiar vibration of his phone and pulls it from his pocket and notices a text message from a friend. After Eric exchanges about a dozen text messages, Dr. Sousa finally notices Eric using his phone. She asks him to put the phone away and again reminds him of her cell phone policy. Ten minutes later, Eric pulls his phone back out and begins using it again. Following Dr. Sousa's lecture, Eric's cell phone use leaves him with incomplete notes and with the feeling that he missed much of the lesson. It leaves Dr. Sousa wondering what else she can do to keep students from using mobile devices inappropriately during class. For Eric, however, the story is just beginning.

Because texting caused Eric to miss much of his biology lecture, he goes to the library to study for the upcoming biology quiz. Once in the library, Eric turns on his laptop and opens the Power Point slides Dr. Sousa uploaded to their course website. Eric also opens a separate navigation window and logs into Facebook. Throughout the 1-hr long study session, Eric toggles back and forth between the course materials and Facebook, spending nearly equal time on each, thereby reducing actual study time and learning. In the end, Eric's cyber-slacking in and out of the classroom reduces his biology learning and leads to a D grade on the biology quiz. (Flanigan & Kiewra, 2018, pp. 586)

THE IMPACT OF MOBILE PHONE USE

Cyber-Slacking

Cyber-slacking is the use of mobile technology for off-task purposes while attending classroom lectures or doing schoolwork outside of class. Cyber-slacking happens both inside and outside of the classroom when a student interrupts his/her learning task. Cyber-slacking can be initiated by either the person or the technology. One of the initial entry points is when the phone issues an alert. The person attends to the phone's alert and is drawn into the latest Facebook post or text message announcing a sale at a favorite retailer. It also happens when the user wants to switch attention or is bored and turns to his/her phone.

The attractiveness of mobile phones and engagement in their use is not entirely the students' fault. Mobile phones and the applications associated with them are tested by technologists to increase engagement and to encourage use. Several techniques are used such as alerts through beeps and alarms, completion bars telling the user how much information they have contributed so far and encouraging more information sharing, and a sense of community through recommendations for new social connections. The phones are purposefully very engaging and attractive. It is difficult to suppress phone checking behavior (Flanigan & Babchuk, 2015). This behavior may be reaching the point of addiction for some students (Flanigan & Kiewra, 2018; Griffiths, 2000; Roberts, Pullig, & Manolis, 2015).

Phone checking/cyber-slacking is tremendously distracting to the phone user and to those around them. According to (Kornhauser, Paul, & Siedlecki, 2016; McCoy, 2016) texting during class is a significant problem with up to ninety percent of students reported themselves doing this at least once. Over fifty percent of students stated that texting should be welcomed in the classroom (Emanuel, 2013).

Studies of slacking in the classroom have empirically supported the connection between cyber-slacking and lower test scores and lower course grades (Bjornsen & Archer, 2015; Ravizza, Hambrick, & Fenn, 2014; Clayson & Haley, 2013; Wentworth & Middleton, 2014; Junco & Cotten, 2012; Lepp, Barkley, & Karpinski, 2014). Outside of the classroom, cyber-slacking may have a severe impact on studying. According to Rosen, Carrier, and Cheever (2013) college students maintained focus on their task for about 65% of a 15-min study period.

The combination of boredom, habituation to the mobile phone, instant gratification, and the desire for novelty encourages students to cyber-slack and to go off task. The social pressure of contributing to their social media accounts, tracking phone calls/texts/email, and simply giving their brains a rest for a few minutes reinforces cyber-slacking. In other words, the normalcy of boredom and the not so subtle art of waiting without distracting oneself is increasingly lost.

Once there is space to fill as when waiting for an event (e.g., the professor to begin lecturing), phones create instant arousal. Mobile phones shield the person from boredom, unwanted interaction with others, and convey status through the phone itself. The person waiting is able to boost self-esteem as she/he waits by displaying her/his expensive phone and being fully engaged in its interaction.

Self-Control

The reader may recall the marshmallow test from the 1960s (Mischel, Ebbesen, & Zeiss, 1972). In this delay of gratification test, the juvenile participant was given a marshmallow. They were told that if they delayed eating the marshmallow until the experimenter returned, they would be given two marshmallows. Usually the participant was under the age of 10 years old. Children found this task very difficult and had trouble delaying the marshmallow consumption. With recent discussions on digital nativism, researchers wondered if children in this generation were better or worse at this task.

In a replication of this study, Carlson and colleagues (2018) found that this generation's parents estimated that their children's wait time would be shorter than the children in the 1960's. Carlson and colleagues found that this current generation's children waited two minutes longer than the 1960's children and one minute longer than another replication done in the 1980s. This was contrary to the parents' predictions and contrary to the digital nativism claims.

In the classroom students seem to be unable to extricate themselves from the powerful grip of social media. The Carlson study (2018) inadvertently demonstrated the interaction between boredom, social situation, group norms and the effect that conditioning through constant mobile phone use has had on DN. Carlson's study also suggests that there are self-initiated forms of regulation or intra-psychic control mechanisms we employ to control impulses. Duckworth, Gendler, and Gross (2014) predicted that these intra-psychic strategies vary greatly amongst people and amongst situations and environments.

One of the moderating factors suggested by Duckworth and colleagues (2014) is cognitive change and working memory. If working memory is compromised or taxed as when the lesson is too challenging, self-initiated regulation is less likely to be effective. As learned strategies take effect (i.e., arranging the environment to reduce the temptation), self-initiated regulation becomes gradually more effective.

For example, in the story of Eric a few paragraphs back, if Eric had learned to leave his phone at home when going to class or the library, he would have been using a situational strategy to control his impulses. Presumably, this would lead to a better grade. Understanding the draw of mobile phones as entertainment rather than assuming that it is a powerful potential networking device helps instructors to view the attraction through uses and gratification theory.

Gratification

Self-control, instant gratification and procrastination are connected as they regulate emotion, behavior, and cognition in a complex dance. In a very entertaining Ted Talk, Urban (2016) describes procrastination as the interaction between the Rational Decision Maker who tries to get work done but is subverted by the Instant Gratification Monkey. The Instant Gratification Monkey prefers to only do things that are fun and arousing. Because of the attraction of fun things, the Monkey easily overwhelms the Rational Decision Maker and takes control. This is when procrastination happens. Deadlines actually get met because the Monkey is afraid of the Panic Monster. In Urban's description, the Panic Monster senses a deadline and stops the Instant Gratification Monkey from consuming the person's attention and subverting actual work getting done. Urban describes that when there is no hard deadline, as in some of life's most important decisions, the Panic Monster never appears.

As technology has taken over many of the social tasks in our lives (e.g., talking to one another face to face), many of the social constructs which created deadlines to prevent procrastination are fading away. Some of these social constructs such as meeting people in person had other benefits which are being revealed. Slowly getting to know a person and then asking them out on a date has been replaced with picture perfect profiles where hundreds of strangers judge your potential. Dating apps were created to fulfill a need, the need for very busy people to date other very busy people. When the applications were designed, the idea that they would create more loneliness rather than erode it did not seem like a possibility (Kraut, Patterson, Lundmark, Kiesler, Mukophadhyay & Scherlis, 1998). The Monkey's instant gratification when viewing thousands of potential mates and selecting the top few was overwhelmingly attractive.

Dating apps and other apps provide an outlet for procrastination. A well-known communication theory, Uses and Gratification theory, predicts the use of these apps through their goal direction. The theory of Uses and Gratification describes media use in terms of the needs it fulfills. Katz, Blumler and Gurevitch, (1974) state that an initiative is taken by the user to satisfy a need that they may or may not be aware of at the time of use. The needs could be diversion, personal relationships, personal identity and surveillance (McQuail, Blumler, & Brown, 1972).

Throuvala, Griffiths, Rennoldson and Kuss (2019) wanted to delve deeper into smart phone use in adolescents and explore the motivations beyond uses and gratifications theory and beyond self-determination theory. They interviewed 42 adolescents and found that there was a need to control relationships, the content presented about themselves on social media, the presentation of the content, and the impressions that others formed of this content. Throuvala and colleagues suggest that this need to control may explain a portion of problematic or excessive phone use.

Dating applications and social network applications have added another layer of complexity as the user may elicit the interaction with the app or the app may elicit the interaction with the user with alerts and requests. When the app elicits the interaction, a different transaction takes place depending on how responsive the user is to the app's request. In this way, the app is conditioning the user to respond to the phone in a way that previous media types such as newspapers and television never could.

Fear of Missing Out and Mental Health

Users identify with their phones. They report a connectedness from use according to Wilkinson and Saldana (2018). Phone users report different needs to connect (Xu, Takai, & Liu, 2018). The social network application elicits certain values and expectations, and this is a key factor for students as they fear missing out (FOMO) (Blackwell, Leaman, Tramposch, Osborne, & Liss, 2017). In other users, social media has an impact on their personality traits with an enhancement for extroverts, and those who score high on openness, and agreeableness, and a detrimental effect on emotional stability and the users' conscientiousness (Xue, ChangZheng, & MingYang, 2018). The assumption that DNs would increase their social capital by connecting with others who were less like them may be true through online gaming platforms (Depping, Johanson, & Mandryk, 2018) and discussion boards (Lee & Choi, 2017).

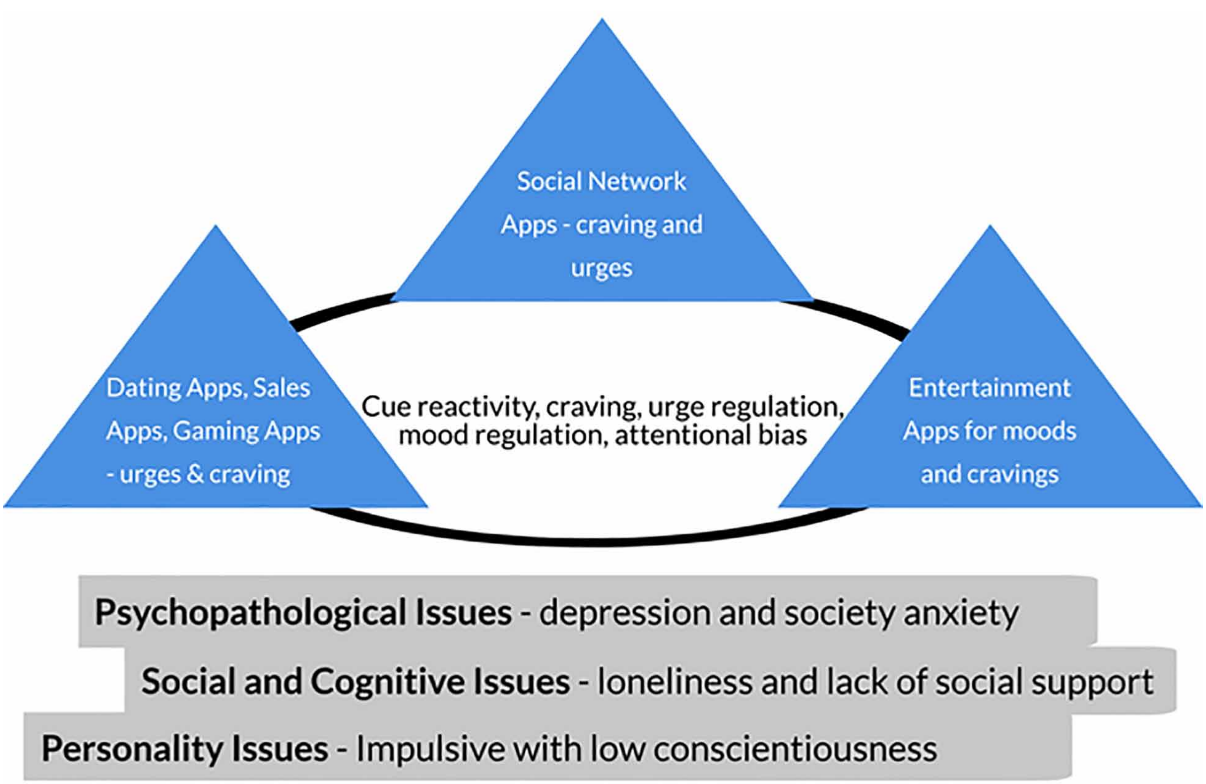
Alerts and the interaction with FOMO condition users to check their phones frequently. The conditioning has led to addiction in some users (Wegmann, Oberst, Stodt, & Brand, 2017; Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017) The conditioning in terms of need fulfillment may lead to an obsessive behavior called internet addiction. It has also led to some cognitive changes in task switching impacting attention and mental health. Wegmann and colleagues (2017) discuss the similarities between an internet use disorder and a substance use disorder. An initial predisposition exists in personality, social/cognitive changes, and psycho pathological issues that encourage people to interact with the apps in an unhealthy way (see Figure 1).

As the gratification increases through app use, the use of the app is reinforced to relieve the feelings of social anxiety, loneliness, and lack of social support. The existence of these conditions along with the propensities toward reactivity and the need for external regulation increase the likelihood that someone will become addicted. Discontinuation of the internet results in loss of control, withdrawal, preoccupation, neglect, as well as other detrimental behaviors (Griffiths, 2000).

Nomophobia, or the fear of not being able to access one's mobile phone (Mendoza, Pody, Lee, Kim, & McDonough, 2018), and FOMO, or the fear of missing out (Przybylski, Murayama, DeHaan, & Gladwell, 2013), combine with the IPACE model to present the potential of harm on some students' mental health. FOMO is the "pervasive apprehension that others might be having a rewarding experience from which one is absent" (Przybylski, Murayama, DeHaan, & Gladwell, 2013, p. 1842). FOMO is a useful predictor of mobile phone addiction according to Chotpitayasunondh and Douglas (2016).

FOMO as a state of feeling or as a personality trait is still being clarified. Wegmann and colleagues hypothesized that FOMO was more complex and believed that FOMO could both be a trait that existed in a student and a state that could be instilled given the right circumstance. Elhai and colleagues (2018) tested FOMO and its relationship with depression, anxiety, stress, proneness to boredom and rumination.

Figure 1. A schematic of the IPACE model by Brand, Young, Laier, Wölfling and Potenza (2016; Davis, 2001) according to uses and gratification theory Blutz, Klumer and Gruvietch, 1974.



They found that FOMO was related to all of these and predicted problematic mobile phone use accounting. In their study, they found that depression, anxiety, stress, proneness to boredom and rumination accounted for 33% of the variance in FOMO.

In further work, Alt (2017) found that FOMO predicted a lack of motivation for learning, Woods and Scott (2016) found an association between FOMO and sleep loss. Buglass and colleagues (2017) found an association between FOMO and decreased self-esteem and feelings of well-being. Volkmer and Lermer (2019) conclude: "Users should be taught that Internet-communication applications are not the only way to initiate or stay in contact with others and satisfy their social needs. Individuals should be offered alternative strategies and opportunities for connecting with other people without having the feeling of missing out on something" p. 41.

FOMO is not a singular problem, it encourages another recent phenomenon, task switching. Task switching is when you are monitoring two things in your environment. You have a primary task such as reading this article or listening in class, and a secondary task such as waiting for the plumber to call. Occasionally, you might look at your phone to see if there is a notification that the plumber called. Then, you go back to reading or maybe listening to a lecture. People will engage in task switching when both items have the same urgency, during periods of boredom, during FOMO, or to try to increase attention to the primary task when cognitive resources are few (i.e. sleep deprived).

Task Switching

Mobile phones give the illusion of successful multitasking. The user's actions feel automatic and not intrusive. In support of this view, researchers have found that concurrent messaging and reading has an effect on reading speed but not on comprehension (Chen & Yan, 2016). However, the type of reading comprehension task did make a difference. Fox, Rosen, and Crawford (2009) found that recognition and recall were not affected as high difficulty passages with free recall questions. Kuznekoff and Titsworth, (2013) asked students to take notes and then take a test after a lecture and either use their phones or not. Students in the no mobile phone group scored higher on the test and wrote down 62% more information.

Mustapha and Kashefian-Naeeini (2017) reviewed the literature and states that most people feel that they can simultaneously carry out more than one task. Unless the second task is based on an implicit procedure (e.g. walking), there is a task switching cost (Sweller, Ayres, & Kalyuga, 2011; Herman, Mirelman, Giladi, Schweiger, & Hausdorff, 2010; Gladstones, Regan, & Lee, 1989; Pashler, 1994). In particular, Pashler states: "people have surprisingly severe limitations on their ability to carry out simultaneously certain cognitive processes that seem fairly trivial from a computational standpoint" (Pashler, 1994, p. 241).

This happens because of a refractory period. When the first task switch has been responded to, there is a minuscule amount of time in which the system must switch attention and reallocate cognitive resources. Mendoza and colleagues (2018) found that task switching did not affect the understanding of a lecture until ten to fifteen minutes into the lecture. Then, participants in their study who were allowed to task switch by using their mobile phone during the lecture earned the lowest number of points in material covered in the last half of the twenty-minute lecture. Other studies in task switching, such as Fox and colleagues (2009), found that when they allowed students to text during the experiment of reading a passage, students took 1.66 times longer than if they didn't text during the passage reading. There is a negative effect of multitasking on learning in terms of shallow information processing (Carr, Iredell, Newton-Smith, & Clark, 2011).

Information is processed to reduce uncertainty in the environment or situation. In order to process the information deeply, quite a bit of additional information is needed such as the context in which the information is given (e. g. lecture, slides, video, conversation with another student, class discussion, or reading material). The veracity of the information is context dependent, so is the information preceding and antecedent to the actual piece of information. In many disciplines, terminology is context dependent. For example, in Psychology, we talk about a person's affect or emotional state. If a student is not paying full attention during the lecture (e. g. texting), these additional pieces of information are not encoded properly.

Information doesn't live in a vacuum; it lives amongst its kind. If a full complement of information isn't present already in the student, there will be no relationship between the previous information and the new information. This makes it hard or impossible to remember the information long term. In addition, some instructors prefer a linear lecture style, while others prefer a non-linear style with a lot of side stories and class activities. Nonlinear lectures are more difficult to process as the student must pick out the relevant information and encode it in relation to previously learned information.

Non-linear lectures increase the student's cognitive load. Students find it difficult to pick out details and relate them to one another. This creates shallow processing (Zumbach & Mohraz, 2008). Learning to focus on these relevant details and attend to what is important is vital for students to glean the right information and construct understanding.

Mayer and Moreno (2003) describe three types of processing that occurs during the sense-making process when the student is trying to understand: essential processing, incidental processing and representational holding. Essential processing is the initial sense-making endeavor where the learner selects the salient characteristics of each channel and organizes the information. Incidental processing is the integration of additional background that adds non-essential information. Representational holding allows the learner to let the information process in working memory until it goes into long term memory or is used immediately. When a learner integrates a mobile phone into the learning process, it takes up some of the representational holding capacity which interrupts the encoding into long term memory or between sensory memory of hearing the lecture and taking notes or between associating previous concepts heard in the lecture a few minutes ago with concepts being presented. As attention is subdivided, the learner loses focus. If the learner is prone to boredom, she or he is more likely to seek the temporary stimulation of the mobile phone as they believe that it will help them to stay awake or engaged.

According to ACT-R theory (Anderson, 1996), the independent cognitive modules that process information are interactive but limited by the cognitive architecture. Each module can process only a single task at a time. Therefore, the cross-modularity tasks may seem to work (i.e., you are listening to the instructor but typing a bit of automatic text to your friend- "I'll be there when class ends"). This seems to require very little processing capacity as you are not using your ears to hear two different things, you are using your eyes and your ears. However, in both cases, you are using your speech processing module to understand the words being said and to produce new words at the same time and you are using working memory to store what the professor said and what your friend asked and make sense of both simultaneously. As the second type of cognitive processing seems effortless, the multitasking is invisible to all but the cognitively impaired who must put substantial effort toward a such a task. This is the primary bottleneck in multitasking (Chen & Yan, 2016).

EMERGING CLASSROOM EXPECTATIONS

Don't Bore Me

Matt, a cultural historian, studied the memoirs of Americans from the 18th and 19th centuries and those today (Illing, 2019). Matt states that the concept of boredom is strictly 20th century. In fact, she states the word did not exist until the 1900s. Before the concept of boredom, ideas like loneliness or lonesomeness or solitude existed but people thought that this was the way that the world was supposed to be. Not everything could be exciting and entertaining, some periods of time were intended to be empty and unfulfilled. As Matt states: "And 21st-century Americans are developing all these expectations of having a kind of limitless, completely fulfilling, sociable life at all times, which make us really unequipped to deal with the moments that aren't like that" (Illing, 2019).

According to motivation literature, once boredom begins, the person will seek an arousal state (Myers & Dewall, 2016). The novelty of a new phones, some new apps, breaking news, new games, create arousal. The fear of missing out creates motivation to engage. Each time to app dispenses a new reward in a returned email, new level on the game, new information on the news or a better price on the coat you've been wanting, it sets into play a complex set of neurochemical releases that reinforce the action of checking the phone. It is in this way that students are classically conditioned to use their phones. In some individuals, conditioning happens very rapidly. Other individuals are able to resist or overcome it through delaying gratification. What determines whom is able to resist or overcome conditioning relies on personality, the environment, an expectation of novelty, and self-control.

Everyone, especially students, dislikes being bored. As Westgate and Wilson (2018) state, boredom is so aversive to many people that they would choose electric shock over being bored for an hour. Havermans and colleagues (2015) demonstrated this as they asked undergraduates to watch tennis for an hour. In the room, the participants had the opportunity to give themselves an electric shock during the tennis video. The tennis video was purposefully extremely boring as it was an 85 second clip repeated for an hour. Havermans found that 93% of the participants shocked themselves. Of these participants, there was an average of 22 shocks during watching the one-hour tennis video.

People react to being bored by changing their attention to something else (van Tilburg & Igou, 2017). When they feel that the activity lacks meaning, they lose attention and hope to re-establish it by engaging in novelty or risky behaviors (Westgate & Wilson, 2018). Some may argue that a strong mobile phone policy in the classroom would enable a situational strategy that would help students curb phone use.

However, some researchers argue that boredom is a beneficial state that helps humans achieve. As Elpidorou (2016) discusses boredom is a regulatory state that helps keep our current attentional state in line with our goals and projects. It inspires us to pursue something new if the item that we are currently attending to does not seem to be in line with our goals. Boredom has two types: trait boredom and state boredom. Trait boredom is associated with a more permanent personality tendency that is not situation dependent. Over all contexts a person with trait boredom is characterized by the inability to maintain attention, negative affect, hostility, aggression, and a tendency to make riskier decisions (Hunter & Eastman, 2018). State boredom is situation dependent. In state boredom, a person who normally does not feel negative affect does so in a particular context such as in Havermans' watching a tennis game on a repeating loop for an hour. State boredom is temporary and once the context changes, the person ceases to feel bored. Often state boredom is a mix of monotony and the feeling of being unable to leave as in a student feeling trapped in a boring classroom lecture.

A students' feelings of control and value in a situation along with being under or over challenged by the material presented contribute to boredom (Hunter & Eastman, 2018). Boredom can also happen with over arousal (Berlyne, 1960; Bernstein, 1975; Merrifield & Danckert, 2014; Fisher, 1993). Westgate and Wilson (2018) conclude that ultimately, boredom means unsuccessful attention management. When the current attentional demands exceed or significantly fall short of the activities and goals, and when people feel a loss of agency, they experience boredom. Hunter and Eastwood (2018) further clarify that when someone is unable to engage their attention and are aware of the disengagement, they will attribute the disengagement to the activity or task rather than their own ability. This is where teaching can become theater in order to avoid being blamed for students' boredom.

The seemingly constant need for stimulation urges students to check their phones during class time in which they perceive themselves to be under stimulated or bored. This interruption in attention may relieve the bored feelings but it increases the sense of frustration when they re-attend to the lecture and must re-acclimate to what the instructor is discussing. Instructors have taken the approach of trying not to bore their students by changing their approach purely in an effort NOT to bore the students. Actually, this is an impossible task as boredom is not a predictable and homogeneous state imposed upon a classroom. It varies by individual and their state, so rather than trying to avoid boring the students, the aim should be in teaching them self-discipline, as the discipline to endure under-stimulating tasks bring about subtle but important cognitive and behavioral changes of their own.

In an essay about the value of boredom, Kneebone (2018) recounts his days as a medical student in the 1970s and doing the "bloods." In this activity, he had to collect blood from the patients on the ward. At the time, he disliked the repeated task and the lack of stimulation. However, now as a physician, he sees the value as he is an expert at dealing with fearful patients, convincing someone to do something they would rather not, and drawing blood. All are soft skills that are difficult to teach in a classroom. It is only through repetition that one becomes expert at these things. In the boredom, he searched for ways to get the job done faster and more efficiently so that it would be over quicker with fewer mistakes that required him to go back and do it again. The boredom inspired accuracy and efficiency in a way that a teacher could not. The boredom also acted as a self-selection mechanism. If he, as a doctor, was unable to see about a hundred patients or so, convince them to give blood, and have a pleasant enough manner that they would do so again in the future, how would he be able to figure out how to do the same things as a full physician? Of course, it is likely that he would not. Therefore, the boredom of this repetitive and arduous task indicated to his supervisors that he would be able to develop the social cognitive skills needed to be a physician later on.

In a different essay, Wickman, (2019) has a similar anecdote. She recommends the boredom of cross stitching as a way to relax. She recounts the lessons that cross stitching has taught her: small consistent efforts help you reach a goal, patience matters, how to break down large projects into smaller pieces, and how to develop self-discipline. Wickman cites a study by Geda and colleagues (2016) where they found that crafting helped to lower the probability that cognitive impairment would later occur. Most important, Wickman (2019) states that crafting introduced her to the concept of flow. Flow is when you concentrate intently on a project and you seem to lose all sense of time. You are so engaged in the project or activity that it encompasses all your attention and you set the stage for producing amazing work.

Harnessing the global and diverse outlook of this generation takes a teaching approach that balances between theater, mining, and boot camp. Theater in that every 20 minutes, topics or activities change to engage students' attention. Mining in that we traverse deep uncharted tunnels of knowledge and don't know what we will find. Boot camp in that we must maintain focus and a strict drive to accomplish the task at hand.

Don't Make Me Think

One of the most successful books on technology design, by Steve Krug, touts the title, "Don't make me think" (2000). In the book, Krug describes ways to design technology so that people don't have to think, creating the expectation that thinking is unnecessary work. Krug suggests that technology should not add to cognitive load. In some ways, the usability movement's intent to make technology accessible to all has done DN a disservice. Originally, computers did not have interfaces. Anyone who wanted to use a computer was forced to understand the rudiments of coding. The lack of an interface laid bare the workings of the computer. Usability strives to make technology accessible to all persons. We have hidden technology's complexity and lulled ourselves into thinking that we own wizards in our phones. The wizard will magically make the Amazon box appear with the new ink jet cartridges at just the right price and just in time.

When you add in better customer service, this has lulled us into thinking that if we press hard enough and complain enough, we won't have to work. No one likes to work. As Steve Krug (Krug, 2000) states in his usability book, the job of the interface is to not make people think. In the classroom, this transfers as students are overwhelmed and do not know where to begin. They haven't learned how to break down problems on their own. There may be more to the digital native trope as in the types of skills that the frequent use of technology has developed and underdeveloped in this generation that has always used technology.

The Digital Native Trope

If digital nativism is true and there are distinct advantages to growing up with technology, then digital natives should have a better intuitive knowledge of technology and how it works. Maybe in something that they know very well and use often such as a social media app, they would know how it works. They would understand it implicitly as the Digital Native supporters suggest (Prensky, 2001; Tapscott, 1998; Howe & Strauss, 2000; Smith, 2012).

The Implicit Understanding of Social Networks

To test this idea, data has been collected over the past three years on how undergraduate students interpret the workings of social media. Hmelo-Silver and Pfeffer (2004) had done a similar study on the understanding of terrariums by biology students, biology teachers, and professional biologists. In their study, as a person's knowledge of terrariums grew so did the number of things that they described in the structure. A better understanding of something included a better description of the function, the structures, and the behaviors inherent to that item. If the idea that Digital Natives implicitly understood technology, then this would be true of digital natives and an application that they use often.

In the study, participants were asked to draw a schematic of how a social network such as Facebook or Instagram posts their comment to their friend's page. This may seem like a simple request, but it was not. Many students were confused and clearly hadn't thought about how the underlying technology for their favorite applications worked. In the first year and a half of the study, many drawings were of two screens: the person posting screen and the friend's viewing screen. In order to clarify the task, some suggested functions, behaviors, and structures were added to the instructions. Some of these were accurate and some were not accurate; participants were told that they could use the suggested ones or come up with their own. Three computer science professors were asked to do the same.

For each drawing, the number of functions, structures and behaviors drawn were examined and quantified. The data collection to date shows that very few of the participants came close to describing the same information flow as the computer science professors. A surprising number of participants reported that a human checked each and every message before it was delivered to a friend. To date we have tested 16 women and 28 men with an average age of 23 years old, ($SD = 6$). Women described significantly more structures than men $F_{\text{structure}}(1, 57) = 4.63$, $p = .036$; but not behaviors or functions $F_{\text{behavior}}(1, 57) = 3.62$, $p = .062$, $F_{\text{function}}(1, 57) = 2.74$, $p = .103$. No two descriptions were the same. Each individual had a different understanding of how something that they all used frequently worked.

This lack of understanding fuels unrealistic expectations of the applications. Users of the application expect that the data stays secure and that only authorized people have access to their accounts. They expect that the interface will operate as promised. When it does not, users become outraged, they request an increase in government regulation. The lack of understanding of how the technology works is conflated with attribution errors, trust issues, and a misunderstanding of the nature of the applications themselves. When a similar thing happens in an instructional setting, who is to scapegoat? In many instances, it is the instructor of the course. How do instructors address this challenge?

RECOMMENDATIONS

In this framework, lets discuss the four most prevalent issues proposed by the previous literature. These are: self-control (e.g., dealing with FOMO, boredom/motivation, gratification, nomophobia, and cyber-slacking), attention/focus (e.g., dealing with task switching), information literacy and metacognition (e.g., dealing with thinking). Embedding meta-curricular strategies to teach these issues within the contextual course throughout the semester will aid not only the DN but all students.

Weinstein, Acee, and Jung (2011) outlines the importance of learning time management, focus, systematic thinking, and motivation. The learning of these skills in the academic setting transfers to other contexts later in life. Different institutions use different approaches to teach these skills. For example, some institutions incorporate a "learning to learn" course in the first few semesters. These courses seem to be the second most successful of the approaches. Students can get expert feedback in the course as to how to apply the principles and why certain things work better in different domain areas. The most beneficial approach, according to Weinstein and colleagues (2011), is the meta curriculum or the backward course design approach (Fink, 2013). This is when individual instructors embed the motivation, self-control, focus, and metacognitive strategies within the actual content area. Research suggests that this approach is the most successful because the needed skills are situated within the context and students have an opportunity to practice these skills in the learning situation. In this spirit, the next section will introduce these types of goals and suggest the types of situations that the instructor would need to create to incorporate these goals into the coursework of any course.

Self-Control and Focus Strategies

As Prensky (2010) notes, we cannot teach until we connect with the students. Inspiring students to listen to us, not because they have to but because they want to is a great first day goal. Shatto and Erwin (2016) suggest using social media with students. Other techniques include “three truths and a lie” “what is your passion” and “best class/worst class”. My favorite of these is “best class/worst class” (DeBrew, 2019). In this activity, students provide the best things about previous classes and the worst things anonymously. Then, the instructor goes through the items individually learning what can be done about each one.

Teaching engagement through Duckworth and colleagues’ strategies (2014) could be incorporated by letting students know about these strategies and enforcing these strategies in the classroom. This approach models and allows practice of self-control. According to Duckworth and colleagues (2014, p. 40) there are five self-control strategies that could be incorporated into a backward course design or into a single lesson:

1. **Social Situation**: Behavior is easier when surrounded by people doing the behaviors that we want to emulate. Our environment is physical and social.
2. **Environmental Situation**: Arrange the environment so that there is no choice or the desire to misbehave is lessened – get up out of bed to turn off the alarm clock.
3. **Attention Deployment**: Ignoring temptation.
4. **Cognitive Change Strategy**: Thinking about the harm that the temptation will do rather than the immediate enjoyment. In arguments, the third person strategy – going to the balcony and looking out on what is happening in the situation disrupts the egocentric viewpoint and the emotional viewpoint.
5. **Response Modulation**: Exerting control over subversive impulses, very difficult and sometimes takes a toll in other ways.

Mobile phones themselves offer an opportunity to teach these strategies while reducing cyber-slacking through a mobile phone policy. While having a mobile phone policy may provide motivation for better behavior, educating the students on these five strategies and developing lesson plans around them may alleviate the need for a strong cell phone policy altogether.

Most educators view mobile phones as either an opportunity or a hindrance. On the side of opportunity, incorporating mobile phones into the day’s lesson has broad support. On the side of hindrance, there is evidence supporting a strong and enforced mobile phone policy to keep students on task during class and improve the classroom atmosphere (McCoy, 2016); strong policies also help the mobile phone users learn self-control. When the policies are in place but not enforced it conveys the message that self-control and respect for others is not important and lessens the effectiveness of mobile phone policies in all of the classrooms on campus (Flanigan & Kiewra, 2018; Tindell & Bohlander, 2012).

Campbell (2006) surveyed 96 students and 80 faculty members. In this survey, they found strong support for restrictions on mobile phone use in the classroom. Hopke and Marsh, (2011) surveyed 189 students and found that when students followed a clearly stated mobile phone policy and classroom mobile phone use decreased. Presumably, this was because the phone policy changed the goals of students from a boredom averse goal to grade or learning aligned goal.

Felisoni and Godoi, (2018) found a relationship between mobile phone usage and academic performance. They collected data from about 43 participants who had installed a tracking app on either their android or iPhone and shared the data with the researchers. Then, they also shared their grades with the researchers. They used a 100-point grading scale. The researchers found that every additional ten minutes spent on the phone resulted in a half a point grade drop on their 100-point GPA scale. If considered during class time, each 10 minutes spent per day during class time resulted in a 1.2-point grade drop on a 100-point scale.

Reclaiming Agency

Teaching students to maintain interest and exercise self-discipline when the material may be over or under challenging allows the students to reclaim agency and reduces the boredom attribution to the instructor or the material. An example of negotiated engagement with students would be by providing them with more opportunities to control the presentation of instructional materials, such as an instructor stating, "Today our topic is language development in children – would you rather see the lecture over the chapter or view a video on wild children and study this section of the chapter on your own?" With a sense of agency and thoughtful engagement, the instructor changes the theater, lets the students chose how they mine the material, and keeps the class sharply focused on the tasks at hand.

Teaching Information Literacy

Before the digital age and the internet, the matter of what was a viable source and what was not existed in where and how you accessed the information. People did not face the same challenges of different types of information appearing to be equally valid in the same physical location. Peer reviewed, scholarly research belonged in the library, and in order to access this very high-quality information, you physically went to read that research in the library. Once you were in the library reading the academic journal, there was no doubt in anyone's mind who published the research and if the research was verifiable. Journalists who had been trained in how to discover the truth through investigation wrote stories for publication in newspapers, magazines and on television. If you wanted to read their work, you bought the newspaper or viewed it on the television. There was no other way to receive the information. If the information was free, it was likely advertisement and suspect.

This physical segregation of information has disappeared. Currently, you may access peer reviewed, scholarly research at home through your computer without going to the library. Noted researchers appear on the evening newscast to share their latest findings alongside trained journalist. News outlets online tout a combination of trained journalist's stories and advertisements that seem to be real stories. Anyone can write a blog online and publish it freely. Sometimes, the information on the blog will contribute to a journalist's news story or a peer reviewed scholarly publication. This blurring has increased information consumption but also increased the confusion surrounding "real" or "fake" as in fabricated information. The responsibility for determining the veracity of the information no longer exists in how you accessed the information or where you accessed it. It is up to the reader to determine if the information is true. This change in information literacy has had a dramatic impact on society.

Musgrove, Powers, Rebar, and Musgrove (2018) state several resources for teaching information literacy in the wake of the "fake news" era. According to the Pew Research Center survey by Gottfried and Shearer (2016), 62% of American adults use social networking sites as a news source. Musgrove and colleagues state the cognitive biases such as the confirmation bias, the availability heuristic and the familiarity heuristic play a role in the believability of the fake claims posted on social media.

As Šorgo, Bartol, Dolničar, and Boh Podgornik (2017) note, DNs may be familiar with devices and own them but that does not mean that they understand their power or know how to use them to better their own condition. The convenience of ready information has masked the legitimacy of different news sources as legitimate. Non-legitimate feeds will appear together with legitimate news feeds. It becomes difficult to discern which is legitimate news. For example, a dastardly event such as Pizzagate (Zadronsky, 2019) in which several politicians and Washington D.C. restaurants were falsely identified as being part of a human trafficking and child sex ring seems as real as similar horrific events, such as the abuse case of the thirteen California children who were beaten, shackled, and starved by their parents, David and Louise Turpin. The abuse case was true but seems to be more outlandish than Pizzagate (Whitman, 2019). When the reporting style is identical, the means by which a person learns of the event is the same, and the characteristics of the event are similar, it is difficult to discern the legitimate from the fake news. The proliferation of people sharing the Pizzagate news affected the political campaigns and reputations of the restaurants. The fact that so many people can be so easily fooled suggests that information literacy instruction will be critical to our futures.

Incorporating a skill set of verifying sources is important in nearly every course. The library literature has a distinct advantage in teaching how to distinguish the different types of sources and use them to the best advantage. Brady and Malik (2019) give the example of discovering the genealogy of a theory in psychology. With the librarians help, students in their introduction to psychology course would find a current topic of interest in a scholarly publication and then trace the inception of that idea to its earliest roots. Along the way, they would learn how the idea changed scientifically with contributions from different professors, labs, and schools of thought.

Lawson and Brown (2018) asked introduction to psychology students to establish the causal link between vaccines and autism. First, they were given instruction on how to select and evaluate sources. The handout explained the differences between peer reviewed sources and academic books. Then, students were given three articles to read on vaccines and autism. One was a journal article, the second was a website from the U. S. Centers for Disease Control and Prevention, the third was the personal account of a mother who believed that the vaccines were related to her child's autism. In a second assignment, students evaluated the information about dolphin assisted therapy. In the second assignment, they were to rate the quality of the information and the likelihood of recommending this type of therapy to a friend. The researchers did find an effect with the students who had done the autism and vaccine assignment as they were more skeptical of the dolphin assisted therapy.

Teaching Metacognition

Along with information literacy, metacognition is to be one of the up-and-coming critical skills as it guides information foraging. Metacognition is termed as knowing what you know and what you don't know. In terms of learning, it is critical for the learner to be able to spot the lack of knowledge in order to "fill in the gaps." Understanding what you need to learn and what others know and don't know has been addressed through several methods of teaching: first, teaming and study guides, and second, writing across the curriculum approaches.

The accurate metacognitive monitoring of one's own learning and the metacognitive judgments of others was the subject of several studies by Tullis (2018). Tullis recommends against giving study guides and suggests creating one together in class. Several writing across the curriculum programs recommend breaking up large writing assignments. In Psychology coursework, the American Psychological Association style or APA paper, is a good example of such a writing assignment. This assignment is required in most psychology research methods courses as it is central to conducting any research. The APA paper is also the most challenging part of the course for the instructor (Smith & Egglestein, 2001).

This challenge exists in nursing as well. Diehl (2007) and Morse (2009) discuss a multi-year study of nursing graduate students who also must know how to write an APA paper. Entering graduate students lack these important skills. Graduate advisors' complaints ranged from "they should know how to write a decent paper" to "their papers don't say anything" (Diehl, 2007, p. 202). Morse found that the nurses' fears focused on not knowing how to construct the paper and what to write in the different parts of the paper (2009, p. 543).

While there are many approaches possible when teaching how to construct an APA style manuscript, most instructors rely on the way that they learned. Luttrell, Bufkin, Eastman and Miller (2010) relay some common options: 1) learn APA on their own, 2) create a specific APA writing class separate from research methods course, or 3) incorporate writing exercises into the research methods class. Smith and Eggleston (2001) asked students to identify errors in a poorly written APA style paper as a way to develop metacognition in writing. Franz and Spitzer (2006) suggest teaching the APA style mechanics through a checklist and template. While all of these approaches are good, they fail to incorporate the APA paper assignment into the entire research methods course as a learning tool.

Testing the Teaching of Metacognition Through Writing

In a psychology research methods course, Elliott (2017) used a novel method of teaching metacognition through writing this paper. The method was developed over the course of several semesters. In the last semester that the course was taught in this way, a class of 20 students took the revised paper course. The students were in the 18-25 years old range with two students outside of this range at 43 and 64 years old. Six of the students were men and the rest of the students were women. All of the students had written an APA style paper as a 'whole' assignment in a previous psychology class.

Students engaged in the assignments as part of their regular course. Students worked in teams of up to five persons per team. In these teams, students developed and conducted an experiment in class with one independent variable at two levels and one dependent variable. The students all used the same topic with the same literature review and similar hypotheses. For this particular study, they used the research topic of texting and walking.

Throughout the course, the teams worked on the APA paper assignments in and outside of class. The APA paper assignments were based on a question/answer method. In this approach, the student answers a few questions to get the document started such as, "How many participants were in the study?" The assignments are available in the Application Activities Appendix. At the end of the course, the students took a survey that was composed of seven questions comparing the two approaches to the assignment. When the survey was distributed in the last few weeks of class, students were asked to think of the previous class in which they had written an APA paper as a single whole paper assignment. The students answered the following questions on a semantic rating scale specific in each question.

"*Comparing the Whole Paper approach to the Paper in Parts approach, which did you think was easier?"* Fifty-five percent of the students stated that the "Paper in Parts approach" made the APA paper assignment easy or sort of easy. Twenty-five percent rated it as moderate and 20% rated it as moderately difficult or difficult. None of the students rating the Whole Paper approach as easy or moderately easy.

"*Which did you like better, the Whole Paper approach or the Paper in Parts approach?"* Ninety-five percent of the students liked the "Paper in Parts approach" better than the whole approach.

"*In which assignment did you earn a better grade?"* Ninety-five percent of the students rated that the "Paper in Parts approach" compared to the "Whole Paper approach" helped their grade. In a subsequent question about why, students stated that they felt that in the "Paper in Parts" approach they learned each section in-depth and received more useful feedback. They also liked the ability to revise their work according to the feedback before they turned in the final version. They stated that they liked the step-by-step instruction and the ability to submit it more than once.

"In which assignment did you feel that you learned more?" One hundred percent of the students stated the "Paper in Parts approach" helped them to learn. In a subsequent question on why or why not, one student stated, "I had no idea how to write an APA paper before. Writing in steps makes it much easier to learn as you go and save the parts to a Google doc which makes it easier to piece the end paper together." Another student stated, "because breaking a big project (which I didn't know how much research these papers took) into small parts and reviewing them in detail allows me to understand the whole picture better and result in a better chance to replicate a solid APA paper compared to doing it all at once and doing a lot of things wrong. Which will be hard to remember little details." The students' comments indicated that their understanding of what they knew and did not know improved as a result of breaking the assignment into many smaller assignments over the course of the semester.

There are disadvantages to this approach as it creates more work for the instructor over the semester. Each section is graded multiple times. However, as the students begin to master the concepts, there is less grading toward the end of the semester. Students who wanted a better grade were motivated to develop better metacognitive strategies through revising the paper. Overall, the smaller assignments taught the students how to organize their thinking scientifically. These are several strategies to help students' metacognition: breaking large assignments up and distributing them throughout the semester; developing study guides in class as a group; and having students work in teams and making them accountable for each other's learning; teaching information literacy; modeling the self-control strategies in class; and teaching focus through restricting mobile phone use.

DIRECTIONS FOR FUTURE RESEARCH

There are several future research opportunities. In the teaching of metacognition through writing, "Paper in Parts" study, this study needs to be replicated at different institutions and within different disciplines. An empirical assessment of large assignment segmentation and dispersion throughout the semester is needed. Further work needs to be done in the user's understanding of social networks and how this leads to decreased information literacy, unrealistic expectations of the social networking applications, and the mis-understanding data privacy and security. Finally, further work is needed in boredom and how that contributes to the cycle of cyber-slacking, de-motivation, and loss of focus in the classroom.

CONCLUSION

The authors, Flanigan and Kiewra (2018) and Smith (2012), provide convincing arguments that DNs have not taken advantage of their increased access to computing power. Kirschner and De Bruyckere,

(2017) make two strong points: DNs may be a different generation but they are not endowed with superior technological ability due to the length of time they have had with technology. The idea of digital nativism has resulted in misinterpreting a whole generation's abilities. The DN generation is a group of people who have less information processing capability along with a host of other handicaps. McKeachie and Svinicki (2013) and Flanigan and Kiewra (2018) state that the classroom environment is the ideal setting to begin to undo the DN information handicaps. Instructors are obliged to create and maintain distraction free classrooms that help students practice focus and self-control, but they are also obliged to create the next generation of thinkers and leaders. Flanigan and Kiewra, (2018, p. 589) suggest that instructors reject the DN myth and focus strengthening their tech policies. They suggest incorporating more group work, discussions and problem-based learning along with goal setting, time management and self-control strategies.

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KEY TERMS AND DEFINITIONS

Cyber-Slacking: The act of using the Internet to go off task, usually during an important task such as studying or in being in class.

Digital Natives, or Gen-Z, or Homo-Zappiens: Individuals who grew up in a world where technology has always existed. Digital Immigrants are individuals who grew up in a world where technology was still emerging or did not exist.

FOMO: Fear of Missing Out is a fear that others are doing something that they want to be included in or the fear connected to the belief that everyone will know some piece of gossip or information and they will not know it in a timely manner.

Nomophobia: The fear of not being able to use or access your mobile phone.

Social Networks: Websites and applications that allow users to interact with others socially through posting messages, pictures, and engaging in other purely social activities online through their portal.

APPENDIX

Application Activities

Assigning Students to Random Groups

Preparation: Index cards- about 5-10. Decide how many students should be in each group and then how many groups you need. There may be groups of about 3-5 students. Then, for each group set aside one index card that is cut into the number of students you want in the group. Sometimes you need to use two index cards per group if the group is 5 or more students.
For each group think of categories of concrete nouns such as these categories: *Office Supplies, Things you would eat at Dinner, Different Makes and Models of Cars, Types of Clothing, Names of Vegetables*. The groups should be orthogonal in that a person could not confuse the names of one group for another group. For each group, write down examples that belong in the category on the index card. For example, *Office Supplies: stapler, scissors, invisible tape, pencil, pen, paperclip*. You only need one item per student within that group's category. Once you have finished, cut the index cards up so that each student will get only one item and the category isn't stated on the card that they receive. Mix the card up and put them in a bowl or other container for the students.
Implementation: In class, ask each student to choose a card and silently read it. Then, ask them to find other students in class who have cards that list something that is similar to theirs. This will be confusing at first. If the students balk, suggest that they talk to more students and it will become clearer. The class will self-form into the five groups that you had originally planned. Ask the groups to congregate together in a corner of the classroom. Then, ask the students how they would categorize the items in their group. Finally, explain the idea of concept formation from the psychology literature <http://www.scholarpedia.org/article/Cognitive_psychology>.

Best Class Worst Class

Preparation: Index cards and markers.
Implementation: This is a quick activity that is best done the first week of class. Pass the index cards out to all of the students. Then, assign the students to random groups (see above). Once the students are in their groups and settled into their seats, ask them to answer the three questions written on the board. You may specify that one person writes the answers for question one on their index card, another writes the answers for question two on their index card, and so forth. The important part is that there is some anonymity in their answers and that they discuss it as a group.

1. What five things annoy you most about course design in college (e. g., tests, lectures, group work)?
2. What five things do you dislike about professors in college?
3. Name five things that professors have done in the past that have helped you learn.

Backward Design Course Planning Example for an Introduction to Psychology Course

In the chapter, how metacognition can be incorporated into the course at a deeper level through backward course design is discussed. In backward course design texts mentioned in the chapter, there are a few approaches. Each approach relies on careful planning. Here is one example of a plan to use two different types of goals. These goals can be assessment related, department related, or discipline related. Goal 1 in Table 1 could be assessment and discipline related with Goal 2 as department related.

Table 1. Backward Course Design

Course Goals	*Metacognitive and Interpersonal goals*	*Practice One*	*Practice Two*	*Assess*
1.	Understanding the connection between experiments and theory building	Do an in-class experiment with the students as participants	Have the class do an in-class experiment that requires observing hallway behavior	Test question about how a certain type of data would support or refute a particular theory
2.	Make a friend	Have students work in teams and have the teams change often- speed dating	Make the students choose the teams toward the first third of the semester so that friendships develop	Observation in class

Teaching Metacognition through Writing

Research Methods Materials.

Instructions: These are the ten assignments discussed in the chapter. They were originally worksheets with space for students to write. Here, they are abbreviated to save space.

Assignment 1. Identifying Independent and Dependent Variables.

Instructions: For each of these hypotheses, define the IV and the DV. What would happen in the study if there was a significant effect? What will happen in the study when there was no significant effect?

1. Will students' math test scores on an achievement test differ between morning and afternoon testing?
   a. Independent variable
   b. Dependent variable
   c. What will the math test scores do if there is an effect?
   d. What will the math test scores do if there is <u>not</u> an effect?
2. Are students who are married more or less likely to drop out of college during their freshman year?
   a. Independent variable
   b. Dependent variable
   c. What will the DV do if there is an effect?
   d. What will the DV do if there is <u>not</u> an effect?
3. How do three memorization techniques help people remember items for an upcoming exam?

   a. Independent variable
   b. Dependent variable
   c. What will the DV do if there is an effect?
   d. What will the DV do if there is <u>not</u> an effect?
4. Which reading method helps students retain more information: skimming or scanning?
   a. Independent variable
   b. Dependent variable
   c. What will the DV do if there is an effect?
   d. What will the DV do if there is <u>not</u> an effect?
5. The ability to discriminate between lies and the truth increases with chronological age and gender.
   a. Independent variable
   b. Dependent variable
   c. What will the DV do if there is an effect?
   d. What will the DV do if there is <u>not</u> an effect?

Assignment 2. Literature Search Part 1

1. Your research topic is…
2. The hypothesis for your research topic is…
3. Create a two circle Venn diagram below for search terms.
4. Using PsychInfo and one word from each circle above, search for some peer reviewed articles on your topic. Insert the word "and" between two of the search terms. does this expand or restrict the number of articles?
5. Insert the word "or" between two of the search terms. Does this expand or restrict the number of articles?
6. Search for 4 articles which are relevant to your team's hypothesis. Select only Peer Reviewed and Full Text articles. Email these articles to yourself and your teammate. Then, write down the names of the four articles below in APA style using the APA guide, 6th Edition:
   a. __
   b. __
   c. __
   d. __

Assignment 2. Literature Search Part 2: How to Read a Journal Article

Instructions: With your team, each person should select one of the articles. Read the article and write responses to these questions. This is the order in which you should read a journal article. Sometimes, these articles take a long time to read, so be patient. There are many new terms and unfamiliar ideas.

Method

1. Who were the subjects/participants in this experiment and how many were there?
2. How many factors were there in the experiment? How many levels for each factor/conditions?
3. What were the conditions?

4. What was manipulated?
5. What was measured?

Results

1. Did the researchers find a significant effect?
2. What was the statistic (i. e. $F(8, 34) = 45.90$)?
3. What was the mean for each condition?
4. What conclusions did the researchers suggest?

Introduction

1. What is the research problem in this article?
2. What methodology did other researchers use?
3. What were some of the other findings from previous researchers on this topic?

Discussion

1. How did the findings relate to the hypothesis?
2. What further research is suggested by this paper?

References

1. How many of the references are from journal articles?
2. How many of the references are from books?
3. How many are from non-peer reviewed sources such as Wikipedia?

Assignment 3. Planning the Experiment

Instructions: Please answer each question. This is the basis for the next step in the process. You do not need to type this one out.

1. Our hypothesis is:
2. How many levels will it have?
3. Do you expect a participant's performance to be affected by other variables that you cannot control? What are those variables?
4. How will you measure your dependent variable?
5. What statistical analysis will you use to determine if your independent variable has had an effect on the dependent variable? Hint: If you have two groups = t-test; if you have more than two groups = ANOVA or Regression; if you are looking for how one variable changes as a result of another variable = correlation.
6. Will your experiment be a between design (every participant has a different condition) or will it be a within design (every participant is in all conditions)?
7. What will your participants do specifically- use the back of this sheet of paper?

Assignment 4. Write the Introduction

Instructions: You'll be writing the introduction section to your paper. Using assignment 2- literature search and notes, answer the following questions, then attach a typewritten version of these questions with citations and in proper APA format. If you have questions about APA format, refer to the publication manual, your textbook, or to the Purdue Owl at <http://owl.english.purdue.edu/owl/resource/560/18/>

1. What are your variables?
2. What is the title of your team's paper? The title should describe the effect of one variable on the other in easy to understand terms. It is similar to your research question.
3. Write the first paragraph establishing the relationship between these variables and why they should be important to the reader.
4. Write the second paragraph about one of the articles in your literature search. The paragraph should start with a general statement of what they found. Then it should discuss what was tested, then it should discuss the results,
5. Write the third paragraph about one of the articles in your literature search. The paragraph should start with a general statement of what they found. Then it should discuss what was tested, then it should discuss the results.
6. Write the fourth paragraph about one of the articles in your literature search. The paragraph should start with a general statement of what they found. Then it should discuss what was tested, then it should discuss the results.
7. Write the fifth paragraph that should summarize what these three articles found and then begin the guide the discussion of this research in how it will support your hypothesis
8. The sixth paragraph discusses the specific experimental hypothesis or you can add it to the end of the fifth paragraph, your choice.
9. Write down the references that you cited in APA form (see the APA Guide, 6th Edition).

Assignment 5. Do the Experiment in Class.

Instructions: This worksheet has two parts. The first part is for your experiment that you run in class. The second part is for you to participate in your classmates' experiments. You must turn in both sections to get credit for this assignment. Please bring this sheet to each class meeting until the experiments are finished.

1. What is your hypothesis?
2. What are the independent variable(s)? How many levels?
3. What is the dependent variable? How is it measured?

   You may use this table to record your data. *(Note to instructors: add rows for the number of participants that you want each group to run. For example, if there are 25 students in class and 4 students in this group, adjust the rows below until you have 21 rows- 1 for each student).*

Participant number	Age	Gender	condition	level 1	level 2	comments

Participant Sheet
What is your assigned participant number? _______________
For each experiment, have the experimenter sign your paper below. In order to receive full credit for this assignment you must participate in at least 75% of the experiments. If you participate in all experiments, you can earn 2 points extra credit.
1. ____
2. ____
3. ____

Assignment 6. Write the Method Section

1. How many participants did you have, how many men and how many women?
2. Is the experiment between subjects (each subject participated in only one level of the independent variable) or within subjects (each subject participated in all levels of the independent variable)?
3. What materials did you use to conduct the experiment?
4. Are there any extraneous variables you had to control for?
5. If you had the experiment to do over, what would you change?
6. What was the actual experimental procedure?
7. Please type up the answers and attach it to this assignment. You will need the answers to 1, 2, 3, and 6 in the method section. Please look in the APA 6th edition to review how to write a method section.

Assignment 7. Do the Analysis

1. Do the analysis using SPSS.
2. What is your hypothesis?
3. Which statistical tests did you perform?
4. What was the result as written in a statistical sentence?
5. Was it significant (hint: $p < .05$) ?
6. What did you find in relation to the hypothesis, did you support the null or the alternative and why?
7. Draft a Results section, type it up and attach it to this paper.

Assignment 8. Write the Discussion section

Instructions: Write the discussion section by answering the following questions on a separate piece of paper. If you type it up, it will save work for you later on.

1. Paragraph 1. Begin by providing an interpretation of your results: what is it that you have learned from your research?
2. Paragraph 2. Do not repeat what you have already said in your results—instead, focus on adding new information and broadening the perspective of your results to your reader.
3. Paragraphs 3, 4, and 5. Look at your introduction. What were the studies that you mentioned? Discuss how your results compare to these previous findings. If there are differences, discuss why you think these differences exist and what they could mean.
4. Briefly consider your study's limitations, but do not dwell on its flaws.
5. Consider also what new questions your study raises, what questions your study was not able to answer, and what avenues future research could take in this area.

Assignment 9. Individual Assignment.

Congratulations, the paper is almost finished!

1. Put all of the pieces of the paper into one document. You should have an introduction,a method, a results and a discussion section. The best way to do this is to add all of the pieces to the introduction section because this section has the references.
2. Go to your reference manager and construct the references section. Be sure to select APA 6th edition. The title of the section should be References and it should be on a separate page.
3. Double check to be sure that all of the in-text citations are included in the references and the reference section does not have any extra citations.
4. Double check to be sure that all of the references are correctly cited and there are no mistakes. Use the APA 6th Edition Style Guide in the library if you have questions.
5. Add in the headings and subheadings for each section according to the Style Guide and a title and the abstract.

Assignment 10. Put together the Final Paper

Instructions: Be sure that your paper is formatted correctly with the headings and body in the correct typeface and size. Then go through this checklist below. This is what I will use to grade your paper. For any formatting questions that are not covered in your book, please check the APA 6th edition style guide in the library or go to the Purdue Owl at http://owl.english.purdue.edu/owl/resource/670/04/

1. Title Page:
    a. Running head at the top
    b. Title centered in the middle of the page
    c. Author's name beneath the title (List YOUR name first, and then the other members of your research group)

2. Introduction:
    a. Briefly explain what your research question was, why you were interested in it, and why you chose the method you chose; the introduction should introduce the problem and create interest in the topic.
    b. Include a brief review of the background literature, for each study describe their research question/hypothesis, their method and their results.
    c. You need to cite all of the background literature in this section, please include 1-3 references (you MUST cite any articles you use). Remember to use the References tab on MS Word.
3. Method:
    a. Full method section
    b. Include relevant subheadings of Participants, Apparatus and/or Materials, Procedure
    c. Be detailed! But do not include trivial information (e.g. what the consent document says, what software you used [unless it was unusual], where the study was conducted)
    d. You may want to include figures or an appendix to help you describe the stimuli you used; if so, these will be attached at the end of the paper but you can refer to them in this section (e.g. "see Figure 1"). I like to see figures and tables in the body of the paper but I will also accept them at the end as in the APA manual.
4. Results:
    a. Full Results section
    b. Briefly remind readers of your hypothesis/research question
    c. Describe what tests you used
    d. List relevant means and standard deviations for each group tested
    e. Give statistical numbers for significant or non-significant results relevant to your research question.
    f. You may want to create a table or graph to depict your results; if so, these will be attached at the end of the paper but you can refer to them in this section (e.g. "see Figure 2")
5. Discussion:
    a. What can you conclude from your Results? Was your hypothesis supported?
    b. Were there any surprising results?
    c. How does this relate to the previous literature in your introduction section?
    d. If you didn't find a significant effect, why not? List some possible problems with the study design, hypothesis, or method?
    e. Future directions: based on these results what would you do next? Do the results of this study suggest any further lines of research on this topic? What would you improve on if you were to do this study again?
    f. Discussion should be no more than 2 pages.
6. References:
    a. List all resources/background articles used (and cited) here in APA format
    b. Please remember that if you copy from an internet source, book, journal article or anything previously written, it needs to be cited and you need to add quotation marks and the page number. If you use a source, it just needs to be cited in the paper and listed in the references.
7. Figures/Tables/Appendix
    a. If you have referred to any figures, tables, or items in an appendix, attach them to the end of the paper and be sure to label and caption them.

Chapter 24
The Past, Present, and Future of Virtual Reality in Higher Education

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ABSTRACT

This chapter focuses on how Virtual Reality (VR) can be used to educate students in a variety of disciplines. Authors include a comprehensive synthesis of previous virtual reality in the educational setting literature. They also provide specific examples of virtual reality usage in the education setting utilizing specific VR class assignments from multiple universities. Based on their comprehensive review of previous research, the authors provide suggestions for future research and application of VR both inside and outside of the classroom. Two specific VR class assignments/activities are incorporated and can be utilized by professors to provide undergraduate and graduate students with an introduction to the application of VR.

INTRODUCTION

Virtual reality is a technology that allows a user to interact with a computer-simulated environment (Mandal, 2013). While virtual reality has existed for more than 50 years, the technology has only recently enabled users to immerse themselves in a realistic virtual environment. Immersive virtual reality has only existed since the early 2000's and as technology has improved educators have found more uses for virtual reality (Freina & Ott, 2015). Early applications of virtual reality in education were mainly in the healthcare setting, but as the technology has improved professors from a variety of disciplines have started to use virtual reality in their teaching (Li, Yi, Chi, Wang, & Chan, 2018). As the usage of virtual

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reality in education has increased so has research regarding the effectiveness of virtual reality in higher education (Pelargos et al., 2017).

In this chapter, the present authors educate readers regarding the benefits and challenges associated with using virtual reality to teach students by providing a summary of the previous literature and practitioner examples. The authors focus on how virtual reality can be used to instruct and engage students in a variety of disciplines. This chapter includes a comprehensive analysis of previous virtual reality in the educational setting. The authors also provide specific examples of virtual reality usage in the educational learning environment utilizing specific case studies from multiple universities.

LITERATURE REVIEW

The History of Virtual Reality

In the literature review the authors summarized how virtual reality has evolved in the past five decades. The early application of virtual reality can be traced back to early 1960s in the movie industry. The roots of virtual reality can be found in research conducted by the aerospace and defense industries back in the early 1960s (Burt, 1995). In the 2010s, virtual reality was commercialized in various areas, such as video gaming, education, training, manufacturing, etc. A brief history of virtual reality is explained in detail below.

Morton Heilig, the filmmaker, invented the Sensorama Machine in 1962. The Sensorama Machine was (is) the first 3D immersive simulator and the first approach to create a virtual reality system. More specifically, the Sensorama Machine was (is) a multi-sensory simulator that simulated the feeling of a motorcycle driving through Brooklyn characterized by several sensory impressions, such as audio, olfactory, and haptic stimuli. The Sensorama Machine additionally included wind to provide a realistic experience (Cipresso, Giglioli, Raya, & Riva, 2018).

Ivan Sutherland became the first to present virtual reality in 1965 (Mandal, 2013). He proposed the concept of the ultimate display in which the user could interact with objects in a world that does not need to follow the laws of physical reality (Sherman & Craig, 2018). What he proposed was (is) an artificial world construction concept that included interactive graphics, force-feedback, sound, smell and taste (Mazuryk & Gervautz, 1996). Sutherland asserted that a display connected to a digital computer enables us to get familiar with concepts not realizable in the physical world, and it is similar to "a looking glass into a mathematical wonderland" (Sutherland, 1965).

Inspired by Sutherland's ultimate display concept, Fred Brooks started the GROPE project at the University of North Carolina at Chapel Hill in 1967 to explore the use of kinesthetic interaction as a tool for helping biochemists feel interactions between protein molecules (Brooks, Ming, Batter, & Kilpatrick, 1990). GROPE was realized as the first prototype of a force-feedback system (Mazuryk & Gervautz, 1996) in 1971. They approached the project in four stages: a 2D system, a 3D system, tested with a simple task, a 6D system tested with a simple task, and a full 6D molecular docking system (Brooks et al., 1990). They found that haptic display can improve perception and understanding both of force fields and of world models populated with impenetrable objects.

In 1975, Myron Krueger created VIDEOPLACE, an artificial reality laboratory, in which the users' body figures were captured by cameras and projected on a screen (Mazuryk & Gervautz, 1996). More specifically, VIDEOPLACE was used to define an artificial reality in which the laws of cause and effect are composed by the programmer, meaning a conceptual environment with no existence. In VIDEOPLACE, the silhouettes of the users captured by the cameras were projected on a large screen (Mandal, 2018). The VIDEOPLACE system combined a participant's live video image with a computer graphic world and coordinated the behavior of graphic objects and creatures so that they appeared to react to the movements of the participant's image in real-time (Krueger et al., 1985). In this way, two or more users could interact in the 2D-virtual space (Cipresso et al., 2018).

Thomas Furness at the US Air Forces Armstrong Medical Research Laboratories developed the Visually Coupled Airborne Systems Simulator (VCASS), an advanced flight simulator, in 1982. Fighter planes were becoming very complex and powerful due to the advancement of science and technology. Complex and powerful fighter planes led to three issues: (1) Fighter pilots were threatened to exceed their capabilities to use fighter planes effectively. (2) A fighter pilot's tasks had become very complicated. (3) There was a need for new ways of controlling the flight and weapons. The new systems they created would allow pilots to access flight data in less abstracted but more intuitive forms. Informed by an analysis of the way humans use visual and auditory cues to determine spatial orientation, new systems were designed to make the controls fit humans better. The computers combined radar, control and weapons data into a simple graphical form, representing the aircraft's position, speed, underlying landscape and target in symbolic form on the head up display. This was combined with auditory cues, also designed to simulate 3D space (Chesher, 1994).

In 1984, Michael McGreevy at NASA started the Virtual Visual Environment Display (VIVED) project at the Ames research center. VIVED was a cheaper, smaller-scale virtual environment system. By early 1985, McGreevy designed and developed NASA's first Virtual Environment Workstation, a personal simulator and telepresence device consisting of a host computer, an interactive computer graphics system, video imaging technology and the VIVED system (McGreevy, 1991). He created an immersive computer graphics simulation system by 1987. *Scientific American* featured VIVED, a minimal system, in October that year, but one which demonstrated that a cheap immersive system was possible (Chesher, 1994).

The use of computer graphics in flight simulation progressed rapidly, with many valuable principles being established. Among these was the minimum rate at which images had to be updated in order to appear realistic, the amount of detail required to recognize objects and creation of perspective and techniques or orientation of the use in relation to the display. The computer power required to create, display and update complex images was a limiting factor in development, and many original ideas could only be exploited as computer technology advanced.

The use of the term virtual reality is first credited to Jaron Lanier, the founder of VPL Research, a pioneering company in virtual reality development (Burt, 1995). The VPL DataGlove was the best known of these devices and the first commercially available virtual reality device (Mazuryk & Gervautz, 1996). In 1985, the availability of low cost liquid crystal device (LCD) displays from hand-held television sets allowed the construction of head-mounted displays which did not rely on the expensive high resolution Cathode Ray Tubes (CRT). This, coupled with the development of the VPL DataGlove, a device which allowed interaction with the computer-generated images heralded an explosion of interest in virtual reality from a variety of sources, including the entertainment industry (Burt, 1995). Interactive devices allow the user to move and manipulate objects within the virtual environment. The choice of device is usually governed by the preference of the user. For example, wired gloves have been associated with virtual reality for some time. The objective is to describe the action and position of the hand by using sensors running across the joints. These sensors may be fibreoptic bundles where the change in light intensity caused by bending is detected by a distal sensor or electromechanical sensors (Burt, 1995).

Binocular-Omni-Orientational Monitor (BOOM) is a complex system composed by a stereoscopic-displaying device, providing a moving and broad virtual environment, and a mechanical arm tracking (Cipressor et al., 2018). That is, BOOM is a small box containing two CRT monitors that can be viewed through the eye holes (Mandal, 2013). It was commercialized in 1989 by the Fake Space Labs (Mandal, 2013). One of the major advantages of BOOMs is that they can support high resolution CRT's not typical of the Head Mounted Displays (HMD). Fake Space Labs offered a number of BOOMs which incorporate both high-resolution CRT's and motion tracking. They could provide either black and white or color displays (Ressler, 1994).

A team of faculty and students at the University of North Carolina Chapel Hill started a series of projects (UNC Walkthrough Project) in 1986. The team had built interactive computer graphics systems for six years to enable a viewer to experience an architectural model by simulating a walk through the model (Brooks et al., 1992). Several virtual reality devices were constructed to improve the quality of this system, such as, HMDs, optical trackers and the Pixel-Plane graphics engine (Mandal, 2013).

Virtual Wind Tunnel was developed in early 1990s at the NASA Ames application (Mazuryk & Gervautz, 1996). The Distributed, Collaborative Virtual Wind Tunnel (DCVWT) is an immersive virtual reality-based system for use in the investigation of simulated airflow by geographically distributed, collaborative teams. The DCVWT users can interact with the airflow simulation as if they were in the same space interacting with a model, even if they are remotely located across the country. The DCVWT provides an immersive environment for collaborative design and plays a role as a test bed for developing new methods (Bryson & Levit, 1992). The display device for the stand-alone Virtual wind Tunnel is a boom-mounted six degree of freedom head-position-sensitive stereo CRT system. The control device is an instrumented glove which provides the position and orientation of the user's hand as well as the degree of bend of the user's fingers (Bryson & Gerald-Yamasaki, 1992).

According to Kenyon (1995), CAVE is a recursive acronym that stands for cave automatic virtual environment. CAVE is an interactive, real time, three-dimensional visual, auditory, and haptic environment which extrapolates and expands the immersive properties of such synthetic surroundings to a novel extent (Repperger, Gilkey, Green, LaFleur, & Haas, 2003). In 1992, the Electronic Visualization Laboratory of the University of Illinois created the CAVE (Cipressor et al., 2018). The CAVE is a cube with display-screen faces surrounding the viewer; as the viewer moves within the bounds of the CAVE, the correct perspective and stereo projections of the environment are displayed (Cruz-Neira, Sandin, DeFanti, Kenyon, & Hart, 1992). Synthetic environments provide a mechanism to immerse the user in a virtual reality that offers perceptual realism, which may compensate for the fact that an operator has to perform a task at a remote location. CAVE was developed to provide the user an accurate portrayal of a remote environment with an appropriate high-resolution visual display (Repperger et al., 2003).

More recently, several videogames companies have improved the development and quality of virtual reality devices, such as Oculus Rift, or HTC Vive that provide a wider field of view and lower latency. Additionally, the actual HMD's devices can be now combined with other tracker system as eye-tracking systems (e.g., FOVE, Tobii, HTC Vive Pro Eye), and motion and orientation sensors (e.g., Bosch Sensortec, Razer Hydra, Oculus Touch, or HTC Vive).

Augmented reality refers to a real-time direct or indirect view of a physical real-world environment that has been enhanced or augmented by adding virtual computer-generated information to it. Augmented reality aims at simplifying the user's life bringing virtual information not only to his immediate surroundings, but also to any indirect view of the real-world environment, such as live-video stream. Augmented reality enhances the user's perception of and interaction with the real world. While virtual reality completely immerses users in a synthetic world without seeing the real world, augmented reality magnifies the sense of reality by superimposing virtual objects and cues upon the real world in real time (Carmigniani, Furht, Anisetti, Ceravolo, Damiani, & Ivkovic, 2011).

According to Augmented Reality for Enterprise Alliance (n.d.), the first prototype augmented reality system was piloted for wire harness routing in the airplane production facility in the late 1980s. Caudell and Mizell from Boeing created the phrase augmented reality while helping workers assemble wires and cable for an aircraft in 1992 (Caudell & Mizell, 1992). They also started discussing the advantages of augmented reality as opposed to virtual reality, such as requiring less power because fewer pixels are needed. In the same year, Rosenberg and Feiner (1993) developed an augmented reality fixture for maintenance assistance, demonstrating that the operator performance enhanced by added virtual information on the fixture to repair (Cipressor et al., 2018). Feiner, MacIntyre and Seligmann (1997) developed an early prototype of a mobile augmented reality system (MARS) that registers 3D graphical tour guide information with buildings and artifacts the visitor sees (Van Krevelen & Poelman, 2010).

At this time, true mobile augmented reality was still out of reach, but since then several applications have been developed. For example, a few years later Loomis, Golledge and Klatzky (1998) developed a GPS-based outdoor system that presents navigational assistance to the visually impaired with spatial audio overlays. Soon computing and tracking devices became sufficiently powerful and small enough to support graphical overlay in mobile settings (Van Krevelen & Poelman, 2010). Thomas et al. (2000) created ARQuake, a mobile augmented reality video game. In 2008, Wikitude developed Wikitude Drive, which allows users to display user generated virtual object on top of a camera view. Wikitude Drive is the first application for mobile augmented reality that utilizes a handheld device and was used to guide drivers to a specific location using their mobile device (Balagang & Baharum, 2017). In 2009, other augmented reality applications, such as AR Toolkit and Site Lens have been developed in order to add virtual information to the physical user's surroundings (Cipressor et al., 2018).

It was not until the year 2010 that computer technology advanced enough to support the development of truly immersive virtual reality and augmented reality systems that could reach mass appeal (Pelargos et al., 2017). Large corporations quickly began developing virtual reality and augmented reality systems including the Oculus Rift, from Oculus VR and Facebook, HTC Vive from HTC and Valve Corporation, PlayStation VR from Sony Corporation, Samsung Gear VR from Samsung Electronics, and HoloLens from Microsoft Corporation. In 2011, Total Immersion developed D'Fusion, and augmented reality system for designing projects. More recently, Google developed Google Glass and Google Hololens in 2013 and 2015, respectively (Cipressor et al., 2018).

The Application of Virtual Reality in the Education Setting

The advancement of virtual reality technology has influenced the teaching methods in higher education. In the paragraphs below, the authors discussed how virtual reality is currently being utilized in higher education. More specifically, the applications of virtual reality in medical education and engineering are highlighted due to their prevalence in these areas. This segment concludes with how virtual reality is employed in other academic disciplines in higher education. Additionally, engineering professors currently using VR in the classroom were consulted while writing this chapter and two class activities/ assignments have been concluded at the end of the paper for readers to incorporate in their teaching. The usage of VR in the higher education area to date has been somewhat limited.

The Application of Virtual Reality in Medical Education

The majority of current applications of virtual reality focus on surgical and medical education. In the United States, medical errors are the third leading cause of death, behind cancer and heart disease. For this reason, student training is a fundamental activity in medical education which often follows the Halstedian Apprenticeship model since the early 20th century (Corrêa, Nunes, Ranzini, Nakamura, & Tori, 2019). This Halstedian method of surgical training is often exemplified as the "see one, do one, teach one" approach to training. This system depended on opportunistic encounters, particularly of the complex case mix variety, and remains tremendously time-dependent. This apprenticeship model resulted in surgical training often being prolonged in order to gain sufficient surgical experience to reach a subjective level of operative experience (Shaharan & Neary, 2014). These can range from mannequins and tangible objects to computing and hybrid systems, with a growing use of computer systems. These technologies can reduce risks for patients, increase the apprentices' certainty and enable the execution of automated user performance assessment. Additionally, these technologies can provide several levels of training, with different situations and degrees of difficulty, and minimize or eliminate the cost of keeping physical laboratories with infrastructure consisting of animals or cadavers (Corrêa et al., 2019).

More recently, there has been increasing interest in the integration of simulation-based training in curricula (Corrêa et al., 2019). Advancements in virtual reality represent some of the newest modalities being integrated into surgical practice and resident education (Pelargos et al., 2017). Virtual reality enhances the training of medical professionals due to its ability of providing an interactive and engaging educational experience (Mantovani, Castelnuovo, Gaggioli, & Riva, 2003). For example, virtual reality medical simulations deliver a tailored learning experience that can be standardized and can cater to different learning styles in ways that cannot be matched by traditional teaching. These simulations also facilitate self-directed learning, allow trainees to develop skills at their own pace and allow unlimited repetition of specific scenarios that enable them to remedy skills deficiencies in a safe environment (Ruthenbeck & Reynolds, 2017).

Current virtual training applications for healthcare differ significantly as to both their technological, multimedia sophistication and to the types of skills trained, varying from tele-surgical applications to interactive simulations of human body and brain, to virtual worlds for emergency training (Mantovani et al., 2003). The medical trainee reacts in a scenario with elements that resemble real and that can be changed and adjusted according to the targeted level of performance. This requires a time and cost investment in virtual reality simulation training. In the context of minimally invasive surgery, residents, novice surgeons, and surgeons of different levels of expertise need to learn basic skills to be trained in basic and advanced surgical procedures or to be trained in rarely encountered situations. Thus, the effectiveness of virtual reality simulation training should be evidenced for different levels of human behavior (Yiannakopoulou, Nikiteas, Perrea, & Tsigris, 2015).

The operating theater has been the primary classroom for surgeons in their apprenticeships, as the acquisition of surgical skills requires repeated exposure and opportunity for hands-on experience. However, this educational practice exposes a number of patients to increased risk at the expense of resident education. For this reason, continuous advancement of new technologies is essential in the medical area to increase resident exposure to surgical procedures and decrease patient risk (Pelargos et al., 2017). Virtual reality simulators provide basic skills training without supervision in a controlled environment, free of pressure of operating on patients (Yiannakopoulou et al., 2015).

Of the current training technologies using virtual reality, training simulations with haptic interaction are used for various medical procedures and in various medical specialties, such as palpation, laparoscopy, endovascular procedures, endoscopy, arthroscopy, and needle insertion. In the case of needle insertion, it is an important task in several simulated medical procedures: (1) palpation procedures, which assist the needle insertion task, (2) laparoscopy and arthroscopy procedures, which involve needle insertion at the suture stage, and (3) endovascular procedures, which start with needle insertion. Needle insertion involves several skills, such as navigation, handling needle steering and deformation during the insertion, using an image or a sequence of image; insertion with palpation; or insertion and extraction only (Corrêa et al., 2019).

In the case of neurosurgeons, they are constantly challenged by small anatomical corridors draped with fragile blood vessels and critical neural structures that often lie within millimeters of their surgical instruments. These procedures require vast amounts of knowledge, superior technical skill, and meticulous preparation. Due to the intricate and complex nature of neurosurgical procedures, virtual reality may become a valuable tool for education in neurosurgery. Both virtual reality and augmented reality can serve as integral tools in the pre-operative rehearsal and overall development of neurosurgical skills (Pelargos et al., 2017; Robison, Liu, & Apuzzo, 2011). Pelargos et al. (2017) asserted that virtual reality systems would be most useful in preoperative planning and resident education if virtual reality systems allow a certain threshold of depth of field, depth of focus, field of view, image resolution, and position tracking.

In medical education, virtual reality has been widely used at a wide range of levels, such as the nurse education in a collaborative immersive system, medical training in a virtual hospital, medical professional training, to a simulated caries removal exercise dental students to show the practitioners the exact movements of the expert's fingers during surgery (Freina & Ott, 2015). Additional opportunities for usage of virtual reality have continued to increase with technological advances in higher education. For example, each year more and more universities have offered virtual reality campus tours and the number of courses and programs incorporating virtual reality has increased significantly in recent years.

The Application of Virtual Reality in Engineering Education

One of the most prevalent areas utilizing virtual reality in higher education is engineering. Engineering education is predominantly descriptive and complex. In order to enhance the student's practical knowledge while complementing this shortcoming, laboratory demonstrations are commonly used in engineering education as the recognized technique. Laboratories are designed to (1) improve the student ability to investigate and solve engineering problems with appropriate levels of independent thought and creativity and also to (2) demonstrate suitable levels of reporting technical information. However, considering that industry relies on distinctive skills to innovate and compete, educational institutes must prepare for emerging technologies. Virtual reality is an appropriate technology for enhancing the effectiveness of teaching and learning and ultimately aiding students' successful transition into their careers in the industry (Abulrub, Attridge, & Williams, 2011).

Currently, virtual reality is widely used in the industry and is becoming more and more affordable for end users. Since higher education students want to be well-prepared for their professional life, they expect more courses with practical application of theoretical knowledge acquired during their studies (Häfner, Häfner, & Ovtcharova, 2013). With the increasing demand for innovative in higher education for engineering, and with the advancement in 3D visualization technologies and computer hardware, a growing range of engineering teaching and training material is utilized in virtual reality environments (Abulrub et al., 2011).

In earthquake engineering, virtual reality is integrated into courses to enhance a learning process focused of earthquake-resistant structures and their impact on the prevention of human losses, damage to property and high infrastructure repair costs. In particular, the virtual earthquake engineer lab is a useful teaching and learning tool for different fields of earthquake engineering, such as structural dynamics, geotechnics, and structural analysis. The virtual earthquake engineering lab is an open-source platform that enables user interaction with models that are representative of reality via animations and simulations, which contribute to the understanding of concepts and the interpretation of results. The virtual earthquake engineering lab aids students in understanding concepts for visualization and interpretation of results. Furthermore, virtual earthquake engineering lab supports the teaching-learning process by facilitating meaningful participation of students both inside and outside the classroom, which enhances interactive self-learning (Guerrero-Mosquera, Gómez & Thomson, 2018).

Virtual reality has been rapidly recognized and implemented in construction engineering education and training in recent years due to its benefits of providing an engaging and immersive environment. The virtual reality technologies adopted for construction engineering education and training evolve over time, from desktop-based virtual reality, immersive virtual reality, 3D game-based virtual reality, to building information modelling (BIM)-enabled virtual reality. These technologies have been applied in architecture and design visualization, construction health and safety training, equipment and operational task training, and structural analysis (Wang, Wu, Wang, Chi, & Wang, 2018).

Civil engineering requires students and practitioners to visualize and understand complex geometries, which justifies the use of advanced tools to support them. Students who do not yet realize the full scope of the field may benefit from an immersive environment where they can actively interact with the virtual scenario. More specifically, an immersive virtual reality interface helps students navigate through a 3D model of an actual building and discover construction solutions that are normally hidden in civil engineering. The interface is based on a BIM of buildings, which expedites the process of developing virtual environments. The use of a HMD provides an immersive experience that would otherwise requires a visit to the construction site (Dinis, Martins, Carvalho, & Guimarães, 2017).

The Application of Virtual Reality in General Higher Education

Although medicine and engineering have been prevalent areas in higher education utilizing virtual reality, a growing body of research suggests that virtual reality can be effective in math education, science education, foreign language education, computer science education, and physics education (Freina & Ott, 2015; Parong & Mayer, 2018). Mikropoulos and Natsis (2011) found several educational contexts suited for virtual environments. These contexts included, the exploitation of the characteristics and features of virtual reality in the learning process, the contribution of educational virtual environments to positive learning outcomes, and the pedagogical approaches followed in the educational virtual environments were mostly science and mathematics topics in schools and colleges. These mainly concern information and knowledge organization, concepts and notions out of the everyday experiences, experimental nature of phenomena, spatial perception and orientation, visual perception.

Parong and Mayer (2018) studied instructional effectiveness of immersive virtual reality by examining the usage of a desktop slideshow as media for teaching scientific knowledge in a college context. First, college students viewed a biology lesson about how the human body works either in immersive virtual reality or via a self-directed PowerPoint slideshow on a desktop computer. In the following experiment, students either viewed a segmented virtual reality lesson and produced a written summary after each segment or viewed the original, continuous virtual reality lesson as in the first experiment. Parong and Mayer (2018) found that students who summarized the lesson after each segment performed significantly better on the posttest and the groups did not differ on reported interest, engagement, and motivation. That is, students' interest can be primed with a virtual reality lesson while still being an effective medium to convey scientific information compared to traditional lesson setting.

The Importance of Immersion in Virtual Reality Education

In our rapidly changing society, it is becoming more and more difficult to predict or imagine the tasks in professions. According to Dede (2009), immersion through virtual reality educational activities can be critical in supplying students with a state-of-the-art education which prepares students for the challenges and activities they will face in our technology-enhanced world. For example, students need to learn to solve problems as part of an interactive and distributed team, in preparing for facing challenges in their future careers which actually are too big to be solved, or perhaps event conceptualized, by individuals acting alone. Leaners also need to learn to *find* or *define* problems, before they leap forward to *solve* the problem. In order to do this, students must be more aware of self, of others, and of situations, environments, possible futures, and possible outcomes and effects. Modern learners must acquire the skills associated with self-guided and group reflection. Students must also become more proficient at making meaning out of complex reality to succeed in the tasks which they will face. Dede (2009) further pointed out necessary skills for students, included creating and making use of sophisticated models, representations, and tools, noticing and identifying patterns, and reasonably communicating with others who hold different perspectives. These skills can be effectively learned by participating in interactive and immersive virtual reality educational activities (Dede, 2009).

Virtual reality is distinguished by its ability to provide an unprecedented level of engagement for the user (Ankomah & Vangorp, 2018). Virtual reality allows humans to experience events and partake in a computer-generated environment as if they are physically in that environment (Ankomah &Vangorp, 2018; Li, Yi, Chi, Wang, & Chan, 2018). That is, virtual reality represents effort to in creating a virtual environment with visual and immersive aids to let users feel a real sensation (Li et al., 2018). As discussed in the "The Importance of Immersion in Virtual Reality Education" section, the application of virtual reality to higher education has great prospects for new opportunities in teaching and learning, as virtual reality has the potential to create an immersive learning environment compared to traditional teaching. For instance, 3D learning environments have been shown to increase learner motivation, engagement, enhance spatial knowledge representation, improve contextualization of learning, and develop superior technical abilities (Dalgarno & Lee, 2010; Hedberg & Alexander, 1994). For instance, a VR user may learn how to land an airplane smoothly in bad weather conditions by using a VR simulator to enhance spatial knowledge/awareness. However, virtual 3D environment is not necessary to be established based on a real environment since virtual reality attempts to replace a user's perception of the surrounding world with a computer-generated artificial 3D environment (Li et al., 2018).

Considering the potential virtual reality has in the university setting, it is important to examine how immersion works in virtual reality applications. According to Slater, Linakis, Usoh, and Kooper (1996), immersion refers to what the virtual reality technology delivers from an objective point of view. The more a system delivers displays and tracking that preserves fidelity in relation to their equivalent real-world sensory modalities, the more the system is immersive. According to Bolter (2000), transparent immediacy is considered a new form of media that thinks of itself as *interfaceless* by making the medium indiscernible. For example, written words are an interface for speech while virtual reality is a self-contained world that is experienced. Lee, Park, Lee, and Kim (2017) explained transparent immediacy as a property of virtual reality that allows users to forget the existence of media and believe that they are immersed in the virtual world. They further pointed out that immersion is the most important feature of virtual reality.

Immersive virtual reality can enhance students' knowledge construction. According to Sampaio, Ferreira, Rosário, and Martins (2010), the interaction allowed by 3D geometric models could end to passive teaching attitudes, which are often found in traditional academic teaching situations. Students comprehend knowledge more effectively when they have the freedom to move and engage in self-directed activities within their learning context. Students invest mental effort for the construction of conceptual models that are both consistent with what they already understand and with the new content presented while finding and structuring content independently (Mantovani et al., 2003). According to McGuire (1996), this active process allows students to reach understanding of the world through an ongoing process of making sense out of new information by creating their own version of reality instead of simply receiving the author's view. When students independently accommodate this process, the effective adaptation of old knowledge to new leads to understanding and success is also intrinsically motivating. When students effectively adapt their old knowledge to new, they fully understand what they learn. Additionally, when the students completely control this adaptation process, their success is intrinsically motivating. Simulation of the real world provided by virtual reality provides students the opportunity to learn when they are situated in the context where what they learn is applied. This may result in more meaningful and effective learning, as compared with learning out of context. To the extent that immersion in a virtual world allows the same type of natural interaction with objects that participants engage with in the real world, actions in virtual environments can assist this process of knowledge construction (Mantovani et al., 2003).

According to Mantovani et al. (2003), virtual reality can be an alternative method for presentation of material, as well as new forms and methods of visualization. Its use can be very important in domains where information visualization is needed, such as manipulating and rearranging information using graphic symbols including math and science. It is also useful when it is needed to make perceptible the imperceptible (e.g., as a means to teach abstract physics and biological concepts which are often part of health-care professionals' curricula). Virtual reality allows observation and examination of areas and events unavailable or impossible by other means. This could include a simulation of traveling inside the human body. Additionally, it allows close-up examination of an object and observation from a great distance. Virtual environments can also be a good solution when teaching or training using the real object is dangerous (e.g., there is risk of injury to the patient), or for logistic reasons (e.g., the possibility of training without moving from the laboratory or the clinic). Virtual reality can also provide effective training in situations requiring the use of equipment that is prohibitively expensive or impossible to obtain otherwise (Mantovani et al., 2003).

The importance of immersion can be highlighted in the medical and surgical education. Although surgeons must acquire surgical skills through repeated exposure hands-on experience, this training process exposes patients to increased risks at the expense of resident education (Pelargos et al., 2017). Immersive virtual reality can increase resident exposure to surgical procedures and decrease patient risk (Pelargos et al., 2017). According to Pulijala, Ma, Pears, Peebles, and Ayoub (2018), self-confidence of surgeons influences their performance, the professional satisfaction and success in the future. In particular, improvement in self-confidence is vital for novices in their early stages of training to help them to react appropriately in stressful circumstances. However, 28-40% of all the novice residents are not confident in performing a major procedure, which can lead to unintended incidents during surgery (Pulijala et al., 2018). Immersive virtual reality can enhance not only surgical skills and knowledge but also self-confidence.

Pulijala et al. (2018) examined the impact of virtual reality surgery on the self-confidence and the knowledge of surgical residents. In their study, using an Oculus Rift development kit (DK2) virtual reality headset and a Leap Motion controller, virtual reality surgery application has been utilized to demonstrate Le Fort I maxillary osteotomy, a corrective jaw surgery. Le Fort I maxillary osteotomy is a complex procedure, which lacks adequate training tools. Furthermore, a constrained surgical field that is often covered by surgeon's hands makes it difficult for the residents to fully observe and master this procedure. In order to address these challenges, they highlighted non-technical skills, such as, factual knowledge, cognition and decision making, through an enhanced visual experience. The three essential elements of virtual reality surgery were a 360-degree experience of an operating room, close-up stereoscopic visualization of surgery, and 3D interaction. 360-degree video created a sense of presence in the operating room when watched on an Oculus Rift headset. A computer generated model of the operating room allows the residents to navigate and interact with 3D models of patient's data, instruments and anatomy. Pulijala et al. (2018) found that surgical residents highly appreciated the immersive 360-degree operating room ambience, 3D interactivity with anatomy and data, and close-up visualization of surgery. They concluded that experiences in the immersive virtual reality surgery application on an Oculus Rift with Leap Motion device improved the knowledge and self-confidence of the surgical residents.

Shared virtual reality can encourage collaboration and foster the learning of skills that can be better developed through shared experiences of a group in a common environment. It is most useful when the experience of creating a simulated environment, or model is important to the learning objective. Virtual reality learning also offers the possibility to be tailored to learner's characteristics and needs. Students are allowed to proceed through an experience at their own pace, and during a broad time period not fixed by a regular class schedule. Additionally, well-designed virtual environments can flexibly present students a broader, deeper set of experiences than those that can be found in the standard educational environment (Mantovani et al., 2003).

CASE STUDIES OF VIRTUAL REALITY USAGE IN THE EDUCATIONAL SETTING

In this section the authors provided specific examples of the application of virtual reality in the higher education setting. This included examples from both healthcare and non-healthcare settings as well as both public and private universities. Virtual reality has been utilized in the healthcare education setting for several years now, but educators have only recently started to use virtual reality in other educational settings. According to Ohu (2019), it is very challenging to find case studies in the educational setting in academic journals and conference presentations because virtual reality is still a very new, developing area to adopt in classrooms. For example, Ohu (2019) mentioned that he has only seen one virtual reality case study presentation at a conference. Although he had asked the presenters to share the case study, they refused to share it due to the novelty of the topic. This section provided a blueprint for other educators interested in using virtual reality in their curriculum. Also, this section summarized how virtual reality has been used in college student recruitment (Cipresso et al., 2018).

In our research for this chapter the authors found that many researchers and universities currently use virtual reality for various types of medical simulation, training, and even treatment of medical conditions. Non-healthcare uses of virtual reality technology seemed to be increasing, but healthcare training seemed to be the primary use of virtual reality by many colleges and universities. There has also been a recent proliferation of virtual reality as an alternative for students to visit a college campus virtually. Additionally, while very few colleges and universities currently offer degrees in virtual reality or augmented reality a few schools have recently added degree programs in these areas and these programs tend to focus on art and media. Table 1 lists some of the colleges and universities that currently offer virtual reality courses that focus on very specific uses of virtual reality and Table 2 lists some of the institutions of higher education that offer majors in virtual reality or augmented reality. After thorough research, the authors believed that virtual reality specific courses and majors will continue to be added worldwide and there is significant growth potential in this area of higher education. The case studies below provided a good starting point for professors and administrators who are looking for ideas about how virtual reality can be integrated into their courses and universities (All Virtual Reality, 2019; Cipresso et al., 2018; Freina & Ott, 2015).

It should be noted that when the authors were gathering background information for this chapter they found that very specific information regarding the usage of virtual reality in higher education was very hard to find or proprietary. The authors contacted professors at multiple universities in both healthcare and non-healthcare settings to ask for specific assignments and examples of VR usage in the classroom. The authors consistently received two main responses from the professors regarding VR usage for higher education learning. First, the authors were told that the VR assignments were participation based or still in the preliminary stages of development. Secondly, the authors were told that all VR assignment information was proprietary and could not be disseminated at this time. The authors believe this is due to the fact that only a relatively small number of universities are offering these types of assignments or majors at this time. Consequently, the authors had to focus on synthesizing available information from university websites and previous research to develop this chapter. It is the belief of the authors that as more universities add these types of experiences, courses, and majors related to VR there will be more of a widespread sharing of information. Additionally, the authors would like to point out that information related to engineering education using VR was particularly hard to find because the engineering professors we contacted seemed to be in working on patents or developing unique educational experiences that they were unwilling to share at this time. More specifically, the engineering professors we contacted mentioned that they were in the process of creating unique content for VR education that could be marketed and sold to other educators who were using the same hardware.

Case Studies in Healthcare Settings

Early uses of virtual reality in higher education occurred in the healthcare setting and several professors and universities currently use virtual reality for two main reasons including healthcare simulation and training/research and treatment of specific ailments. This section focused on each of these topics and used one specific case for each subsection. As virtual reality technology continues to advance and immersion improves, it is expected that virtual reality will have new and exciting medical and non-medical applications (Cipresso et al., 2018; Freina & Ott, 2015).

Virtual Reality for Healthcare Training and Simulation

Researchers at the University of Buffalo have created an advanced simulator for robotic surgery training. The RoSS robotic surgery simulator developed by a professor at the University of Buffalo and a surgeon from the Roswell Park Comprehensive Cancer Center is used in a way similar to a flight simulator. This simulator debuted in 2010 and has been used to train future surgeons in robot assisted surgery using virtual reality. The number of robotic surgeries is increasing exponentially and this lab specifically focuses on haptic technology, which brings a feeling of touch to virtual reality surgical training. Robot assisted surgeries are typically viewed as safer than traditional surgeries and are used for a variety of surgeries including gynecologic, gastrointestinal, cardiothoracic, pediatric and other urologic surgeries (University of Buffalo, 2019).

As another example, the MedVR lab housed in the University of Southern California (USC) Institute for Creative Technologies, utilizes virtual reality to train medical students for mental health therapy, motor skills rehabilitation, cognitive assessment and clinical skills training. Specifically, researchers in this lab have found the benefit of using virtual reality to treat stress related disorders and this includes creating interactions with virtual humans for everything from wellness assessments to treating Post Traumatic Stress Disorder (PTSD) (USC ICT, 2019). In our research the authors found that several universities have recently added labs and medical simulation centers for virtual reality training, but treating medical ailments with virtual reality applications seems to be a new trend.

Virtual Reality for Healthcare Research and as a Medical Treatment

While researching this chapter, the authors found that Newcastle University in Tyne, England specifically focuses on using virtual reality to treat and research various neurological conditions. It appeared that the majority of virtual reality labs are developed for training and research, but a few universities like USC and Newcastle have recently shifted their focus to the treatment of specific medical conditions. Researchers at the Institute for Neuroscience at Newcastle University have conducted several studies using virtual reality and augmented reality as a treatment (University of Newcastle, 2019).

For instance, a recent study published by researchers at Newcastle University found that immersive virtual reality helped children with Autism reduce anxiety and fears related to real-life situations. More specifically, virtual reality allowed students participating in the study to experience stressful real-world situations in the virtual setting prior to experience these situations and significantly reduced their fears and stress levels. This allowed children with Autism to participate in activities that they never did in the past due to fear and the researchers are currently pilot testing this protocol as a treatment for children with Autism (Maskey et al., 2019). The University of Newcastle virtual reality medical research and treatment programs have been so successful that they have recently expanded the use of virtual reality as an educational tool for a variety of disciplines and this is discussed in detail in the next section.

Case Studies in Non-Healthcare Settings

The use of virtual reality as an educational tool has expanded in recent years and virtual reality is now being used for more than just medical research and training. The University of Newcastle recently launched the Simulation Technology Evaluation Pilot (STEP) Program to increase student engagement and offer education options for courses/activities that may be too costly or dangerous to offer in a traditional classroom setting. For example, virtual reality can be used to teach midwifery and give students the opportunity to attempt neonatal resuscitation virtually with a lifelike baby. The University of Newcastle believes this can be scalable across many disciplines and students could investigate a virtual crime scene or perform a search and rescue mission in a dangerous fire simulation (Johnston, 2018). From an educational standpoint, it appears the possibilities are endless for applying virtual reality as a cost effective and safe educational tool. With that being said, another area outside of healthcare that is seeing significant usage of virtual reality is art and design.

Drexel University has integrated virtual reality into its new Virtual Reality and Immersive Media B.A. degree program. This area of study teaches students how to create immersive virtual reality and augmented reality content that incorporates 360 degree video and interactive 3D content creation. One of the projects recently completed by Drexel Virtual Reality students was a 360 degree video tour of the National Academy of Natural Sciences museum. While researching this chapter, the authors found that virtual content creation seems to be an emerging area in the virtual reality workforce and this could lead to a significant number of jobs in the near future and additional college degree programs and courses in this area. Faculty members in the Drexel University Virtual Reality and Immersive Media program pointed out that the cost of virtual reality continues to decrease and consequently the educational experiences have become more feasible recently (Drexel, 2019).

As the cost of virtual reality hardware and the educator learning curve have continued to decrease the opportunities for educators to use virtual reality in the classroom has increased significantly. While some faculty members have barely progressed from using chalkboards and PowerPoint slides, a small group of faculty members from all types of higher education institutions have embraced the usage of virtual reality as an educational tool. Professors can be trained on how to use virtual reality hardware such as the Oculus Rift in as little as a few weeks and virtual reality software has become much easier to use for faculty from all disciplines. For as little as a few hundred dollars a professor can get the hardware and software necessary to implement virtual reality in the educational setting. For instance, for approximately $500 a geology professor can create a 3D lesson that allows students to examine vast collections of rare minerals that they would be unlikely to ever see in the real world. Virtual reality used to be for the elite universities with very large research budgets, but it is now an affordable educational tool that can be used with minimal training by the instructor. This has not gone unnoticed by higher education administrators and admissions office (Lieberman, 2018).

Additionally, virtual reality can be also be used as a recruiting tool for future students and more than 600 colleges worldwide have created virtual reality college visits for students that allow students to tour a college campus without actually physically visiting the campus (You Visit, 2019). High school students are increasingly skipping college campus tours and they increasingly rely on university websites and virtual reality tours for the information they need when making a college choice (Reischer, 2017). Virtual reality seems to have many potential uses for higher education and the virtual reality market size is expected to reach $33 billion by 2024, which is approximately 55% growth from 2018-2024 (Market Watch, 2018). The authors of this chapter noticed despite the significant growth and potential virtual reality in higher education still has several limitations and barriers to entry that are discussed in the next section of this chapter (Cipresso et al., 2018).

LIMITATIONS OF VIRTUAL REALITY AS AN EDUCATIONAL TOOL AND RECOMMENDATIONS

In this section, the authors addressed the current limitations of virtual reality as an educational tool and provide specific recommendations for educators to integrate virtual reality in their teaching. The limitations focused on cost, immersion technology, and educational effectiveness. A significant number of studies have demonstrated that while virtual reality is improving as an effective educational tool, it is currently severely limited by both cost and immersion technology (Cipresso et al., 2018).

As mentioned in the previous section, virtual reality technology is becoming increasingly affordable and the barriers to entry are decreasing. However, it is still rather expensive to buy all of the hardware and software components necessary for an entire class or program to fully utilize virtual reality for educational purposes. For instance, currently the Oculus Go headset costs approximately $200, but specialized software and add on components such as high quality headsets and Haptic VR suits can costs thousands of dollars. Additionally, omnidirectional treadmills can really add to virtual reality experience, but they currently cost about $4,000 or more and software that uses all of these features is limited. In other words, very immersive, high quality virtual reality educational experiences currently exist, but they are much more expensive than a basic entry into virtual reality.

High quality virtual reality software can also be very expensive as it requires a significant amount of development due to the 3D nature of the experience. For instance, the Google Expeditions software and required components costs around $380 per student if you have 10 students or more. This software allows students to visit places like The Leaning Tower of Pisa without visiting Italy and offers a fully immersive experience. It seems that currently the most affordable and practical educational applications of virtual reality are limited to viewing and interacting with limited environments such as a museum exhibit or one aspect of surgery. For example, there are virtual reality applications that help students conduct a simulated heart surgery, but there doesn't seem to be applications available that give students the opportunity to act as a virtual doctor and simulate all aspects of working as a surgeon at a hospital such as patient interaction, surgery, healthcare billing, etc.

In brief, despite the decreasing costs of virtual reality hardware and software, universities and academic programs may still need to contribute a significant amount of financial resources to purchasing or developing customized hardware and software components to achieve their learning outcomes. The next section addresses the need for future research in this area and this field is advancing very quickly so future research is imperative.

FUTURE RESEARCH DIRECTION

Based on a comprehensive literature review and examinations of case studies, suggestions are provided for future research. Considering the current applications of virtual reality, future research should look at how specific types of virtual reality and augmented reality impact student recruitment, retention, and learning in the higher education setting. Researchers should also consider the potential for virtual reality to be used as a medical treatment tool and a way to create immersive content that allows students to visualize and complete certain tasks that are dangerous or expensive. For instance, virtual reality could be used as an alternative to study abroad, visiting a museum, or investigating a crime scene. As more colleges continue to add virtual reality specific majors and minors, investigators should research the potential uses for virtual reality in a variety of educational settings. As the cost for virtual reality and virtual reality components continues to decrease, there is significant potential for additional uses of virtual reality in higher education.

Additionally, future research should include examples of virtual reality specific assignments for students and which apps to purchase or use as faculty members may have limited training in this area. It should also be noted that virtual reality headsets and components are becoming more user friendly and faculty members and students without a computer science background should be able to learn how to use them with minimal training. The authors of this chapter contacted several professors who use virtual reality and it seems that virtual reality usage is still limited to a few class activities or assignments at most universities and only a small number of universities currently offer virtual reality majors or minors.

CONCLUSION

Virtual reality has almost six decades of history and has experienced enormous changes and advancement in its technologies. A number of researchers and educators saw a great potential of virtual reality for enhancing the effectiveness of teaching and learning in the higher education setting. For example, the immersive feature of virtual reality provides safe and realistic learning experience with learners. In the case of medical education, the immersive virtual reality can immensely reduce risks that educators, students, and patients may encounter while students are trained with actual patients. Additionally, virtual reality has been more applicable to higher education as virtual reality experiences technology advancement and lowered costs. For example, faculty members are able to utilize virtual reality headsets in their courses because several virtual reality headset models are available under $500. Virtual reality can also reduce time and costs due to simulated experiences it provides. However, despite the advancement of technology and reduced costs of the virtual reality equipment, some issues still exist. For example, the cost barrier is still very high to develop and customize software programs and/or some equipment for courses and training programs. Future researchers need to address these issues to enhance the effectiveness of education and applicability of virtual reality in higher education.

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KEY TERMS AND DEFINITIONS

Augmented Reality: A real-time direct or indirect view of a physical real-world environment that has been enhanced or augmented by adding virtual computer-generated information to it.

BOOM: Binocular-Omni-Orientational Monitor is a complex system composed by a stereoscopic-displaying device, providing a moving and broad virtual environment, and a mechanical arm tracking.

CAVE: CAVE is a recursive acronym that stands for cave automatic virtual environment. CAVE is an interactive, real time, three-dimensional visual, auditory, and haptic environment which extrapolates and expands the immersive properties of such synthetic surroundings to a novel extent.

Virtual Reality: An artificial environment or a technology that allows a user to interact with a computer-simulated environment.

APPENDIX

Virtual College Tour Worksheet
Name:
Remember to think about the landscape, important facts and adjectives to describe what you are looking at.

Table 1. Colleges and universities that offer virtual reality training courses

Type of University	University	Country	Focus
Public	Iowa State University	US	Interaction between humans and computers
	Macquarie University	Australia	Training simulations
	Nanyang Technological University	Singapore	Media innovation and immersion
	Newcastle University	England	Medical simulation
	Norwegian University of Life Sciences	Norway	Data visualization and interaction
	Rowan University	US	Architecture models
	University of Buffalo	US	Surgical simulations
	University of Adelaide	Australia	Geoscientific analysis
	University of Maryland	US	Design of Smart Structures
	University of Pittsburgh	US	Posture analysis to treat balance disorders
	University of Minnesota	US	Digital design
	University of Reading	England	Analysis of the brain's ability to view immersive 3D
	University of Twente	The Netherlands	Facilitating multi-stakeholder decision making processes
Private	Multimedia University	Malaysia	Real time experiential design
	Stanford University	US	Virtual reality simulations
	University of Southern California	US	Medical simulation

(Source: All Virtual Reality, 2019)

Table 2. Colleges and universities that offer virtual or augmented reality majors/certificates

Type of University	University	Country	Program
Public	University of Washington	US	BSc in Computer Science or Computer Engineering with a specialty in VR
	Deakin University	Australia	Graduate Diploma of Virtual and Augmented Reality
	Ryerson University	Canada	BSc (Hons) in Computer Science with a specialty in VR
	University of British Columbia	Canada	BSc (Hons) in Computer Science with a specialty in VR
Private	Drexel University	US	Virtual Reality and Immersive Media, B.A.
	Columbia College Chicago	US	Augmented and Virtual Reality Professional Certificate
	London College of Communication	England	Virtual Reality, B.A.

(Source: Circuit Stream, 2019)

Figure 1. Virtual college tour lesson plan

Visit a Potential Graduate School	
Oculus Rift Activity: Virtual Campus Tour	**Class: Junior or Senior**
Learning objective	Prepare students to write a brochure to persuade tourists to visit one of the Seven Wonders of the World.
Resources/materials	- Smartphone - Oculus Rift - Note-taking table for virtual campus tour
Initial Activity (5 minutes)	Ask students about their interest in attending graduate school. Quiz students about graduate program rankings, university size, and recreational/athletic facilities. *(Hand out the note-taking template to students)*
Main activity (12 minutes)	Show the students youvist.com and have them explore and split their time as follows: - 5 minutes to explore the campus (encourage students to think of: the city/area, the landscape, weather, adjectives, etc.) - 5 minutes for students to make notes - 2 minute to share their observations and notes with a partner *(Make sure you provide students with some facts about each campus so that they can write these in their notes)*
Conclusion (10 minutes)	
Follow up	Let students use the template in a subsequent lesson to complete another. Ask the students to pick a university that they feel most confident describing. Ask them to briefly write why they have chosen that particular campus to explore and describe. Have students present their findings to a partner and eventually the class.

Figure 2. Planning the development of a virtual reality CPR training program

Planning the Development of a Virtual Reality CPR Training Program	
Virtual Reality CPR Training Program Development Process	**Class: Graduate**
Learning objective	Help engineering students develop a virtual reality CPR training program so they can become certified CPR trainers and train other students, faculty, and staff.
Resources/materials	- XSens 3D motion tracking - Laptop or PC - Note-taking tablet for a CPR observation
Initial Activity (20 minutes)	Instructor will have an EMT who can demonstrate CPR in the classroom. The EMT will give a presentation about the basics of CPR.
Main activity (40 minutes)	Students observe EMT performing CPR and take notes. Split their time as follows: - 8 minutes for the EMT to demonstrate CPR in the classroom as students observe the demonstration - 7 minutes for students to take notes (Students will need to figure out points of body with movement on the EMT during the demonstration so that they can attach movement trackers in correct locations on the EMT to track the movement.) - 5 minutes to share their observations and notes with the class - 20 minutes to formulate the plan for the motion capturing
Conclusion (10 minutes)	
Follow up	Let students create a timeline for their virtual reality CPR training program project. Have students present their findings to a partner and eventually the class.

The Past, Present, and Future of Virtual Reality in Higher Education

1. University of Minnesota	**City/area:** **Landscape:** **Facts:** **Adjectives:**
2. Penn State University	**City/area:** **Landscape:** **Facts:** **Adjectives:**
3. The Ohio State University	**City/area:** **Landscape:** **Facts:** **Adjectives:**
4. University of Michigan	**City/area:** **Landscape:** **Facts:** **Adjectives:**
5. Northwestern University	**City/area:** **Landscape:** **Facts:** **Adjectives:**
6. University of Notre Dame	**City/area:** **Landscape:** **Facts:** **Adjectives:**
7. University of Louisville	**City/area:** **Landscape:** **Facts:** **Adjectives:**

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Chien Yu is a Professor in Mississippi State University. She has published numerous articles and book chapters in a variety of national refereed journals and books, and made many presentations at national/ international conferences in the areas of distance learning, multimedia instruction, instructional design and technology, and educational leadership.

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