2018

mLearning Device Usage and Self Efficacy By Higher Education Faculty for Professional Activities: A Case Study

Elbert Davis
davis513@marshall.edu

MLEARNING DEVICE USAGE AND SELF EFFICACY BY HIGHER EDUCATION FACULTY FOR PROFESSIONAL ACTIVITIES: A CASE STUDY

A dissertation submitted to
the Graduate College of
Marshall University
In partial fulfillment of
the requirements for the degree of
Doctor of Education
in
Curriculum and Instruction
by
Elbert Davis
Approved by
Dr. Ronald B. Childress, Committee Chairperson
Dr. Lisa A. Heaton
Dr. Edna Meisel
Dr. Louis Watts

Marshall University
March 2018

SIGNATURE PAGE

I hereby affirm that the following project meets the high academic standards for original scholarship and creative work established by my discipline, college, and the Graduate College of Marshall University. With my signature, I approve the manuscript for publication.

Project Title: mLearning Device Usage and Self-Efficacy by Higher Education Faculty for Professional Activities: A Case Study

Student's Name: Elbert Davis

Department: Curriculum and Instruction

College: Marshall University

Committee Chairperson

03/29/2018 Date

ii

ACKNOWLEDGEMENTS

I would like to express my sincerest gratitude to all those who helped me during the dissertation process. Without them, this project would not have been completed.

To my dissertation committee, Dr. Lisa Heaton, Dr. Edna Meisel, Dr. Louis Watts, and led by Dr. Ron Childress, thank you for the support, wisdom and suggestions throughout. Dr. Childress, thank you for stepping in as my chair when my original chair passed, and the extra push I needed. Drs. Meisel and Watts, thank you for stepping in as committee members when we lost another member. Dr. Heaton, thank you for the encouraging talks at your office door, along with the guidance you provided.

To Dr. Jessica Hanna for the encouragement and for stepping up when I needed you.

To two of my original committee members who are no longer with us, Dr. Fred Pauley, my original dissertation chair, and Dr. Michael Galbraith, thank you for your contributions during the beginning of the dissertation process.

To my brother, Randy, mom, Lovena, and late father, Okey, thank you for always believing in me and instilling the strong work ethic that you have. Dad, I wish you were around to see this finished.

To my beautiful fiancé, Ashley Elam, thank you for your unwavering support, patience, and taking care of everything while I stayed late at the office, or worked weekends to finish. To Annika Elam and Aracoma Richards, thank you for understanding when I had to work a lot. We have a lot to catch up on this summer, little ladies.

Finally, to Dr. Sebastian Diaz for convincing me to apply for admission to a doctoral program.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

This study examined the level of use and the level of self-efficacy use of mLearning devices for faculty at one university. The study also examined the relationship between use and self-efficacy levels, and the challenges faced by faculty members concerning the use of mLearning devices for professional activities. A mixed-methods model was used to complete the study. A 17-item self-report survey was developed by the researcher to determine the frequency of use, and the self-efficacy level of faculty concerning professional activities. An interview protocol was used to collect additional information from selected respondents. Findings indicated statistically significant differences in mean level of use scores for each of the 17 professional activities, but no overall significant differences in mean level of use scores based on selected demographic characteristics. Findings also indicated statistically significant differences in mean self-efficacy level scores for each of the 17 professional activities, but no overall significant differences in mean self-efficacy level scores based on selected demographic characteristics. Significant differences were found in the relationship between level of use and self-efficacy level for 15 professional activities. The most-mentioned challenges for faculty in using mLearning devices were the small screen size, connectivity issues, the incompatibility with Blackboard Learn, the on-screen keyboard, and the comparison to using a computer.

CHAPTER ONE: INTRODUCTION

The availability and use of mLearning devices is becoming ubiquitous in our lives. As of January, 2015, 66% of American adults owned a smartphone (Mobile Technology Fact Sheet, 2015), and 42% of American adults owned a tablet computer (Mobile Technology Fact Sheet, 2015). By November, 2016, 77% of Americans owned a smartphone while 50% owned a tablet computer (Smith, 2017).

Of those owning a smartphone, 63% used the Internet via the smartphone (Mobile Technology Fact Sheet, 2014). At one university, 74% of the students owned a smartphone. Internet access by these students was 98%. Tablet ownership for students was 30% (Hanley, 2013). Classroom usage of smartphones, tablets, or laptop computers was found in 57% of college graduates, while 87% of college presidents proclaimed to use a smartphone daily (Taylor, Parker, Lenhart, & Patten, 2011).

Crompton (2013) stated that there are many different definitions of mLearning. To illustrate this, mobile learning (mLearning) is defined by one writer as "the provision of education and training on smartphones and mobile phones" (Keegan, 2005, p. 3). Based on the work of O'Malley, Vavoula, Glew, Taylor, and Sharples (2005); Traxler, (2005); Sharples, Taylor, and Vavoula, (2007); and Crompton, Muilenburg, and Berge (2013), Crompton (2013) defined mLearning as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (p. 357). El-Hussein and Cronje (2010) define mobile learning as "any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of learners and mobility of learning" (p. 20). "mLearning environment refers to the use of wireless devices like…mobile phones for the learning content delivery" (Wains & Mahmood, 2008, p. 32). mLearning is defined as "…

learning supported by mobile devices, ubiquitous communications technology, and intelligent user interfaces" (Sharma & Kitchens, 2004, p. 205). Mobile technologies provided a way to engage students with content of a course, such as using discussion boards and providing feedback to peers (Franklin & Peng, 2008; Rossing, Miller, Cecil, & Stamper, 2012; Yang, 2012). Students can easily access supplemental information from university libraries and the Internet using mLearning devices.

Most of the literature focuses on student use and self-efficacy of mLearning devices. Available literature on higher education faculty use and self-efficacy for using mLearning devices is sparse (Souleles, Savva, Watters, Annesley, & Bull, 2014).

Student and Faculty Use of mLearning Devices

There are numerous pilot programs in universities that give students access to individual mLearning devices, typically iPads (Murphy, 2011; Wagoner, Schwalbe, Hoover & Ernst, 2011). Research has been conducted on the usage of mLearning devices by college-level students (Geist, 2011; Manuguerra, 2011; Miller, 2012; Murphy, 2011; Shepherd & Reeves, 2011). Studies have also been conducted on the usage of mLearning devices at both elementary and secondary education facilities (Barbour, 2012).

Harris Interactive (2013) surveyed 1,206 college students in 2013 and found 80% of these students felt tablets could change the way material is presented in a course, while 60% expected tablets to increase the student's performance in a course. Tablets were used in academic settings by 40% of students. Previous research lists advantages of mobile learning from a student perspective, including the devices being highly portable (Klopfer, Squire, & Jenkins, 2002; Melhuish & Falloon, 2010; Sharples, 2000) provisions of individualized learning (Klopfer, et al., 2002; Melhuish & Falloon, 2010; Motiwalla, 2007; Sharples, 2000), unobtrusiveness (Sharples, 2000), connectivity (Motiwalla, 2007; Sharples, 2000), adaptability (Sharples, 2000), collaborative application (Klopfer, et al., 2002; Motiwalla, 2007; Park, 2011; Pettit & Kukulska-Hulme, 2007), better access to content (Klopfer, et al., 2002; Melhuish & Falloon, 2010; Park, 2011; Pettit & Kukulska-Hulme, 2007), and emphasis on student centered learning (Peng, Su, Chou, & Tsai, 2009).

Students tend to show interest in using mLearning devices in the classroom (Rogers, Connelly, Hazlewood, & Tedesco, 2010). Student attitudes toward using mLearning devices in the classroom tend to be positive (Cavus & Uzunboylu, 2009; Jacob & Isaac, 2007; Uzunboylu, Cavus, & Ercag, 2009; Wang, Shen, Novak, & Pan, 2009). Students tend to have a high self-efficacy toward mLearning (Kenny, Park, & Van Neste-Kenny, 2010) and would like to see instructors incorporate mLearning into the classroom (Mahat, Ayub, & Luan, 2012). Brand, Kinash, Mathew, and Kordyban (2011) found 88% of 135 undergraduate students at one university believed using mLearning devices in the classroom had reasonable or higher benefits.

"Higher level of self-efficacy results in higher levels of performance expectancy, social influence, and effort expectancy, which support higher behavioral intention…Performance expectancy had the most impact on positive behavioral intention…" (Sung, Jeong, Jeong, & Shin, 2015, p. 203) in 226 university students in South Korea. In another study, Dahlstrom, Eden, and Bichsel (2014) surveyed students in 213 colleges and universities in the United States and 15 other countries. Smartphones were owned by 86% of the students, and tablets were owned by 47% of the students. In class, 59% of these smartphone owners used their smartphone for education-related purposes during class meetings. Among tablet owners, 31% used tablets in class for instructional purposes. Some higher education institutions provide mLearning devices to students (Baldridge & McAdams, 2012), such as Bethel University, Regis College, Seton Hill

University, Illinois Institute of Technology, Georgia Fox University, Oklahoma Christian University, and Rochester College (Online Schools Offering Laptops, n.d.).

Despite the overall usage of mLearning devices by students, faculty members do not seem to take advantage of the technology in an academic context. One hundred thirty-nine faculty at a mid-sized Midwestern university were found to believe that mLearning devices could be useful in higher education teaching (Drouin, Vartanian, & Birk, 2013). Eighty-three percent believed mLearning devices could transform higher education teaching somewhat or much. Only 55% believed mLearning devices could transform service activities, and 55% believed mLearning devices could transform research activities (Drouin, et al., 2013).
Faculty members (N = 109) at an institution in the South, based on a five-point Likert scale, provided a negative response when asked if mLearning should be incorporated into face-to-face class meetings (mean=2.94), despite 92% knowing how to access the Internet from an mLearning device (Pollara, 2011). Of these faculty members, 26% had no interest in using mLearning in the classroom, while 23% indicated mLearning would be a distraction in the classroom (Pollara, 2011).

Dahlstrom and Brooks (2014) surveyed 17,452 faculty members and found 78% were interested in incorporating technology into their pedagogy despite 51% who ban smartphones during class and 18% who ban tablets from class. Only 30% of faculty created assignments that required the use of a mLearning device. Dahlstorm and Brooks (2014) also found 30% of faculty members design assignments to be used with mobile technology. Many students (47%) and faculty (67%) find smartphone/tablets to be distracting during course time (Dahlstorm & Brooks, 2014). Fifty-five percent of 224 faculty members in a United Arab Emirates study felt prepared to use a mLearning device in the classroom (Hargis, Cavanaugh, Kamali, & Soto, 2014).

Fifty-one percent of 124 faculty members in different higher education institutions across the United States cite a lack of time to learn new technologies as a factor in using technology in the classroom (Peluchette & Rust, 2005). Related to training, faculty members in India were concerned with a lack of training on mLearning, and a lack of technical support, among other barriers of 120 faculty members surveyed (Kalyani, Pandeya, & Singh, 2012).

Self-efficacy is defined as "People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986a, p. 391). Self-efficacy "…encapsulates the way that faculty members see themselves as teachers, researchers, and academic citizens as well as their beliefs about whether they can successfully complete tasks in each of these areas" (Major & Dolly, 2003, p. 91). Previous studies have found a positive relationship between computer self-efficacy and the use of technology (Agarwal & Karahanna, 2000; Fagan & Neill, 2004; John, 2015).

Problem Statement

Available literature on faculty use and self-efficacy level of mLearning devices is sparse at best. Chen and deNoyelles (2013) concentrated on undergraduate academic usage of handheld devices in central Florida, but faculty usage was not studied. Perkins and Saltsman (2010) studied iPhones and iPods with students and faculty, but did not study self-efficacy levels. More research is needed concerning mLearning device usage in higher education for instructional and professional activities (Chen & deNoyelles, 2013; Marrs, 2013; Ngyuen, Barton, & Nguyen, 2015; Park, Nam, & Cha, 2012; Perkins & Saltsman 2010). This mixed-methods study provides initial assessments of levels of use of mLearning devices for professional activities and the self-efficacy of faculty members for using these devices. In addition, differences in self-efficacy and use levels, based on selected demographic and attribute variables (age, sex, years of experience, and level taught), are investigated. Finally, major challenges to faculty use of mLearning devices are investigated.

Research Questions

The following research questions were investigated:

1. What are faculty members' levels of use of mLearning devices for professional activities?
2. What are the differences, if any, in levels of faculty members' use of mLearning devices for professional activities based on selected demographic/attribute variables (age, sex, level taught, and teaching experience)?
3. What are faculty members' levels of self-efficacy for using mLearning devices for professional activities?
4. What are the differences based on selected demographic/attribute variables (age, sex, level taught, and teaching experience), if any, of the levels of faculty self-efficacy in using mLearning devices for professional activities?
5. What is the relationship, if any, between faculty levels of use and self-efficacy for using mLearning devices for professional activities?
6. What are the biggest challenges facing faculty members in using mLearning devices for professional activities?

Operational Definitions

Age refers to the age, in years, self-reported, of responding faculty members that was measured by item two, Part B on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D. The respondents selected the best fit within the categories of 30 and under, 31-40, 41-50, 51-60, and 61 and older.

Challenges refer to the faculty member's self-reported response to an open-ended question on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D, describing the obstacles that hinder use of mLearning devices professionally.

Primary College of Respondents refers to the college, within the university which serves as the respondent's self-reported home college. The response was measured by item seven, Part B on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D. The respondents selected the appropriate response from the categories of College of Business, College of Education and Professional Development, College of Arts and Media, College of Health Professions, College of Information Technology and Engineering, College of Liberal Arts, College of Physical Therapy, College of Science, School of Medicine, and School of Pharmacy.

Faculty level of use for using mLearning devices refers to the faculty member's self-reported response to a seven-point Likert scale ranging from rarely to frequently, reporting the frequency with which they use mLearning devices to perform a selected list of professional activities. The response was collected on Part A on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D.

Faculty self-efficacy levels for using mLearning devices refers to the faculty member's self-reported response on a seven-point Likert scale ranging from not at all confident, to very confident, the self-reported self-efficacy level of the listed activity to be measured by Part A on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D.

Level taught refers to the self-reported level, undergraduate, graduate, or combination of levels of courses, that are taught by the faculty member. This variable was measured by item 4, Part B on the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D.

Sex refers to the biological characteristics of the participant as self-reported on question number two in Part B of the survey, *Faculty mLearning Device Survey*, found in Appendix D. Respondents selected the best fit between male or female.

Teaching experience—the number of years, self-reported, the respondent has taught in higher education. This variable was measured by item six, Part B on the researcher-developed *Faculty mLearning Device Survey* in Appendix D. The respondents selected the best fit within the categories of less than one year, one year to less than five years, five years to less than 10 years, 10 years to less than 15 years, 15 years to less than 20 years, or 20 years or more.

Significance of study

The primary purpose of this study was to explore faculty members' experiences with mLearning devices as a representative of technological innovation. The data and results from this study will help technology support professionals and administration in efforts to integrate mLearning devices, and to understand faculty perceptions of mLearning devices. This research added to the understanding of faculty experiences with a single technological innovation.

Numerous studies have been completed on the effectiveness of mobile learning (Al-Fahad, 2009; Baya'a & Daher, 2009; Evans, 2008; Lu, 2008; Shen, Wang, & Pan, 2008) and the potential of student learning. This study attempted to discover the level of (if any) faculty members' usage of mLearning devices and the self-efficacy level concerning the use of mLearning devices for professional activities.

According to the U.S. Department of Education, Office of Educational Technology (2010, p. 52), "We are now, however, at an inflection point for a much bolder transformation of education powered by technology." According to Nguyen, et al. (2015) the effect of mLearning devices on changing teaching and learning practices is inconclusive. Bybee and Starkweather (2006) argue that technology integration is a key component of quality teaching.

Two factors influence the adoption of technology into a classroom. The first factor is the beliefs of perceived value of the technology (Wang, Wu & Wang, 2009), which consists of perceived usefulness and perceived ease of use. The second factor that influences the adoption of technology into a classroom is the perceived self-efficacy of the faculty member (Pianfettil, 2001). This study reported the levels of mLearning device usage of faculty members and faculty members' types of professional activities used with mLearning devices.

Organization of the Study

The study is organized around five chapters. Chapter One of this study includes an introduction, statement of the problem, research questions, significance of the study, theoretical framework, delimitations of the study, operational definitions, and a description of the organization of the study. Chapter Two presents a review of the available literature relevant to the study. Chapter Three outlines the methods and procedures used to collect the quantitative and qualitative data for the study. Chapter Four presents study findings. Chapter Five presents a summary of the findings, conclusions, implications, limitations, and recommendations for further research.

CHAPTER TWO: LITERATURE REVIEW

Introduction

This chapter will review the relevant literature. The literature review contains eight sections. The first section discusses a brief history of mLearning. The second section discusses student mLearning device adoption. The third section addresses faculty mLearning device adoption. The fourth section of the literature review discusses mobile learning. The fifth section of the literature review describes self-efficacy levels related to the use of technology. The sixth section of the literature review addresses the adoption/change models. The seventh section discusses the concerns of mLearning device adoption from both a student and faculty perspective. The eighth section addresses faculty activities. The literature review was conducted using keyword searches related to the study at the Marshall University library website, http://www.marshall.edu/library, and Google Scholar, http://scholar.google.com, and using references from peer-reviewed journal articles. This literature review is not comprehensive as it relates to educational technology, self-efficacy, faculty functions, adoption patterns, or categories of use.

A Brief History of mLearning

Though mLearning is a comparatively new phenomenon, innovations in learning date back many years. In 1910, the first instructional films were used in the public school system of Rochester, New York (Reiser, 2001). In 1913, Thomas Edison believed books would be obsolete due to the rise of the motion picture. In World War II, American military troops were trained using motion pictures (Reiser, 2001). Instructional television began to take center stage in the 1950s, with closed-circuit television used to deliver instructions in Washington County, Maryland (Reiser, 2001).

Telephone-equipped cars were first manufactured in the mid-1950s, but were too cumbersome to be practical. These car telephones caused a major drain on the car's battery (Lacohee, Wakeford, & Pearson, 2003). In 1977, the first cellular telephone system, created by AT&T, was approved by the FCC (Lacohee, et al., 2003). In 1973, the first mobile phone was created, the Motorola DynaTAC 8000X, even though it was not available to the public until 1983 (Crompton, 2013). The Dynabook was the first prototype of a portable device that combined text-editing, animation, drawing, and music creation, although it was not created (Kay & Goldberg, 1977).

Distance learning, in the form of correspondence courses, has been around since at least 1728 when Caleb Phillipps offered a shorthand course via the United States Postal Service (Miller, 2014), Another example of distance learning occurred in 1833 when a Swedish newspaper advertised a correspondence course in composition (Schlosser, & Simson, 2009). In 1840, Isaac Pitman offered a correspondence course in shorthand via the penny post (Schlosser, & Simson, 2009). In 1892, the University of Chicago became the first traditional higher education institution to offer correspondence courses (Miller, 2014). In 1906, The Calvert School in Baltimore was the first primary school to offer correspondence courses (Miller, 2014).

Distance learning courses were offered to students in a variety of ways as new technologies were discovered. Some institutions used radio broadcasts in the 1920s (Miller 2014), while some universities experimented with correspondence courses via television in the 1950s, the telephone in the 1960s, and in the 1980s with online courses (Miller, 2014). In 1981, the Western Behavioral Sciences Institute launched the first completely online program with noncredit mini-courses (Feenberg, 1993). Text lectures were the dominant teaching method, although discussions were included. The first mention of mLearning occurred in 2000 by

Sharples, who discussed the potential of mLearning devices in education. Smartphones, or cellular telephones with Internet capabilities such as web browsing (Litchfield, 2010), were introduced in 2000 (Chen, Yen, & Chen, 2009).

Computers began to be used in education in the 1980s, when desktop computers could replicate the power previously used by room-sized computers (Reiser, 2001). "Educational technology has evolved steadily, from the stand-alone computers of the 1980s, to the networked, multimedia workstations of the 1990s, to the highly portable and wireless devices that are beginning to proliferate today" (Culp, Honey, & Mandinach 2005, p. 23). In the 1990s and 2000s, universities such as Michigan State, Open University, CALCampus, and Jones International University began to create online pilot programs (Miller 2014). Companies including Blackboard, Inc., WebCT, iTunes U, Youtube EDU, and Udacity, were created which attempted to design templates to make online delivery of content more uniform (Miller, 2014).

Patten, Sanchéz, & Tangney (2006) designed a functionality framework to categorize apps for handheld devices into seven categories: collaborative, location aware, data collection, administration, referential, interactive, and microworld. Collaborative consists of co-present games such as Syllable, as well as cooperative games based on a user's location, such as Savannah (Patten, et al., 2006). Location aware apps are those based on a user's environment, such as museum guides and Ambient Wood (Patten, et al., 2006). Data collection is split into three subcategories: scientific, reflective, and multimedia. Administrative apps are those such as calendars and organizers (Patten, et al., 2006). Reference apps are those such as Adobe Reader, Microsoft Word, and e-books (Patten, et al., 2006). Microworlds allow students to experience real world tasks, such as billiard games (Patten, et al., 2006). Interactive apps can be flash card apps and response apps that mimic game show buzzers (Patten, et al., 2006).

Over 170 million mLearning devices have been sold since March 2010 (Roettgers, 2013). Karlson, Meyers, Jacobs, Johns, and Kane (2009) discovered smartphones have replaced desktop personal computers as the primary computer for users in a study of 16 individuals.

In 2015, in a study of 2,188 people, 64% of American adults owned a smartphone (Smith, 2015). As the age level increased, the percentage owning smartphones decreased. Of those adults who were 18-29 years old, 85% owned smartphones; of those adults who were 30-49 years old, 79% owned smartphones; of those adults who were 50-64 years old, 54% owned smartphones; of those adults who were 65 and older, 27% owned smartphones (Smith, 2015). Of all the adults surveyed, 66% of the males, and 63% of the females (regardless of age) owned smartphones (Smith, 2015).

Student mLearning Device Adoption

According to Walker (2011), educational apps are the fourth most popular category of apps, trailing only games, books, and entertainment. As of October 28, 2013, Apple®'s mLearning devices controlled 94% of the tablet market in education (Needle, 2013). There are over 80,000 educational apps designed for Apple®'s iPad in the iTunes App Store (Apple®, 2015). Mobile learning has been accepted by students, who want access to resources anytime and anywhere, without the constraints of desktop personal computers (Lopez, Royo, Laborda, & Calvo, 2009; Wafa'N & Abu-Al Sha'r, 2009). "[mLearning] devices offer a means to maintain the physical structure of the classroom while enhancing content delivery and student productivity (Berson & Balyta, 2004, p. 145). During focus group interviews, Gikas and Grant (2013) found students enjoyed the instant access to information mLearning devices provided, as well as the ease of mobility.

mLearning devices allow the boundary of the classroom wall to be removed and extend the learning environment (Liu, 2007; Rogers, Connelly, Hazelwood, & Tedesco, 2010). Students have positive reactions toward mLearning in face to face classroom settings (Al-Fahad, 2009; Chase & Herrod, 2005). Students are more engaged with the content when mLearning is used in the classroom Al-Fahad, 2009; Miller, 2011). Seven categories of learning activities are supported by mLearning: behaviorist, constructivist, collaborative, informal, situated learning and teaching support (Naismith, Lonsdale, Vavoula, & Sharples, 2004), and social constructivist theory (Browne & Campione, 1996).

In 2002, Keegan predicted “mobile learning is a harbinger of the future” (p. 9). mLearning transforms students from passive learners to active learners. One instructor implemented mLearning through text messages for three face-to-face meetings of one English course at a Chinese university (Wang, Novak, & Pan, 2009). The instructor received 365 messages from 170 students. One hundred ten of these students participated in all three sessions. Students were to practice English dialogue, quiz questions, course feedback/suggestions, all done through text messages. Students were enticed by bonus points or a reduction in the fees for the next semester to participate (Wang, et al., 2009).

Baker, Lusk, and Neuhauser (2012) surveyed 882 students and 96 faculty members in New York, North Carolina, and Texas and found students typically spend between 1-2 hours using a cellphone daily, while faculty members spend 10-30 minutes using a cellphone daily. Thirty percent of students spend more than two hours daily using a cellphone. In another study, with 269 students at one northeastern university, 95% of the students bring a cell phone to class each day, 92% text in class every day, even if there are policies prohibiting cell phone usage during class (Tindell & Bohlander, 2012). The two most popular smartphone activities for college students are text messaging and emailing (Dean, 2010). In two universities in Australia, with 1,658 responses, 89% of students used social media for collaboration on coursework, while 73.6% used web-based documents for working collaboratively (Henderson, Selwyn, Finger, & Aston, 2015).

Brand, et al., (2011) discovered 87% of 135 students believed there was reasonable benefit or a lot of benefit in using mLearning devices as part of an undergraduate Digital Media and Society course that consisted of face-to-face meetings and an online component using Blackboard Learn. From another study of 638 students at one university, 82% of the students wanted to have the option of mLearning, but 46% of the same students did not feel mLearning should be required (Croop, 2009). Using mLearning devices in classroom settings has been shown to increase the achievement level and engagement in students in a university setting (McConathat, Praul, & Lynch, 2008; Miller, 2012; Thornton & Houser, 2005).

In a study of 200 undergraduate students and 200 graduate students at Amman College in Jordan, 80% of the undergraduate students were found to use smartphones, specifically Android phones, and 83% of the graduate students were found to use smartphones, specifically Android phones (Almasri, 2014). The graduate students used smartphones for apps (80%), finding Internet resources related to class (99%), a calculator (75%), and sending text messages relating to class (94%) (Almasri, 2014). Undergraduate students used smartphones for sending text messages concerning class (50%), finding Internet resources related to class (75%), email (75%), and apps (79.5%) (Almasri, 2014).

An initiative at the University of Minnesota surveyed 273 first-year students in the College of Education and Human Development. Seventy percent of the students felt the iPad enriched their learning experience; 78% felt using the iPad for course activities was convenient

(Wagoner, et al., 2011). Students' attitudes were more positive toward using mobile devices in the classroom if the faculty member incorporated the mobile device into the content of the course (Milrad & Spikol, 2007). Twelve students who participated in a focus group had high expectations of faculty to use mLearning devices (Tufan, 2016).

Various uses of mLearning appear in the literature. Studies have also been completed using mLearning via smartphones to conduct field studies in corn genetics and plant life (Reiger & Gay, 1997). Quick Office allowed students to create spreadsheets for a microeconomics class at Abilene Christian University (Shepherd, & Reeves, 2011). Students were able to use mLearning devices to view course materials, collaborate, generate surveys, collect data, store data, and analyze data (Murphy, 2011). Murphy (2011) provided a summary of universities in the 2010-2011 academic year that used iPads in some type of pilot program. This list includes University of Kentucky, Melbourne University, University of Notre Dame, Long Island University, Oklahoma State University, University of Minnesota, and Briar Cliff University (2011). Other universities which did not have a formal pilot program, but used iPads in face to face courses including Rutgers University, Georgia State University, University of Maryland, Abilene Christian University, University of Southern California, Seton Hill University, Buena Vista University, Indiana University, Northern Arizona University, National University of Singapore, UC San Diego, Cumberland University, University of Houston, Stanford University, University of California, Virginia Polytechnic Institute and State University (commonly called Virginia Tech), Northern University of Kentucky, University of Pennsylvania, New York University, Georgetown University, Duke University, Georgia Fox University, and Arizona Christian University (Murphy, 2011).

Prenksy (2010) suggests that instructors should know how to integrate technology into the curriculum, but it is the responsibility of the student to use the technology. Prenksy (2010) refers to this as partnering pedagogy. In group work, using mobile devices can lead to disengagement (Khaddage, Muller, & Flintoff, 2016).

Faculty mLearning Device Adoption

The foundation of instructional technology can be traced indirectly to John Dewey and Edward Thorndike. Dewey's reflective method promoted the idea of interaction between the learner and the environment. The environment provided cues or problems for the learner to act upon and solve (Dewey, 1938). Thorndike (1911) believed learning occurred due to the learner's mind making connections with the environment. People are rewarded for choosing desirable actions and punished for choosing undesirable actions (Thorndike, 1911). The Virginia Tech College of Engineering was the first to use tablet PC's in a classroom setting in 2002, using Microsoft OneNote for collaboration among students, for faculty-student collaborations, and Classroom Presenter for annotations on lecture slides (Tront, 2007). Rieger and Gay (1997) used mobile computing to analyze data from laboratory experiments using corn in an undergraduate genetics course.

The successful introduction of mobile learning is dependent on the acceptance of faculty members (Mac Cullum, 2010). In order to adopt technology, teachers must feel the technology is an improvement over the current method (Zhao & Cziko, 2001). Introducing new technology to experienced faculty can be very stressful and can be intimidating (Haymes, 2008). "The history of modern education is littered with the trash of technology left behind by unrealistic purchases, naive users and vendors working on a quota system" (Albright & Graf, 1992, p.2). Pea and Maldonado (2006) provide eight advantages of mLearning devices in the classroom …"

(1) size and portability; (2) small screen size; (3) computing power and modular platform; (4) communication through wireless and infrared beaming networks; (5) wide range of available multipurpose applications; (6) ready ability to synchronize and back-up with other computers… (7) stylus driven interface" (p. 4) and (8) affordability. The self-efficacy of faculty members to incorporate technology into the curriculum is a key factor in adopting a technology into the classroom (Allsopp, Alvarez McHatton, & Cranston-Gringras, 2009).

> When different spheres of activity are governed by similar sub-skills there is some interdomain relation in perceived efficacy. Proficient performance is partly guided by higher-order self-regulatory skills. These include generic skills for diagnosing task demands, constructing and evaluating alternative courses of action, setting proximal goals to guide one's efforts, and creating self-incentives to sustain engagement in taxing activities and to manage stress and debilitating intrusive thoughts. Generic self-management strategies developed in one realm of activity are serviceable in other activity domains with resulting co-variation in perceived efficacy among them. (Bandura, 2006, p. 308)

Faculty members' willingness to adopt technology in the classroom depends on their perception of their ability to be successful with the technology (Albion, 2001; Mac Callum, 2010). Of 1,115 college faculty members, those with 1-5 years of teaching experience rated themselves more comfortable with portable e-devices (3.39 on a 5-point Likert scale) compared to those with 6-10 years teaching experience (3.02), 11-20 years teaching experience (2.86), and 20+ years teaching experience (3.02) (Georgina & Hosford, 2009). Even though new teachers (those with less than six years of experience) are comfortable with technology outside of the classroom, these teachers need further professional development on how to implement technology into the classroom and see the value of technology in the classroom (Russell, Bebell, O'Dwyer, & O'Connor, (2003). Santilli and Beck (2005) found 47 graduate faculty members who used educational technologies in the classroom reported communication with students as being the most-often used technology. As faculty members advance in age and years of experience, the desire to incorporate new technologies decreases (Myers, Bennett, Brown, & Henderson, 2004).

Lindsey (2011) found in a study of 19 faculty members/support staff, 95% typically used mLearning devices for administrative tasks, such as email, or conducting business during meetings. Wagoner, et al., (2011) surveyed 27 faculty of the University of Minnesota's College of Education and Human Development and discovered that 75% of the faculty felt the iPad promoted inquiry, active learning, and/or experiential learning methods. Olliff, Mueller, Bentley, Forester, and Sullivan (2014) discovered, by conducting group interviews with 15 faculty members, these faculty members used mobile devices in the classroom for writing notes using Notability, Top Notes, and Good Notes on top of lecture slides.

Faculty members have final say over the use of technology in their respective classrooms (Ertmer, 2005). Technologies are typically acquired in a top-down model. Administrators make the purchases, and instructors are charged with the implementation of the technology, despite any incompatibility with the current technologies (Cuban, 2001). Georgina and Olson (2008) discovered that 70% of faculty from 15 doctorate-granting institutions believed it was solely the university's responsibility to train faculty members when new technology is integrated into the curriculum. Russell, Bebell, et al. (2003) stated that teachers are more likely to use a new innovation if they currently use another type of technological innovation.

Georgina and Olson (2008) found small group faculty forums with trainers (56%) and asking colleagues (52%) were the two most-preferred ways faculty members chose to receive technology training, despite only 35% of faculty claiming to have trained peers. Venkatesh and Davis (2000) argue that perceived usefulness is increased when peers promoted the benefits of the innovation(s). In a study of 76 faculty members, Jacobsen (2017) found that faculty relied on other faculty and graduate students (in one-on-one situations) to assist with technology. "This observational learning effect is demonstrated most clearly when models exhibit novel responses which observers have not yet learned to make and which they later reproduce in substantially identical form" (Bandura, 1971, p. 6). Bransford, Brown, and Cocking (2000) supported the idea of teachers learning from peers, both formally (workshops and presentations) and informally (daily interactions).

One hundred fifteen university decision makers did not cite staff training levels as a major reason to invest in instructional technology (Then & Amaria, 2013). Sahin and Thompson (2006) described faculty members' expertise in the use of a given technology as the main factor in deciding to adopt the given technology in the curriculum. Sahin and Thompson (2006) found self-efficacy "…to be the most important factor influencing educators' instructional computer use" (p. 86) compared to access, barriers, attitude, support, and adopter level.

Self-efficacy

The concept of self-efficacy was primarily based on the social cognitive theory (Bandura, 1989). "Social cognitive theory favors a model of causation…[in which] behavior, cognition, and other personal factors, and environmental influences all operate as interacting determinants that influence each other…" (Bandura, 1989, p. 2). Self-efficacy is the "belief… in one's capabilities to organize and execute the courses of action required to manage prospective situations” (Bandura, 1995, p. 2); “[j]udgement of one’s ability to use a technology (e.g., computer) to accomplish a particular job or task” (Venkatsch, et. al., 2003, p. 432).

Self-efficacy in the teaching profession began with Armor, et al. in 1976. The Rand Corporation was awarded a contract to study the 6th grade reading achievements of the Los Angeles Unified School District after the implementation of the School Preferred Reading Program. This program was implemented in 1972, in elementary schools with a predominant minority population. Based on Rotter’s (1966) work concerning locus of control, teachers were given two agreement statements to rate their ability to motivate student performance. Bandura (1977) argued that Rotter’s locus of control (1966) was concerned with behavioral outcomes, and not associated with self-efficacy. A second study was conducted by Berman et al. (1977). Student performance and the continuation of federally funded grants after the grant finished were linked to teacher efficacy.

Outcome expectancies, or the belief the expected result will occur, plays a role in self-efficacy (Bandura, 1977). Outcome expectancies can provide positive or negative incentives for a behavior to be attempted. According to Bandura (1977), the initial decision to attempt a task, the amount of effort used, and persistence are based primarily on the expectations of self-efficacy. Continued experiences have an effect on self-efficacy (Brown & Inouye, 1976). If an individual believes his/her successes occurred due to skill, rather than luck, self-efficacy expectations are increased (Bandura, 1977). Success with minimal effort increases self-efficacy, while success with great difficulty diminishes the effect on self-efficacy (Bandura, 1977).

Self-efficacy is believed to be domain-specific, and specific instruments should measure the self-efficacy of specific populations performing specific tasks (Bandura, 1977; Maibach & Murphy, 1995). Computer self-efficacy is the self-perceived belief that one has the ability to use a computer (Compeau & Higgins, 1995). Self-efficacy has been identified as a significant factor in the use and acceptance of technology (Compeau & Higgins, 1995b; Wang, et al., 2009) The lack of self-efficacy is a factor in deciding to reject using technology in the classroom (Littrell, Azgummy, & Aagummy, 2005).

There have been a number of frameworks developed to assist in describing use and acceptance levels related to technology. Using the Social Cognitive Theory (Bandura, 1989) and, the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis, 2003), this study attempts to determine the perceived use and user acceptance level of faculty members toward mLearning devices. The UTAUT was developed in 2003 by combing eight theories of technology acceptance: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB, Model of PC Utilization (MPCU), and Innovation Diffused Theory (IDT) (Venkatsch, *et. al,* 2003). UTAUT provides four core determinants of intention and usage (performance expectancy, effort expectancy, social influence and facilitating conditions) and four moderators of key relationships (age, sex, experience, and voluntary usage) (Venkatsch, et. al, 2003). Carlsson, Carlsson, Hyvonen, Puhakainen, and Walden (2006) did not feel the UTAUT could measure the acceptance level of mobile devices, as the UTAUT was designed for organizations, and mobile devices are adopted by individual users.

The TRA reasons that behavioral intention is based on two factors: 1) the person's attitude toward the behavior and 2) the subjective norms concerning the behavior. Attitude or subjective norms are not equally weighted, depending on the individual (Fishbein & Ajzen, 1975).

Davis' Technology Acceptance Model (1983) was used to determine the self-reported level of technology integration for each respondent. In 1989, Davis' developed psychometric scales for perceived usefulness and perceived ease of use. The scales were refined and modified based on three stages of testing: 1) pretesting, 2) an empirical field study, and 3) a laboratory experiment. In the pretesting phase, Davis (1989) interviewed 15 people who were considered experienced computer users to measure perceived usefulness and perceived ease of use by answering 14 statements for perceived usefulness and 14 statements for perceived ease of use. After the pretest, Davis revised the scales to include 10 statements for perceived usefulness and 10 statements for perceived ease of use. A laboratory experiment consisting of 112 IBM employees was conducted. Each statement was to be rated on a Likert scale from 1-7, with seven equal to strongly disagree, and one equal to strongly agree (Davis, 1989). After further revisions, each scale was modified to rate CHART-MASTER, and Pen-draw, two particular pieces of software. Forty participants were given a one hour, hands-on demonstration of each piece of software. After the demonstration, participants were to rate the perceived usefulness and perceived ease of use of both software programs using a six statement scale for each (Davis, 1989).

> In TAM…the actual behavior is affected by behavioral intention (BI), and the behavioral intention is directly influenced by the perceived usefulness (PU) and attitude toward the target system. Attitude is affected by both PU and perceived ease of use (PEOU). The framework for this study was guided with the aid of the UTAUT theoretical framework. The foundation of this study is the Social Cognitive Theory, based on the work of Bandura (1977; 1982; 1986). With the social cognitive theory, vicarious experiences and verbal persuasion affect self-efficacy as well as personal mastery experiences (Bandura,

1977; Cervone & Peake, 1986). Further, PU is also influenced by PEOU (Chen, Chen, & Yen, 2011, p. 423.)

TAM is based on Fishbein and Ajzen's Theory of Reasoned Action (1975), which suggests a person's beliefs and evaluations will present an attitude toward a certain behavior; this attitude, combined with the subjective norm (normative beliefs and motivation to comply), along with the behavior intention will lead to the actual behavior (Davis, Bagozzi, & Warshaw, 1991).

"BI is a measure of the strength of one's intention to perform a specified behavior" (Fishbein & Ajzen, 1975, p. 288). A "represents a person's general feeling of favorableness or unfavorableness toward some stimulus object" (Fishbein & Ajzen, 1975, p. 216). "Subjective norm is the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975, p. 302).

> According to the TRA, a person's attitude toward a behavior is determined by his or her salient beliefs (b_i) about consequences of performing the behavior multiplied by the evaluation (e_i) of those consequences: $A = \sum b_i e_i$. Beliefs (b_i) are defined as the individual's subjective probability that performing the target behavior will result in consequence *i*. The evaluation term (e_i) refers to the "evaluative of attribute I" (Fishbein & Ajzen, 1975, p. 29) to the consequence. $SN = \sum nb_i me_i$ "represents an information-processing view of attitude formation and change which posits that external stimuli influence attitudes only indirectly through changes in the person's belief structure. (Fishbein & Ajzen, 1980, pp. 82-86)." "An individual's subjective norm (SN) is determined by the perceived expectations of specific referent individuals or groups, and his or her motivation to comply with these expectations" (Fishbein & Ajzen, 1975, p. 302.)

> …TAM postulates that computer usage is determined by BI, but differs in that BI is viewed as being jointly determined by the person's attitude toward using the system (A) and perceived usefulness (U), with relative weights estimated by regression, [as seen in Figure 2]…The A-BI relationship represented in TAM implies that, all else being equal, people form intentions to perform behaviors toward which they have positive effect. (Davis, Bagozzi, & Watson, 1991, pp. 985-986).

The Motivational Model (MM) suggests that intrinsic and extrinsic motivation play a role in the adoption of computers used in the workplace, in addition to PEOU and perceived output quality of the software (Davis, et al., 1992). MM adds enjoyment to the TAM as a determinant.

The Theory of Planned Behavior (TPB) (Ajzen, 1991) adds perceived behavioral control to the subjective norms and attitude toward the technology of the TRA. Perceived behavior control is seen as the factors that may influence the performance of the behavior, either positively or negatively (Ajzen, 1991). Mirta, et. al. (1999) found faculty members who use one type of technology typically have a higher self-efficacy toward other types of technology.

The Combined TA and TPB (C-TAM-TPB) combines the behavior control of the TPB and the perceived usefulness of the TAM (Taylor & Todd, 1995). Taylor and Todd (1995) found that prior experiences had an effect on the use of technology. Those with prior experience to a technology were more likely to use similar technologies.

There are four core determinants in the UTAUT: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh, et. al., 2003). These core determinants may be modified by age, sex, experience, and voluntariness to use technology (Venkatesh, et. al., 2003).

Based on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, et al., 2003), this study attempts to determine the level of use and self-efficacy level of faculty members toward mLearning devices. The UTAUT was developed in 2003 by combing eight theories of technology acceptance: theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), technology acceptance model (TAM) (Davis, 1983), motivational model (MM) (Davis, et al., 1989), theory of planned behavior (TPB) (Ajzen, 1991), Combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995), model of pc utilization (MPCU) (Triandis, 1980; Thompson, Higgins, & Howell, 1991), the social cognitive theory (Bandura, 1986; Compeau & Higgins, 1995), and innovation diffused theory (IDT) (Rogers, 2003; Moore & Benbasat, 1991).

The UTAUT used “four core determinants of intention and usage [performance expectancy, effort expectancy, social factors, and facilitating conditions] and up to four moderators of key relationships [sex, age, experience, and voluntariness of use]” (Venkatsch, *et. al,* 2003, p. 425). (Figure 1). Three determinants (sex, age, and experience) will be explored in this study. Performance expectancy is the expectation that using the technology will result in an increase in performance. Effort expectancy is the relative ease of use expected to achieve the performance gain. Social factor is the perceived expectation that other important people expect the person to use the technology. Facilitating condition is the availability of technical and instruction support for the technology (Venkatsch, *et. al*, 2003).The UTAUT was further tested by Brand, et al., (2011) in a study of 135 undergraduate students and the use of iPads.

Technology adoption categories are early adopters, early majority, late majority, and laggards (Rogers, 2010). Early adopters of new technological advances may report negative feedback to other educators if the experience with the technological advance is less than satisfactory. Rogers (2010) further uses the terms homophily and heterophily to differentiate between individuals of the same group (homophily) and between individuals of different groups (heterophily). People are more likely to adopt an idea from a member of a homophilious group, since they share the same interests (Rogers, 2010). Professional development is vital to provide support to the early adopters (Moser, 2007).

Age has been reported as a factor in the use of technology, as it pertains to training, post-training tests, and the amount of assistance needed (Elias, Elias, Robbins, & Gage, 1987). Brand, et al. (2011) discovered age and attitudes toward technology are positively correlated. Faculty members in the 30-50 age group had higher computer self-efficacy levels than those who were younger than 30, or older than 50 (John, 2015).

Sex appears to be a discriminating factor with computer self-efficacy, with conflicting results. Female students are more likely to have a lower computer self-efficacy than male students before completing an activity using technology (Cooper, 2006; Young, 2000), although female self-efficacy increases once an activity using technology is completed (2000). Hoffmann (2015) suggested studying sex differences in the usage of mLearning devices, as females tend to avoid mLearning more than males (Yurt, Kurnaz & Sahin, 2014). Cassidy and Eachus (2002) found males had higher self-efficacy scores (150.44) related to computers than females (113.68). John (2015) found a similar result with an independent samples t-test ($t = 2.46$, $p = 0.01$) showing males had a higher computer self-efficacy than females in university faculty positions. Mehdinezhad (2012) discovered that male faculty members rated themselves lower in self-efficacy than female counterparts concerning technology ($M = 3.903$; $M = 4.000$). In another previous study, Spotts, Bowman, and Mertz (1997) found that men express more self-efficacy with technology than women, and men have a higher self-efficacy as it pertains to experimenting with technological innovations. Males were more confident of their respective abilities to use technology (Bimber, 2003; Isman & Celikli. 2009). Men were found to have a higher self-efficacy level concerning copying disks and/or files, organizing and managing files, and software compatibility (Torkzadeh & Koufteros, 1994). Li and Kirkup (2007) discovered men "were more likely to have positive attitudes towards the Internet, spent more time on the Internet, and used the Internet more extensively" (p. 317). Hemmings and Kay (2009) found faculty members from two Australian universities had a higher self-efficacy in teaching (M = 7.57) than research or service, of 357 total faculty members.

There are conflicting results regarding the relationship between self-efficacy and years of experience. Benz, Bradley, Alderman, and Flowers (1992) found that preservice teachers had a higher sense of self-efficacy when compared to experienced teachers in motivation of students. Klassen and Chiu (2010) agreed with Huberman's (1989) study, finding the self-efficacy of teachers increased through 23 years of experience, then began to decline as experience increased. However, Mehdinezhad (2012) found no significant differences in perceived self-efficacy of technology implementation when comparing years of experience (1-10 years, 11-15 years, 16-20 years, 21-25 years, and 26 or more years). Mirta, et al. (1999) found faculty members who were new to a university were more likely to use technology than those who had more experience.

No statistically significant differences were found between 161 graduate faculty members and 439 undergraduate faculty members as related to acceptance of mLearning devices (Marrs, 2013).

Adoption/Change Models

The process of acceptance and adoption of technology into teaching practice is grounded in faculty's beliefs about teaching (Cuban, 1993; Schrum, Shelley, & Miller, 2008). Rogers (1983) provides five distinct groupings of technology adopters: "(1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards" (p. 22). Hartman, Dziuban, and Brophy-Ellison (2007) classified innovators as those who are the first in an organization to adopt a technology. Early adopters, begin to adopt the technology after observing the innovators. The early and late majority adopt the technology after the innovators and early adopters show the relevance and reliability of the technology. The laggards typically decide to forgo the technology.

Geoghegan (1994) argued that the innovators and early adopters may alienate the mainstream faculty by pursuing new technological advances much quicker than the conservative mainstream faculty. The success of early adopters and innovators may convince administrators to purchase a certain technology and expect other faculty members to be successful with that certain technology. Rogers (1983) identifies four elements of diffusion: innovation, communication channels, time, and the social system. "An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1983, p. 11). Communication channels are the ways the new idea or information is shared from one person to another. For persuasive purposes, the ideal communication channel is inter-personal and homophilious (Rogers, 1983). Time is recognized as a variable in the diffusion of innovations theory (Rogers, 1983) in three distinct situations: 1) the period between knowledge of the innovation and the decision to accept or reject the innovation, 2) the comparison of time between an individual's adoption of an innovation and other members of the group, and 3) the rate of adoption in an organization (Rogers, 1983).

The actual advantages of the innovation are subservient to the perceived advantages of the innovation, according to Rogers (1983). The innovation must be perceived as compatible with previous, similar ideas. If faculty believe productivity will increase and usefulness of the technology is apparent, use of a technology will increase (Bandura, 1994; Teo, 2011). While a positive attitude toward technology leads to experimentation with different types of technology, a positive attitude toward technology does not guarantee using any one type of technology (Shoffner, 2009). "Innovations can be adopted or rejected (1) by individual members of a system, or (2) by the entire social system, which can decide to adopt an innovation by a collective or an authority decision" (Rogers, 1983, p. 29).

Higher education faculty adoption rates occur in three waves, according to Celsi and Wolfinbarger (2002): "(1) technology as support, (2) mirroring, and (3) discontinuous innovation." (p. 64) *Technology as support* is technology that is behind the scenes, data entry activities, such as spreadsheets and word-processing (Celsi & Wolfinbarger, 2002). *Mirroring technology* replaces physical-world technology. There is no behavioral or structural change. Rather the delivery method has changed, such as creating PowerPoint presentations instead of using overhead transparencies (Celsi & Wolfinbarger, 2002). *Discontinuous innovation* creates a fundamental shift in the classroom. Celsi and Wolfinbarger (2002) also offer the example of online components to courses that were previously strictly face-to-face, such as Blackboard® online course software.

During the implementation phase, *reinvention* may take place. The potential adopters of the technology can elect to modify the technology to fit his/her needs, rather than accept or reject the technology as presented (Rogers, 1983). By reinventing the technology, potential adopters tend to continue to use the technology rather than discontinue usage (Berman & Pauley, 1975).

Challenges for Using mLearning Devices

Students were concerned that mLearning devices would be a distraction in the classroom (Gika & Grant, 2013; Kinash, et al., 2011); Rossing, et al., 2012) although Mang and Wardley

(2012) found that students who used mLearning devices were less likely to engage in off-task behavior, such as checking email, social media, chatting, and viewing videos.

One concern of faculty with the use of mLearning devices in university classrooms is that attendance will drop (Geist, 2011). A second concern relates to time management and recognition by his/her university. Unless learning a new technology is directly related to the goals of earning tenure and/or a promotion, junior faculty members believed they did not have the time needed to learn the new technology (Spotts, 1999). Technology is not typically recognized as having value when compared to research and publications (Spotts, 1999). Higher pay and promotions are typically awarded to faculty members who concentrate on research activities, rather than teaching and instruction (Fairweather, 1993).

Cuban (2001) found that frequent users of technology needed alternate lesson plans in the event the technologies failed to work correctly. Students complained about the reliability of Internet/network connections as well (Al-Fahad, 2009; Andrews, Smyth, & Calladine, 2010; Rossing, et al., 2012).

Students expressed concerns about the touch-based keyboards on mLearning devices (Rossing, et al., 2012). Other device-related concerns of students were small screen size (Kukulska-Hulme 2007), short battery life (Kukulska-Hulme 2007), application limitations (Kukulska-Hulme 2007; Mathur, 2011), network reliability/speeds (Kukulska-Hulme 2007), anti-technology instructors (Gakis & Grant, 2013), and bright screen when used outside (Kukulska-Hulme 2007).

Loucks (1983) describes the seven stages of concern when a new technological innovation is presented a) unconcerned, b) informational, c) personal, d) management, e) consequence, f) collaboration, and g) refocusing. Typically, people are more concerned with how the innovation affects him/her, rather than how the innovation benefits the respective clientele. Georgina (2007) states faculty members desire training that is based around the instructor's pedagogy, rather than a basic demonstration of the technological innovation.

> Before using a new technology program, teachers will ask themselves: [1] Is the machine or software program simple enough for me to learn quickly? [2] Is it versatile, that is, can it be used in more than one situation? [3] Will the program motivate my students? [4] Does the program contain skills that are connected to what I am expected to teach? [5] Are the machine and software reliable? [6] If the system breaks down, is there someone else who will fix it? [7] Will the amount of time I have to invest in learning to use the system yield a comparable return in student learning? [8] Will student use of computers weaken my classroom authority? (Cuban, 2011, p. 168)

Spence (1994) provided seven reasons people resist technological innovations: to protect one's social status or an existing way of life; to avoid job elimination; a contradiction between the innovation and the employee's social customs and habits; the inherent rigidity of large bureaucratic organizations; personality, habit, fear of change; the tendency of organized groups to force conformity; reluctance to disturb the equilibrium. Hew and Brush (2007) found six categories of barriers to using technology in the classroom: resources, institution, subject culture, attitude and beliefs, knowledge and skills, and assessment.

Potential adopters may reject the technology under two circumstances. With the first circumstance, a newer technology may appear, making the previously-adopted technology obsolete, which is referred to as *replacement discontinuance*. *Disenchantment discontinuance* occurs when the technology is rejected due to an unfavorable issue with the technology (Rogers, 1983). Seventy-four percent of faculty did not receive any incentive to use technology in the classroom by their respective university (Hurtado, Eagan, Pryor, Whang, & Tran, 2012).

Two-thirds of students believed a faculty member had the right to insist students turn off cellphones during class. Ninety-three percent of faculty members believed they had the right to insist students turn off cellphones during class (Baker, et al., 2012). In the classroom, 80% of respondents felt a ringing cellphone during class was disruptive and disrespectful (Baker, et al., 2012). Half of the respondents felt cell phones disrupted the learning process in the classroom (Baker, et al., 2012). Thatcher and Mooney also discovered the idea of ringing cellphone to be a distraction in the classroom (2008). Of 269 students at one university, 10% had used cell phones to text during an exam (Tindell & Bohlander, 2012).

Two other issues with mLearning devices are the price and the planned obsolescence (Gong & Wallance, 2012). Students believed the prices of mLearning devices were extreme, and 57% believed the technology would be obsolete soon (2012).

Faculty Activities

Professional activities, in this study, refer to faculty activities in three major areas: teaching, research, and service. Teaching "refers to all of the time devoted to teaching, including time spent in class, preparing for class, preparing and grading assignments and examinations, and time spent talking to students about the class" (Yuker, 1984, p. 36). Teaching is one of the three categories (teaching, research, and service) used to categorize the responses in terms of use and self-efficacy in Part A of the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D. Research "refers to a broad range of intellectual and scholarly activities that normally result in some type of scholarly output" (Yuker, 1984, p. 36). Research is one of the three categories (teaching, research, and service) used to categorize the responses in terms of use and self-efficacy in Part A of the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D. Service “refers to a broad category of activities, including general administration (correspondence, serving as department head, keeping records, preparing budgets, etc.), attending meetings and functions common to university campuses, participating in registration, student services… [and] includes those professional activities that occur outside of the institution consulting, giving lectures or speeches, holding office in a public organization, and so on” (Yuker, 1984, p. 36). Service is one of the three categories (teaching, research, and service) used to categorize the responses in terms of use and self-efficacy in Part A of the researcher-developed *Faculty mLearning Device Survey* provided in Appendix D.

Murphy (2011) discovered six typologies of mLearning device use in educational contexts: content delivery, administrative tasks, peer-to-peer/peer-to educator collaboration, content generation, research/material yielding, and productivity enhancement.

Classroom activities include cooperative learning, presentations, group projects (Hurtado, et al., 2012), lectures, films, and class discussions (Schuetz, 2002). Hurtado, et al. (2012) found class discussions, cooperative learning, group projects, student presentations, and lectures were common ways to deliver content to students.

Teachers College, Columbia University used iTunes U to audio record the two-day, Campaign for Educational Equities 2007 Symposium (Acquaro & Fadjo, 2008). Purdue University Indianapolis used iPads in the 2010-2011 terms to understand student perceptions of using mobile technology in the classroom. Using between one and seven class periods, certain types of content were delivered to students using iPads, such as tourism applications, musical intervals, mapping applications, staffing grids, human movement, and academic honesty

(Rossing, et al., 2012). Students can access information quickly and download course content when using mLearning devices (Gikas & Grant, 2013).

When asked if they would be interested in collaborating with faculty or classmates, 166 of 223 students (74.4%) indicated they would, with 121 (54.3%) indicating they would like to work with both faculty and classmates (Olliff, et al., 2014). Students also felt text messages and social media applications, such as Twitter made conversations with classmates and faculty more efficient (Gikas & Grant, 2013).

In a second group interview with seven participants, Olliff, Mueller, Bentley, Forester, and Sullivan (2014) found that 57.1% of faculty members used the iPad to check email. Using case studies, Gukibau, Davidson, Williams, and Corker (n.d.) found that iPads allowed program staff to access student queries via email outside of the traditional office. Patton, Sanchez, and Tangney (2006) included calendars and grading apps in this category.

Summary

Numerous studies have been conducted to determine student acceptance of mLearning devices for educational purposes. Despite this acceptance, it is believed faculty members are resistant to using mLearning devices in the classroom and for other professional activities (Balash, Young, & bin Abu, 2011).

Some studies concerning both use and self-efficacy have mentioned discriminating factors, such as age, gender, and years of experience. Some concerns of faculty members regarding the use of mLearning devices were reliability of the technology, time management, and training.

CHAPTER THREE: METHODS

This study investigated faculty levels of use and self-efficacy levels of mLearning devices for professional activities. The purpose of this chapter is to describe the methods used in this study, including research design, population, instrumentation development/validation, data collection procedures, and data analysis by research question.

Research Design

The research design used in this study was a mixed methods case study consisting of quantitative and qualitative data collection and analysis. A mixed method approach combines qualitative and quantitative research into one study, providing deeper insight, than if the data sets were used alone (Johnson & Onwuegbuzie, 2004). A researcher-developed survey was used for the quantitative data collection, while semi-structured interviews were used for the qualitative data collection. "Qualitative and quantitative methods can be mixed in a single study or a sequence of studies in multiple, often complimentary ways" (Leydens, Moskal, & Pavelich, 2004, p. 70). Leydens, et al. (2004) discuss three ways that qualitative and quantitative methods can be used together: qualitative studies can precede a quantitative study, quantitative studies can precede a qualitative study, or "a few in-depth studies or interviews can be embedded in a large-scale quantitative study to provide context and/or checks on validity of the quantitative results" (p. 70). Follow-up semi-structured interviews were conducted with selected respondents who provided consent to be interviewed, as indicated in the original survey.

Population

The population for this study consisted of all faculty members at one public, not-for-profit university in the Southeast United States, in the 2016-2017 academic year. All full-time faculty members, regardless of rank and tenure status, were invited to participate in the survey.

Faculty from all colleges including the College of Business, College of Education and Professional Development, College of Arts and Media, College of Health Professions, College of Information Technology and Engineering, College of Liberal Arts, College of Physical Therapy, College of Science, School of Medicine, and School of Pharmacy, were included in the population. The entire population of 1,067 faculty members was surveyed (College Factual, n.d.).

Instrument Development/Validation

Two instruments were used for data collection. The self-report survey instrument, *Faculty mLearning Device Survey*, was a two-part, three-page, researcher-developed survey (see Appendix D). The interview protocol, *Faculty mLearning Interview Protocol* was also researcher-developed (see Appendix E).

Part A of the *Faculty mLearning Device Survey* requested the participants provide demographic and attribute data including age, sex, years of faculty experience at any university, level taught, types of mLearning devices used, and his/her academic discipline. The demographic and attribute information was used to categorize participants for tests of mean differences.

Part B of the *Faculty mLearning Device Survey* consisted of 26 questions. The first 17 questions relate to the frequency of use of a particular professional activity. The second 17 questions relate to the self-efficacy level the faculty member believes he/she possesses as it relates to the given activity. Self-efficacy scales measure a person's ability to perform a task (or tasks) in the present, as opposed to the future. Self-efficacy scales range from 0 to a predetermined maximum number, and do not include negative numbers (Bandura, 2006). To reduce response bias, Bandura (2006) recommended using a title other than *self-efficacy*. *Confidence level* was used in lieu of *self-efficacy* for this study (Bandura, 2006).

The final statement asked respondents if they would like to be contacted for a follow-up interview. If so, the respondent was asked to select a link to a separate survey in order to provide contact information. The link was separate from the *Faculty mLearning Device Survey* in order to maintain confidentiality of all respondents of the *Faculty mLearning Device Survey*.

An interview protocol, *Faculty mLearning Interview Protocol*, was used to clarify information gathered through the survey as well as gathering additional information not provided through the survey to explore the uses and challenges of using mLearning devices professionally. The *Faculty mLearning Interview Protocol* was used as the response rate to *Faculty mLearning Device Survey* was below 33.3% (Baruch & Holtom, 2008). The *Faculty mLearning Interview Protocol* contained six questions based on research questions one (What are faculty members' levels of use of mLearning devices for professional activities?), three (What are faculty members' levels of self-efficacy for using mLearning devices for professional activities?), and six (What are the biggest challenges facing faculty members in using mLearning devices for professional activities?). Qualitative research uses purposeful sampling that reflects certain characteristics of a population, rather than random sampling (Ritchie, Lewis, & Elam, 2003).

Using both quantitative and qualitative data allows triangulation of the findings. Both concurrent and across methods triangulation were used to analyze the data. For concurrent triangulation, the open-ended question on the survey combined with the single-response items on the *Faculty mLearning Device Survey* was collected simultaneously (Creswell, 2003). Across methods triangulation allowed both qualitative data and quantitative data to be collected, either simultaneously or not (Bekhet & Zauszniewski, 2012).

Instrument Validation

A panel of experts was used to ensure content validity for both instruments. These experts consisted of faculty members with expertise in mLearning devices. The participants were provided a copy of the study instruments and were asked to silently read the instructions to check for clarity. The researcher read the survey items one by one and asked for comments concerning clarity of each item on the survey and protocol (Dillman, 1978). The following questions were asked for each item:

> Does the question require an answer?...To what extent do survey recipients already have an accurate, ready-made answer for the question they are being asked to report?...Can people accurately recall and report past behaviors?...Is the respondent willing to reveal the requested information?...Will the respondent feel motivated to answer each question?...Is the respondent's understanding of response categories likely to be influenced by more than words?...Is the survey being collected by more than one mode?... (Dillman, 2007, pp. 34-42)

As a result of the panel of experts, the professional activity of creating audio/video was added to the survey instrument. Other minor editorial edits, such as word choice, and punctuation, for some of the questions were added. A list of those individuals is provided in Appendix H.

A reliability analysis was carried out on the list of professional activities concerning level of self-efficacy comprising 17 items. Cronbach's alpha showed the survey to reach acceptable reliability, α = .90. Most of the items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted. The only exception was social media, which would increase the alpha to α = .91. As such, removal of this item should be considered.

Data Collection Procedures

Approval from the Marshall University Institutional Review Board (IRB) (Appendix A) was secured prior to beginning the research. The survey instrument was administered to faculty members using the university mailing list. Permission for the researcher to access the listserv database, and to use it for the purposes of this study was requested, and granted from the Office of Academic Affairs (Appendix B).

The population was emailed a link to a self-report survey (Appendix D), a cover letter introducing the researcher, the purpose of the study, a confidentiality statement, and contact information. The cover letter included the IRB approval number. The population was asked to visit a website hosted by Qualtrics in order to complete the survey. A deadline of two calendar weeks was used for the first email.

Three weeks after the initial email, a follow-up email was sent to non-respondents to ask for a response. IP addresses were not collected. Kaplowitz, Hadlock, and Levine (2004) suggest online surveys have similar response rates to hard copy surveys. A deadline of two calendar weeks from the second email was used.

Data Analysis by Research Question

For research questions one and three, a one-sample t-test was used to compare mean scores for the sample distribution of the 17 professional activities to the mean score from a normal distribution. For research question two, differences in level of use of mLearning devices for professional activities were analyzed based on selected demographic variables. An independent samples t-test and one-way analysis of variance test (ANOVA) were used to determine if significant differences existed in the level of use for each function based on the type of mLearning device used by comparing the means from the two groups. For research question four, differences in self-efficacy of mLearning devices for professional activities were analyzed based on selected demographic variables. An independent samples t-test and a one-way analysis of variance test were used to determine if significant differences existed in the self-efficacy for each function and the total self-efficacy for each function based on the type of mLearning device used by comparing the means from the two groups, based on selected demographic variables. For research question five, a Spearman's correlation was run to determine the relationship between the levels of use for each of the 17 professional activities and the self-efficacy level for the corresponding professional activity.

Data collected to address research question six were analyzed by coding the responses based on emergent themes, and analyzing the percentage of respondents selecting specific themes (Onwuegbuzie & Teddlie, 2003). The independent variables in this study were the selected demographic attributes/variables (age, sex, level taught, teaching experience, and discipline taught). The dependent variables were the level of faculty member self-efficacy for using mLearning devices, and the level of use of mLearning devices for the given professional activities.

Limitations

A sample of convenience was used for this study. Faculty members at one university were included in the population. The results of this study should not be generalized for other populations. The data were obtained via self-reported surveys. The accuracy of self-reported data may not be accurate.

CHAPTER FOUR: FINDINGS

The purpose of this study was to examine the relationship of self-efficacy levels and frequency of use for mLearning devices such as smartphones and tablets as they relate to professional activities of faculty at Marshall University. The study also sought to determine the challenges faculty members incur when using mLearning devices in the classroom and for other professional uses. This chapter is organized in the following manner: data collection, presentation of descriptive characteristics of respondents, findings for each research question, and concludes with a summary of the findings.

Data Collection

In April, 2017, and May, 2017, the self-report survey, *Faculty mLearning Device Survey,* was distributed via email to 1,067 faculty members. Six emails were returned as undeliverable. Twelve days after the initial email, a reminder email was sent to 1,008 faculty members who did not respond or opted-out of future emails. Fourteen days after the reminder email, an additional email was sent to 980 faculty members who did not respond or opted-out of future emails. A final email was sent to 955 faculty members who did not respond nor opt-out of future emails six days after the previous reminder email. Overall, 142 surveys were returned. Of those, two were deemed unusable, as no answers were marked for any question on the *Faculty mLearning Device Survey*. Of the 140 usable surveys, 107 respondents answered the open-ended question.

The *Faculty mLearning Device Survey* also included a request to participate in a follow-up interview with the co-Primary Investigator (co-PI). Twenty-one respondents agreed to be contacted for an interview. Eleven of these 21 faculty members were successfully contacted and interviewed. Interviews began in June, 2017 and concluded in July, 2017.

Descriptive Characteristics of Respondents

Part A of the *Faculty mLearning Device Survey* requested the faculty members to respond to five demographic and attribute questions: sex, age range, level of courses taught, years of faculty experience, and his/her college. These data are provided in Table 1.

Thirty-seven percent (n = 52) of the respondents were male and 62.6% (n=87) were female. Six respondents (4.3%) were 30 or younger, 22.1% (n = 31) were 31-40 years of age, 22.1% (n = 31) were 41-50 years of age, 31.4% (n = 44) were 51-60 years of age, and 20.0% (n = 28) were 61 years of age or older.

Thirty-two (22.9%) respondents taught undergraduate courses only, 47.1% (n = 66) taught graduate courses only, and 30.0% (n = 42) taught both undergraduate and graduate courses. Forty-four (31.4%) had five years or less experience as a faculty member in higher education, 15.7% (n = 22) had 6-10 years of experience, 22.1% (n = 31) had 11-15 years of experience, 12.1% (n = 17) had 16-20 years of experience, and 18.6% (n = 26) had more than 20 years of higher education experience.

Sixty-one (56.4%) respondents reported teaching face-to-face courses only, 12 (8.6%) taught online courses, eight (5.7%) taught hybrid courses, 16 (11.4%) taught face-to-face and online courses, 17 (12.1%) taught face-to-face and hybrid courses, eight (5.7%) taught online and hybrid courses, and 15 (10.7%) taught face-to-face, online, and hybrid courses.

Table 1

Demographic Characteristics of Respondents

Characteristic	N	%
Sex		
Male.	52	37.4
Female.	87	62.6
Age Range of Respondents		
30 or younger.	6	4.3
31-40.	31	22.1
41-50.	31	22.1
51-60.	44	31.4
61+.	28	20.0
Level of courses taught		
Undergraduate only	32	22.9
Graduate only	66	47.1
Both undergraduate and graduate	42	30.0
Years of experience as a faculty member		
5 years or less.	44	31.4
6-10 years.	22	15.7
11-15 years.	31	22.1
16-20 years.	17	12.1
More than 20 years.	26	18.6
Mode		
Face to Face (F2F) Only	61	56.4
Online Only	12	8.6
Hybrid Only	8	5.7
F2F and Online Only	16	11.4
F2F and Hybrid Only	17	12.1
Online and Hybrid Only	8	5.7
F2F, Online, and Hybrid	15	10.7

Note: *N* = 140.

Participants were also asked to identify the college in which their faculty position was housed. Nine (6.5%) of the respondents' primary faculty position were in the Lewis College of Business, 27.5% (*n*=38) were in the College of Education and Professional Development, 2.2% (*n* = 3) were in the College of Arts and Media, and 13.8% (*n* = 19) were in the College of Health Professions. Five (3.6%) of the respondents' primary faculty position were in the College of

Information Technology and Engineering, 18.8% (*n* = 26) were in the College of Liberal Arts, 11.6% (*n* = 16) were in the College of Science, 12.3% (*n* = 17) were in the Joan C. Edwards School of Medicine, and 3.6% (*n* = 5) of the respondents' primary faculty positions were in the School of Pharmacy. Due to the low number of respondents, and to respect the integrity of the data, the primary college data were not used in analyses. These data are provided in Table 2.

Table 2

Primary College of Respondents

College	*N*	%
Lewis College of Business	9	6.5
College of Education and Professional Development	38	27.5
College of Arts and Media	3	2.2
College of Health Professions	19	13.8
College of Information Technology and Engineering	5	3.6
College of Liberal Arts	26	18.8
College of Science	16	11.6
Joan C. Edwards School of Medicine	17	12.3
School of Pharmacy	5	3.6

Note: *N* = 140.

Respondents were asked to identify the types of mLearning devices they used for professional activities. Twenty-six (18.6%) used smartphones, 7.1% (n = 10) used tablets. Forty-eight (34.3%) used smartphones and tablets, 5.0% (n = 7) used smartphones, tablets, and e-readers. Twenty-two (15.7%) respondents indicated they did not use mLearning devices for professional activities. No other combinations of smartphones, tablets, and e-readers use were reported. Fourteen respondents selected other devices, including handouts, computers and laptops, laptops, Surface tablet, cell phone, (Smart [sic]), Apple Watches, computer, and clickers. These data are summarized in Table 3.

Table 3

Types of mLearning Devices Used by Respondents

Device	*N*	%
Smartphone and tablet only	48	34.3
Smartphone only	26	18.6
Tablet only	10	7.1
Smartphone, tablet, e-reader only	7	5.0
None	22	15.7
Other	14	10.0

Note. N = 140.

The percentage response for not using mLearning devices ranged from a low of 7.9% for email to colleagues to a high of 26.4% for having students access Internet apps for in-class activities, discussions, presentations, etc. The frequencies of respondents indicating they do not use mLearning devices for each of the professional activities were grouped into three categories: 10% or less (n = 48), 10.1-19.9% (n = 137), and 20.0% and greater (n = 142). Professional activities with scores of 10% or less were email to colleagues (7.9%), text messages to colleagues (8.6%), email to students (8.6%), and research consumption (9.3%). Professional activities with means scores between 10.1% and 19.9% were students-Internet resources (10.7%), calendar/scheduling (10.7%), access Internet resources (10.7%), meetings (13.6%), course materials (13.6%), providing feedback (19.3%), and access Internet apps (19.3%). Professional activities with scores of 20.0% or greater were creating audio/video (22.9%), research creation (23.6%), text messages to students (25.0%), social media (25.0%), service committee work (25.0%), and students Internet apps (26.4%). These data are summarized in Table 4.

Table 4

Responses of "Do Not Use mLearning Devices" for Professional Activities

Professional Activity	*n**	%
Students Internet apps	37	26.4
Service committee work	35	25.0
Social media	35	25.0
Text messages to students	35	25.0
Research creation	33	23.6
Creating audio/video	32	22.9
Access Internet apps	27	19.3
Providing feedback	27	19.3
Course materials	19	13.6
Meetings	19	13.6
Access Internet resources	15	10.7
Calendar/scheduling	15	10.7
Students--Internet resources	15	10.7
Research consumption	13	9.3
Email to students	12	8.6
Text messages to colleagues	12	8.6
Email to colleagues	11	7.9

Note. N = 140. N* = duplicated count

Major findings

Six major research questions were addressed in this study. This section presents the findings for each of these questions. Findings are organized by research question.

Levels of use of mlearning devices for professional activities. All respondents who reported they used mLearning devices for professional activities were asked their level of use for mLearning devices for the 17 professional activities using the following five-point Likert scale: 1=Very Rarely. 2=Rarely. 3=Sometimes. 4=Frequently. 5=Almost Always. A one-sample t-test ($p < .05$) was used to compare the sample mean for each activity to the mean (*M* = 3.0) from a hypothetical normal distribution for each activity.

The means of the 17 professional activities ranged from *M* = 3.35 for creating audio/video to *M* = 4.35 for email to colleagues. Five professional activities had mean scores of

4.00 or higher, nine had mean scores between 3.50 and 3.99, and three had mean scores of 3.49 or lower.

The five professional activities with mean scores of 4.00 or greater were text messages to students (*M* = 4.17, *SD* = .91), text messages to colleagues (*M* = 4.19, *SD* = .89), email to students (*M* = 4.34, *SD* = .89), email to colleagues (*M* = 4.35, *SD* = .78), and research consumption (*M* = 4.00, *SD* = .98). Sample means for all five of these activities were statistically significantly different from the mean (*M* = 3.0) of the hypothetical normal distribution at $p < .05$. Nine professional activities had mean scores between 3.50 and 3.99. These professional activities were social media (*M* = 3.71, *SD* = 1.20), providing feedback (*M* = 3.89, *SD* = 1.10), accessing Internet resources (*M* = 3.88, *SD* = 1.00), having students access Internet resources (*M* = 3.89, *SD* = 1.07), calendar/scheduling (*M* = 3.90, *SD* = 1.20), research creation (*M* = 3.55, *SD* = 1.23), service committee work (*M* = 3.75, *SD* = 1.07), meetings (*M* = 3.90, *SD* = 1.01), and updating/creating course materials (*M* = 3.66, *SD* = 1.17). Sample means for all nine of these activities were statistically significantly different from the mean (*M* = 3.0) of the hypothetical normal distribution at $p < .05$.

Three professional activities had mean scores of 3.50 or less. These professional activities were creating audio/video (*M* = 3.35, *SD* = 1.34), accessing Internet apps (*M* = 3.38, *SD* = 1.33), and having students access Internet apps (*M* = 3.44, *SD* = 1.24). Sample means for all three of these activities were statistically significantly different from the mean (*M* = 3.0) of the hypothetical normal distribution at $p < .05$. These data are summarized in Table 5.

Table 5

Use of mLearning Devices for Professional Activities

Professional Activity	*n*	*m*	*SD*	*t-value*
Text messages students	81	4.17	.91	11.66*
Text messages to colleagues	104	4.19	.89	13.62*
Email to students	105	4.34	.79	17.32*
Email to colleagues	105	4.35	.78	17.67*
Social media	79	3.71	1.20	5.25*
Providing feedback	89	3.89	1.10	7.67*
Access Internet resources	101	3.88	1.00	8.83*
Access Internet apps	88	3.38	1.33	2.64*
Creating audio/video	84	3.35	1.34	2.36*
Students--Internet resources	100	3.89	1.07	8.30*
Students Internet apps	78	3.44	1.24	3.10*
Calendar/scheduling	99	3.90	1.20	7.51*
Research consumption	104	4.00	.98	10.46*
Research creation	82	3.55	1.23	4.04*
Service committee work	79	3.75	1.07	6.22*
Meetings	96	3.90	1.01	8.69*
Course materials	94	3.66	1.17	5.47*

N = 140. *p ≤ .05. Scale: 1=Very Rarely. 2=Rarely. 3=Sometimes. 4=Frequently. 5=Almost Always.

Use of mLearning devices based on demographic/attribute variables. A reliability analysis was carried out on the list of professional activities concerning level of use comprising 17 items. Cronbach's alpha showed the survey to reach acceptable reliability, α = .96. All of the items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted.

The 17 professional activity mean scores were analyzed to determine if there were differences in mean scores based on selected demographic and attribute variables. These demographic and attribute variables included respondent sex, age, years of teaching experience, and level taught (undergraduate, graduate, or both).

Age. A one-way analysis of variance (ANOVA) test was conducted to compare the effect of age on the levels of use of each of the 17 professional activities. For purposes of analysis, two categories, < 30, and 31-40 were combined into one category, < 40, due to a low number of responses for both categories.

Significant differences in mean level of use scores based on age were found for one professional activity. Mean level of use scores for research consumption between age groups of 40 and younger (*M* = 3.87, *SD* = 1.10), 41-50 (*M* = 4.18, *SD* = 1.01), 51-60 (*M* = 4.33, *SD* = .646), and 61 and older (*M* = 3.54, *SD* = 1.03) were statistically significant at $p \leq .05$.

There were no significant differences in mean level use scores based on age for ages 40 and younger (*M* = 4.67, *SD* = .49), 41-50 (*M* = 3.94, *SD* = 1.20), 51-60 (*M* = 4.23, *SD* = .73), and 61 and older (*M* = 4.00, *SD* = .976) for sending text messages to students, for ages 40 and younger (*M* = 4.23, *SD* = 1.19), 41-50 (*M* = 4.27, *SD* = 1.20), 51-60 (*M* = 4.26, *SD* = .61), and 61 and older (*M* = 4.00, *SD* = .88), for sending text messages to colleagues, for ages 40 or younger (*M* = 4.25, *SD* = .79), 41-50 (*M* = 4.30, *SD* = 1.02), 51-60 (*M* = 4.50, *SD* = .57), and 60 or older (*M* = 4.27, *SD* = .83), for sending email to students, for those ages 40 and younger (*M* = 4.29, *SD* = .81), 41-50 (*M* = 4.35, *SD* = 1.03), 51-60 (*M* = 4.48, *SD* = .76, and 61 or older (*M* = 4.26, *SD* = .76) for sending email to colleagues. For using social media, between age groups of those 40 or younger (*M* = 3.60, *SD* = 1.50), 41-50 (*M* = *4.24*, *SD* = .90), 51-60 (*M* = *3.68*, *SD* = 1.02), and 61 or older (*M* = 3.37, *SD* = 1.34), there were no statistically significant differences between mean level of use scores. For providing feedback to students, between age groups of 40 or younger (*M* = 3.74, *SD* = 1.10), 41-50 (*M* = 3.67, *SD* = 1.11), 51-60 (*M* = 4.19, *SD* = 1.00), and 61 or older (*M* = 3.86, *SD* = 1.17), for accessing Internet resources for class, between age groups of 40 and younger (*M* = 3.90, *SD* = .89), 41-50 (*M* = 3.96, *SD* = .98), 51-60 (*M* = 4.06, *SD* = .95), and 61 and older (*M* = 3.56, *SD* = 1.16), there were no statistically significant mean level of use scores.

No statistically significant mean level scores were found for accessing Internet apps for class between age groups of 40 and younger (*M* = 3.94, *SD* = .90), 41-50 (*M* = 3.43, *SD* = 1.47), 51-60 (*M* = 4.06, *SD* = .95), and 61 and older (*M* = 3.56, *SD* = 1.16), for creating audio/video between age groups 40 or younger (*M* = 3.56, *SD* = 1.15), 41-50 (*M* = 3.72, *SD* = 1.18), 51-60 (*M* = 3.22, *SD* = 1.53), and 61 and older (*M* = 3.04, *SD* = 1.33), and for having students use Internet resources during class between age groups of 40 and younger (*M* = 3.77, *SD* = 1.07), 41-50 (*M* = 3.81, *SD* = 1.22), 51-60 (*M* = 4.13, *SD* = .87), and 61 and older (*M* = 3.75, *SD* = 1.19). There were no statistically significant mean level scores for having students access Internet apps during class between age groups of 40 and younger (*M* = 3.64, *SD* = 1.01), 41-50 (*M* = 3.63, *SD* = 1.12), 51-60 (*M* = 3.23, *SD* = 1.39), and 61 and older (*M* = 3.37, *SD* = 1.34).

For calendar/scheduling, there were no statistically significant differences in mean level scores between age groups of 40 and younger (*M* = 4.09, *SD* = .97), 41-50 (*M* = 4.04, *SD* = 1.26), 51-60 (*M* = 3.88, *SD* = 1.24), and 61 and older (*M* = 3.59, *SD* = 1.26). For research creation, there were no statistically significant differences in mean level scores between age groups of 40 and younger (*M* = 3.23, *SD* = 1.42), 41-50 (*M* = 3.55, *SD* = 1.15), 51-60 (*M* = 4.00, *SD* = 1.05), and 61 and older (*M* = 3.14, *SD* = 1.28).

There were no statistically significant differences in mean levels of use scores for service committee work for age groups of 40 and younger (*M* = 3.69, *SD* = 1.11), 41-50 (*M* = 4.05, *SD* = 1.03), 51-60 (*M* = 3.93, *SD* = 1.12), and 61 and older (*M* = 3.25, *SD* = 1.12), for use during meetings between age groups of 40 and younger (*M* = 3.87, *SD* = 1.10), 41-50 (*M* = 4.10, *SD* = 1.00), 51-60 (*M* = 3.97, *SD* = .94), and 61 and older (*M* = 3.65, *SD* = 1.03), for creating and updating course materials between age groups of 40 and younger (*M* = 3.64, *SD* = 1.18), 41-50

(*M* = 3.62, *SD* = 1.24), 51-60 (*M* = 3.93, *SD* = 1.08), and 61 and older (*M* = 3.33, *SD* = 1.20).

These data are presented in Table 6.

Table 6

Use Of mLearning Devices Based on Age

	<40		41-50		51-60		61>		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.67(12)	.49	3.94(17)	1.20	4.23(30)	.73	4.00(22)	.976	1.94
Texts/ colleagues	4.23(22)	1.19	4.27(22)	.88	4.26(35)	.61	4.00(25)	.88	.51
Email to students	4.25(24)	.79	4.30(23)	1.02	4.50(32)	.57	4.27(26)	.83	.61
Email to colleagues	4.29(23)	.81	4.35(23)	1.03	4.48(31)	.76	4.26(27)	.76	.46
Social media	3.60(15)	1.50	4.24(17)	.90	3.68(28)	1.02	3.37(19)	1.34	1.69
Providing feedback	3.74(19)	1.10	3.67(21)	1.11	4.19(27)	1.00	3.86(22)	1.17	1.08
Internet resources	3.90(21)	.89	3.96(23)	.98	4.06(32)	.95	3.56(25)	1.16	1.26
Internet apps	3.94(17)	.90	3.43(21)	1.47	3.21(28)	1.40	3.09(22)	1.34	1.53
Creating audio/video	3.56(16)	1.15	3.72(18)	1.18	3.22(27)	1.53	3.04(23)	1.33	1.08
Students resources	3.77(22)	1.07	3.81(22)	1.22	4.13(32)	.87	3.75(24)	1.19	.76
Students apps	3.64(14)	1.01	3.63(19)	1.12	3.23(26)	1.39	3.37(19)	1.34	.53
Calendar/scheduling	4.09(22)	.97	4.04(23)	1.26	3.88(32)	1.24	3.59(22)	1.26	.79
Research consumed	3.87(23)	1.10	4.18(22)	1.01	4.33(33)	.646	3.54(26)	1.03	3.93*
Research creation	3.23(13)	1.42	3.55(20)	1.15	4.00(28)	1.05	3.14(21)	1.28	2.44
Service committee	3.69(13)	1.11	4.05(19)	1.03	3.93(27)	1.12	3.25(20)	1.12	2.34
Meetings	3.87(23)	1.10	4.10(21)	1.00	3.97(29)	.94	3.65(23)	1.03	.76
Course materials	3.64(22)	1.18	3.62(21)	1.24	3.93(30)	1.08	3.33(21)	1.20	1.11

N = 140. **p* ≤ .05. Scale: 1 = Very Rarely. 2 = Rarely. 3 = Sometimes. 4 = Frequently. 5 = Almost Always.

Sex. An independent samples t-test was used to determine if there were differences in the levels of use of each of the 17 professional activities based on sex. There were no significant differences in the mean level of use scores for sending text messages to students, (Males *M* = 4.14, *SD* = .970; Females: *M* =4.17, *SD* = .88), sending text messages to colleagues (Males: *M* = 4.12, *SD* = .88; Females: *M* = 4.22, *SD* = .91), sending email to students (Males: *M* = 4.24, *SD* = .83; Females: *M* =4.39, *SD* = .78), sending email to colleagues (Males: *M* = 4.27 *SD* = .76; Females: *M* =4.39, *SD* = .80), using social media (Males: *M* = 3.68 *SD* = .1.31; Females: *M* =3.72, *SD* = .1.17), and providing formal/informal feedback to students (Males: *M* = 3.77 *SD* = 1.07; Females: *M* =3.95, *SD* = 1.11).

There were no significant differences in mean level of use scores based on sex for accessing Internet resources to deliver instruction (Males: *M* = 3.71 *SD* = .96; Females: *M* =3.97, *SD* = 1.03), accessing Internet apps to deliver instruction (Males: *M* = 3.31, *SD* = 1.28; Females: *M* =3.42, *SD* = 1.38), creating audio/video for classroom lecture, discussion, presentations, etc., (Males: *M* = 3.32, *SD* = 1.33; Females: *M* =3.36, *SD* = 1.37) and having students access Internet resources for in-class activities, discussions, presentations, etc. (Males: *M* = 3.66, *SD* = 1.16; Females: *M* =4.00, *SD* = 1.01). There were no significant differences in mean level of use scores based on sex in having students access Internet apps for in-class activities, discussions, presentations, etc. (Males: *M* = 3.32, *SD* = 1.25; Females: *M* =3.51, *SD* = 1.26); calendar/scheduling (Males: *M* = 3.97, *SD* = 1.14; Females: *M* =3.86, *SD* = 1.22), scholarly research consumption (Males: *M* = 3.81, *SD* = 1.08; Females: *M* =4.11, *SD* = .91), and service committee work (Males: *M* = 3.76, *SD* = 1.06; Females: *M* =3.76, *SD* = 1.09).

There were no significant differences in mean level of use scores based on sex for program or department, college, university meetings (Males: *M* = 3.70, *SD* = 1.2; Females: *M* =

4.00, *SD* = .89), and uploading, developing, accessing course materials (Males: *M* = 3.60, *SD* = 1.14; Females: *M* =3.70, *SD* = 1.19). These data are presented in Table 7.

Table 7

Use of mLearning Devices Based on Sex

	Male		Female		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*t-value*
Texts/students	4.14(28)	.97	4.17(52)	.88	-.14
Texts/ colleagues	4.12(34)	.88	4.22(69)	.91	-.53
Email to students	4.24(37)	.83	4.39(67)	.78	-.89
Email to colleagues	4.27(38)	.76	4.39(66)	.80	.811
Social media	3.68(25)	1.31	3.72(53)	1.17	-.125
Providing feedback	3.77(30)	1.07	3.95(58)	1.11	-.73
Internet resources	3.71(35)	.96	3.97(65)	1.03	-1.21
Internet apps	3.31(32)	1.28	3.42(55)	1.38	-.35
Creating audio/video	3.32(28)	1.33	3.36(55)	1.37	-.13
Students resources	3.66(35)	1.16	4.00(64)	1.01	-1.53
Students apps	3.32(28)	1.25	3.51(49)	1.26	-.63
Calendar/scheduling	3.97(34)	1.14	3.86(65)	1.22	.43
Research consumed	3.81(37)	1.08	4.11(66)	.91	-1.48
Research creation	3.50(30)	1.25	3.57(51)	1.24	-.24
Service committee	3.76(29)	1.06	3.76(49)	1.09	.14
Meetings	3.70(33)	1.21	4.00(62)	.88	-1.27
Course materials	3.60(35)	1.14	3.69(59)	1.19	-.38

Note. *N* = 140. **p* ≤ .05. Scale: 1 = Very Rarely. 2 = Rarely. 3 = Sometimes. 4 = Frequently. 5 = Almost Always.

Years of experience. A one-way ANOVA test was conducted to compare the effect of years of teaching experience on the levels of use of each of the 17 professional activities. No significant differences were found in any of the 17 professional activities based on years of teaching experience. These data are presented in Table 8.

No statistically significant differences in mean level of use scores based on years of experience were found for sending text messages to students for respondents with five or fewer years of experience (*M* = 4.21, *SD* = .85), 6-10 years of experience (*M* = 4.29, *SD* = 1.05), 11-15 years of experience (*M* = 4.16, *SD* = .90), 16-20 years of experience (*M* = 4.00, *SD* = 1.08), and more than 20 years of experience (*M* = 4.15, *SD* = .69), and sending text messages to colleagues for respondents with five or fewer years of experience (*M* = 4.03, *SD* = 1.05), 6-10 years of experience (*M* = 4.29, *SD* = 1.05), 11-15 years of experience (*M* = 4.16, *SD* = .90), 16-20 years of experience (*M* = 4.31, *SD* = .75), and more than 20 years of experience (*M* = 4.06, *SD* = .66). Similarly, no statistically significant differences in mean level of use scores based on years of experience were found in sending email to students for respondents with five or fewer years of experience (*M* = 4.20, *SD* = .85), 6-10 years of experience (*M* = 4.37, *SD* = .96), 11-15 years of experience (*M* = 4.15, *SD* = 1.03), 16-20 years of experience (*M* = 4.69, *SD* = .48), and more than 20 years of experience (*M* = 4.18, *SD* = .64), sending email to colleagues for respondents with five or fewer years of experience (*M* = 4.20, *SD* = .89), 6-10 years of experience (*M* = 4.33, *SD* = .97), 11-15 years of experience (*M* = 4.50, *SD* = .71), 16-20 years of experience (*M* = 3.79, *SD* = 1.25), and more than 20 years of experience (*M* = 4.17, *SD* = .62).

No statistically significant differences in mean level of use scores based on years of experience were found in using social media for respondents with five or fewer years of experience (*M* = 3.40, *SD* = 1.31), 6-10 years of experience (*M* = 3.86, *SD* = 1.41), 11-15 years of experience (*M* = 3.67, *SD* = 1.11), 16-20 years of experience (*M* = 3.79, *SD* = 1.25), and more than 20 years of experience (*M* = 4.10, *SD* = .74). No statistically significant differences in mean level of use scores based on years of experience were found in providing feedback to students for respondents with five or fewer years of experience (*M* = 3.54, *SD* = 1.22), 6-10 years of experience (*M* = 3.94, *SD* = 1.14), 11-15 years of experience (*M* = 4.04, *SD* = 1.24), 16-20 years of experience (*M* = 4.08, *SD* = 1.12), or more than 20 years of experience (*M* = 4.00, *SD* = .77), and accessing Internet resources in-class for respondents with five or fewer years of experience (*M* = 3.64, *SD* = 1.10), 6-10 years of experience (*M* = 4.00, *SD* = .91), 11-15 years of experience

(*M* = 4.11, *SD* = 1.24), 16-20 years of experience (*M* = 4.00, *SD* = 1.24), or more than 20 years of experience (*M* = 3.64, *SD* = .84).

There were no statistically significant differences in mean level of use scores based on years of experience for accessing Internet apps for in-class activities, etc., between respondents with five or less years of experience (*M* = 3.21, *SD* = 1.41), 6-10 years of experience (*M* = 3.38, *SD* = 1.36), 11-15 years of experience (*M* = 3.43, *SD* = 1.34), 16-20 years of experience (*M* = 3.54, *SD* = 1.51), and more than 20 years of experience (*M* = 3.42, *SD* = 1.08), creating audio/video with five or less years of experience (*M* = 3.32, *SD* = 1.36), 6-10 years of experience (*M* = 3.20, *SD* = 1.74), 11-15 years of experience (*M* = 3.30, *SD* = 1.15), 16-20 years of experience (*M* = 3.38, *SD* = 1.39), and more than 20 years of experience (*M* = 3.64, *SD* = .84). No statistically significant differences in mean level of use scores based on years of experience were found in having students access Internet resources in-class between respondents with five or fewer years of experience (*M* = 3.65, *SD* = 1.32), 6-10 years of experience (*M* = 4.00, *SD* = .91), 11-15 years of experience (*M* = 3.61, *SD* = 1.08), 16-20 years of experience (*M* = 4.31, *SD* = .75), or those with more than 20 years of experience (*M* = 3.80, *SD* = .86), having students access Internet apps in-class between respondents with five or fewer years of experience (*M* = 3.33, *SD* = 1.28), 6-10 years of experience, (*M* = 3.06, *SD* = 1.48), 11-15 years of experience (*M* = 3.61, *SD* = 1.08), 16-20 years of experience (*M* = 3.54, *SD* = 1.51), and more than 20 years of experience (*M* = 3.42, *SD* = 1.08), calendar/scheduling for respondents with five or fewer years of experience (*M* = 3.61, *SD* = 1.23), 6-10 years of experience (*M* = 4.06, *SD* = 1.26), 11-15 years of experience (*M* = 4.15, *SD* = .97), 16-20 years of experience (*M* = 3.75, *SD* = 1.14), or more than 20 years of experience (*M* = 3.50, *SD* = 1.34).

No statistically significant differences in mean level of use scores based on years of experience were found in research consumption for respondents with five or fewer years of experience (*M* = 3.66, *SD* = 1.17), 6-10 years of experience (*M* = 4.17, *SD* = .86), 11-15 years of experience (*M* = 4.15, *SD* = .82), 16-20 years of experience (*M* = 4.62, *SD* = .51), and more than 20 years of experience (*M* = 3.71, *SD* = .99), research creation in respondents with five or fewer years of experience (*M* = 3.09, *SD* = 1.31), 6-10 years of experience (*M* = 3.77, *SD* = 1.24), 11-15 years of experience (*M* = 3.70, *SD* = 1.02), 16-20 years of experience (*M* = 3.82, *SD* = 1.54), or more than 20 years of experience (*M* = 3.67, *SD* = 1.07). Concurrently, there were no statistically significant differences in mean levels of scores based on years of experience for service committee work for respondents with five or fewer years of experience (*M* = 3.37, *SD* = 1.12), 6-10 years of experience (*M* = 3.85, *SD* = 1.28), 11-15 years of experience (*M* = 3.86, *SD* = .89), 16-20 years of experience (*M* = 3.82, *SD* = 1.54), or more than 20 years of experience (*M* = 3.50, *SD* = 1.34), usage during meetings with five or fewer years of experience (*M* = 3.70, *SD* = .99), 6-10 years of experience (*M* = 4.00, *SD* = 1.11), 11-15 years of experience (*M* = 4.00, *SD* = 1.07), 16-20 years of experience (*M* = 4.23, *SD* = .83), or more than 20 years of experience (*M* = 3.67, *SD* = .98), updating and creating course materials, for respondents with five or fewer years of experience (*M* = 3.52, *SD* = 1.09), 6-10 years of experience (*M* = 3.65, *SD* = 1.41), 11-15 years of experience (*M* = 3.92, *SD* = .91), 16-20 years of experience (*M* = 4.00, *SD* = 1.22), or more than 20 years of experience (*M* = 3.08, *SD* = 1.31).

Table 8

Use Of mLearning Devices Based on Years of Experience

	≤5		6-10		11-15		16-20		≥20		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.21(19)	.85	4.29(17)	1.05	4.16(19)	.90	4.00(13)	1.08	4.15(13)	.69	.20
Texts/ colleagues	4.03(29)	1.05	4.56(18)	.62	4.15(27)	1.03	4.31(13)	.75	4.06(17)	.66	1.14
Email to students	4.20(30)	.85	4.37(19)	.96	4.42(26)	.81	4.69(13)	.48	4.18(17)	.64	1.13
Email to colleagues	4.20(30)	.89	4.33(18)	.97	4.50(26)	.71	4.70(13)	.48	4.17(18)	.62	1.40
Social media	3.40(20)	1.31	3.86(14)	1.41	3.67(21)	1.11	3.79(14)	1.25	4.10(10)	.74	.66
Providing feedback	3.54(24)	1.22	3.94(17)	1.14	4.04(24)	1.04	4.08(13)	1.12	4.00(11)	.77	.85
Internet resources	3.64(28)	1.10	4.00(18)	.91	4.11(27)	1.24	4.00(14)	1.24	3.64(14)	.84	1.06
Internet apps	3.21(24)	1.41	3.38(16)	1.36	3.43(23)	1.34	3.54(13)	1.51	3.42(12)	1.08	.15
Creating audio/video	3.32(22)	1.36	3.20(15)	1.74	3.30(23)	1.15	3.38(13)	1.39	3.64(11)	1.21	.18
Students resources	3.65(26)	1.32	3.68(19)	1.25	4.11(27)	.85	4.31(13)	.75	3.80(15)	.86	1.31
Students apps	3.33(18)	1.28	3.06(16)	1.48	3.61(23)	1.08	3.75(12)	1.14	3.44(9)	1.33	.68
Calendar/scheduling	3.61(28)	1.23	4.06(18)	1.26	4.15(26)	.97	4.23(13)	1.17	3.50(14)	1.34	1.47
Research consumed	3.66(29)	1.17	4.17(18)	.86	4.15(27)	.82	4.62(13)	.51	3.71(17)	.99	3.11
Research creation	3.09(23)	1.31	3.77(13)	1.24	3.70(23)	1.02	3.82(11)	1.54	3.67(12)	1.07	1.17
Service committee	3.37(19)	1.12	3.85(13)	1.28	3.86(22)	.89	4.08(13)	1.19	3.67(12)	.89	1.02
Meetings	3.70(27)	.99	4.00(19)	1.11	4.00(22)	1.07	4.23(13)	.83	3.67(15)	.98	.90
Course materials	3.52(27)	1.09	3.65(17)	1.41	3.92(25)	.91	4.00(13)	1.22	3.08(12)	1.31	1.44

Note. *N* = 140. *p ≤.05. Scale: 1=Very Rarely. 2=Rarely. 3=Sometimes. 4=Frequently. 5=Almost Always.

Level taught. A one-way ANOVA test was conducted to determine the effect of level of courses taught on the levels of use of each of the 17 professional activities. There were no statistically significant differences in mean level of use scores for sending text messages to students between undergraduate courses taught (*M* = 4.23, *SD* = .73), graduate courses taught (*M* = 4.15, *SD* = .97), and both undergraduate and graduate courses taught (*M* = 4.19, *SD* = .93), and sending text messages to colleagues between undergraduate courses taught (*M* = 4.14, *SD* = .85), graduate courses taught (*M* = 4.25, *SD* = .84), and both undergraduate and graduate courses taught (*M* = 4.13, *SD* = 1.02), for sending email to students between undergraduate courses taught (*M* = 4.24, *SD* = .70), graduate courses taught (*M* = 4.38, *SD* = .81), and both undergraduate and graduate courses taught (*M* = 4.35, SD = *.84*), and for sending email to colleagues between undergraduate courses taught (*M* = 4.19, *SD* = .75), graduate courses taught (*M* = 4.40, *SD* = .77), and both undergraduate and graduate courses taught (*M* = 4.38, *SD* = .83).

There were no statistically significant differences in mean level of use scores for using social media between undergraduate courses taught (*M* = 4.25, *SD* = .86), graduate courses taught (*M* = 3.49, *SD* = 1.14), and both undergraduate and graduate courses taught (*M* = 3.71, *SD* = 1.40), and for providing feedback between undergraduate courses taught (*M* = 4.17, *SD* = .86), graduate courses taught (*M* = 3.82, *SD* = 1.09), and undergraduate and graduate courses taught (*M* = 3.81, *SD* = 1.23).

There were no statistically significant differences for accessing Internet resources for class between undergraduate courses taught (*M* = 4.00, *SD* = .76), graduate courses taught (*M* = 3.90, *SD* = 1.07), and both undergraduate and graduate courses taught (*M* = 3.76, *SD* = 1.06). There were no statistically significant differences in mean use levels for accessing Internet apps for class between undergraduate courses taught (*M* = 3.33, *SD* = 1.24), graduate courses taught, (*M* = 3.32, *SD* = 1.36), and undergraduate and graduate courses taught, (*M* = 3.50, *SD* = 1.39), creating audio/video between undergraduate courses taught (*M* = 2.89, *SD* = 1.32), graduate courses taught (*M* = 3.42, *SD* = 1.29), and both undergraduate and graduate courses taught (*M* = 3.57, *SD* = 1.43), for having students use Internet resources in class between undergraduate courses taught (*M* = 3.82, *SD* = 1.01), graduate courses taught (*M* = 3.90, *SD* = 1.17), and both undergraduate and graduate courses taught (*M* = 3.93, *SD* = .98), having students use Internet apps in class between undergraduate courses taught (*M* = 3.20, *SD* = 1.21), graduate courses taught (*M* = 3.38, *SD* = 1.27), and both undergraduate and graduate courses taught (*M* = 3.67, *SD* = 1.24), and calendar/scheduling between undergraduate courses taught (*M* = 4.00, *SD* = .77), graduate courses taught (*M* = 3.85, *SD* = 1.35), and both undergraduate and graduate courses taught (*M* = 3.90, *SD* = 1.18).

There were no statistically significant differences in mean level of use scores for research consumption between undergraduate courses taught (*M* = 3.86, *SD* = 1.01), graduate courses taught (*M* = 3.98, *SD* = 1.04), and both undergraduate and graduate courses taught (*M* = 4.14, *SD* = .83), research creation between undergraduate courses taught (*M* = 3.24, *SD* = 1.20), graduate courses taught (*M* = 3.67, *SD* = 1.13), and undergraduate and graduate courses taught (*M* = 3.55, *SD* = 1.24), service committee work between undergraduate courses taught (*M* = 3.79, *SD* = .97), graduate courses taught (*M* = 3.60, *SD* = 1.17), and both graduate and undergraduate courses taught (*M* = 3.96, *SD* = .93), usage during meetings between undergraduate courses taught (*M* = 3.76, *SD* = 1.14), graduate courses taught (*M* = 3.98, *SD* = .91), and both graduate and undergraduate courses taught (*M* = 3.85, *SD* = 1.10), and creating/updating course materials between undergraduate courses taught (*M* = 3.62, *SD* = 1.12), graduate courses taught (*M* = 3.72, *SD* = 1.20), and both undergraduate and graduate courses taught (*M* = 3.60, *SD* = 1.20). These data are presented in Table 9.

Table 9

Use Of mLearning Devices Based on Level Taught

	Undergraduate		Graduate		Both UG and G		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.23(13)	.73	4.15(47)	.93	4.19(21)	.93	.05
Texts/ colleagues	4.14(21)	.85	4.25(52)	.84	4.13(31)	1.02	.22
Email to students	4.24(21)	.70	4.38(53)	.81	4.35(31)	.84	.23
Email to colleagues	4.19(21)	.75	4.40(52)	.77	4.38(32)	.83	.57
Social media	4.25(16)	.86	3.49(39)	1.14	3.71(24)	1.40	2.37
Providing feedback	4.17(18)	.86	3.82(45)	1.09	3.81(26)	1.23	.73
Internet resources	4.00(22)	.76	3.90(50)	1.07	3.76(29)	1.06	.38
Internet apps	3.33(18)	1.24	3.32(44)	1.36	3.50(26)	1.39	.16
Creating audio/video	2.89(18)	1.32	3.42(45)	1.29	3.57(21)	1.43	1.43
Students resources	3.82(22)	1.01	3.90(48)	1.17	3.93(30)	.98	.07
Students apps	3.20(15)	1.21	3.38(39)	1.27	3.67(24)	1.24	.71
Calendar/scheduling	4.00(21)	.77	3.85(48)	1.35	3.90(30)	1.18	.11
Research consumed	3.86(21)	1.01	3.98(54)	1.04	4.14(29)	.83	.52
Research creation	3.24(17)	1.20	3.67(43)	1.13	3.55(22)	1.44	.77
Service committee	3.79(14)	.97	3.60(40)	1.17	3.96(25)	.93	.88
Meetings	3.76(21)	1.14	3.98(48)	.91	3.85(27)	1.10	.37
Course materials	3.62(21)	1.12	3.72(43)	1.20	3.60(30)	1.20	.11

Note. $N = 140$. $^*p \le 05$. Scale: 1=Very Rarely. 2=Rarely. 3=Sometimes. 4=Frequently. 5=Almost Always.

Levels of self-efficacy for using mLearning devices for professional activities. Research question three sought to determine respondents' levels of self-efficacy regarding use of mLearning device for each of the 17 professional activities. Respondents were asked to indicate their self-efficacy level for using mLearning devices for 17 professional activities, using a five-point Likert scale with the following: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very Good. and 5 = Exceptional. Respondents also had the option of indicating they did not use an mLearning device for a particular activity. A one-sample t-test was used to compare the sample mean for each item to the mean (M = 3.00) from a hypothetical normal distribution for each activity. The mean scores of the 17 professional activities ranged from M = 4.30 for email to students to M = 2.82 for accessing Internet apps.

Sample means were grouped into four categories for discussion. These categories were M = 2.50-2.99, M = 3.00-3.49, M = 3.50-3.99, and M = 4.00-4.50. Two professional activities had a mean of 4.00 or higher: email to students (M = 4.14, SD = .89) and email to colleagues (M = 4.30, SD = .73). Sample means for both professional activities were statistically significantly different from the mean (M = 3.0) of the hypothetical normal distribution at $p < .05$.

Two professional activities had a mean between 3.50 and 3.99 (calendar/scheduling (M = 3.93, SD = 1.13), and research consumption (M = 3.52, SD = 1.18). Sample means for both professional activities were statistically significantly different from the mean (M = 3.0) of the hypothetical normal distribution at $p < .05$.

Three professional activities with mean scores between 3.00 and 3.49 were statistically significantly different from the mean (M = 3.0) of the hypothetical normal distribution at $p < .05$: access Internet resources (M = 3.41, SD = 1.12), have students use mLearning devices to access Internet resources (M = 3.46, SD = 1.04), and meetings (M = 3.26, SD = 1.24).

Six professional activities with mean scores between 3.00 and 3.49 were not statistically significantly different from the mean (*M* = 3.0) of the hypothetical normal distribution at $p < .05$: text messages to students (*M* = 3.05, *SD* = 1.22), text messages to colleagues (*M* = 3.05, *SD* = 1.22), social media (*M* = 3.24, *SD* = 1.40), providing feedback (*M* = 3.26, *SD* = 1.23), service committee work (*M* = 3.07, *SD* = 1.03), and course materials (*M* = 3.17, *SD* = 1.33).

Four professional activities were not statistically significantly lower than the means from the hypothetical normal distribution (*M* = 3.0) and had mean scores of 2.99 or lower. These data included accessing Internet apps (*M* = 2.82, *SD* = 1.14), creating audio/video (*M* = 2.88, *SD* = 1.34), having students access Internet apps (*M* = 2.92, *SD* = 1.22), and research creation (*M* = 2.99, *SD* = 1.37). These data are summarized in Table 10.

Table 10

Self-efficacy Level of Using mLearning Devices for Professional Activities

Professional Activity	*n*	*m*	*SD*	*t-value*
Texts/students	75	3.05	1.22	.706
Texts/ colleagues	75	3.05	1.22	.706
Email to students	108	4.14	.89	.000*
Email to colleagues	110	4.30	.73	.000*
Social media	67	3.24	1.40	.169
Providing feedback	84	3.26	1.23	.055
Internet resources	101	3.41	1.12	.000*
Internet apps	77	2.82	1.14	.167
Creating audio/video	78	2.88	1.34	.449
Students resources	100	3.46	1.04	.000*
Students apps	72	2.92	1.22	.564
Calendar/scheduling	102	3.93	1.13	.000*
Research consumed	103	3.52	1.18	.000*
Research creation	80	2.99	1.37	.935
Service committee	75	3.07	1.03	.577
Meetings	96	3.26	1.24	.043*
Course materials	95	3.17	1.33	.222

N = 140. *p < .05. Scale: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very Good. 5 = Exceptional.

Self-efficacy of mLearning Devices Based on Demographic/Attribute Variables.

The 17 professional activity mean scores were analyzed to determine if there were differences in mean scores based on selected demographic and attribute variables. These demographic and attribute variables included respondent sex, age, years of teaching experience, and level taught (undergraduate, graduate, or both).

Age. A one way ANOVA test was conducted to determine the effects of age on the self-efficacy levels for the 17 professional activities. Sample means were grouped into four categories: 40 and younger, 41-50, 51-60, and 61 and older.

Significant differences were found for one professional activity. For research consumption, there were significant differences in mean self-efficacy level scores between age groups of 40 and younger (*M* = 3.87, *SD* = 1.10), 41-50 (*M* = 4.18, *SD* = 1.01), 51-60 (*M* = 4.33, *SD* = .65), and 61 and older (*M* = 3.54, *SD* = 1.03).

There were no significant differences in mean self-efficacy levels of scores for sending text messages to students for ages 40 and younger (*M* = 4.67, *SD* = .49), 41-50 (*M* = 3.94, *SD* = 1.20), 51-60 (*M* = 4.23, *SD* = .73), and 61 and older (*M* = 4.00, *SD* = .98), for sending text messages to colleagues for ages 40 and younger (*M* = 4.23, *SD* = 1.19), 41-50 (*M* = 4.27, *SD* = .88), 51-60 (*M* = 4.26, *SD* = .61), and 61 and older (*M* = 4.00, *SD* = .98), sending email to students in respondents who were 40 or younger (*M* = 4.25, *SD* = .79), 41-50 (*M* = 4.30, *SD* = 1.02), 51-60 (*M* = 4.50, *SD* = .57), and 60 or older (*M* = 4.27, *SD* = .83), and sending email to colleagues for those ages 40 and younger (*M* = 4.29, *SD* = .81), 41-50 (*M* = 4.35, *SD* = 1.03), 51-60 (*M* = 4.26, *SD* = .76), and 61 or older (*M* = 4.26, *SD* = .76). Similarly, there were no significant differences in mean self-efficacy levels of scores for using social media, between age groups of those 40 or younger (*M* = 3.60, *SD* = 1.50), 41-50 (*M* = 4.24, *SD* = .90), 51-60 (*M* = 3.68, *SD* = 1.02), and 61 or older (*M* = 3.37, *SD* = 1.34), providing feedback to students, between age groups of 40 or younger (*M* = 3.74, *SD* = 1.10), 41-50 (*M* = 3.67, *SD* = 1.11), 51-60 (*M* = 4.06, *SD* = .95), and 61 or older (*M* = 3.87, *SD* = 1.17), accessing Internet resources for class, between age groups of 40 and younger (*M* = 3.90, *SD* = .89), 41-50 (*M* = 3.96, *SD* = .23), 51-60 (*M* = 4.06, *SD* = .95), and 61 and older (*M* = 3.56, *SD* = 1.16), and accessing Internet apps for class between age groups of 40 and younger (*M* = 3.94, *SD* = .90), 41-50 (*M* = 3.43, *SD* = 1.47), 51-60 (*M* = 3.21, *SD* = 1.40), and 61 and older (*M* = 3.09, *SD* = 1.34).

There were no significant differences in mean self-efficacy levels of scores for creating audio/video between age groups 40 or younger (*M* = 3.56, *SD* = 1.15), 41-50 (*M* = 3.72, *SD* = 1.18), 51-60 (*M* = 3.22, *SD* = 1.53), and 61 and older (*M* = 3.04, *SD* = 1.33), having students use

Internet resources during class between age groups of 40 and younger (*M* = 3.77, *SD* = 1.07), 41-50 (*M* = 3.82, *SD* = 1.22), 51-60 (*M* = 4.13, *SD* = .87), and 61 and older (*M* = 3.75, *SD* = 1.19), and having students access Internet apps during class between age groups of 40 and younger (*M* = 3.64, *SD* = 1.01), 41-50 (*M* = 3.63, *SD* = 1.12), 51-60 (*M* = 3.23, *SD* = 1.40), and 61 and older (*M* = 3.37, *SD* = 1.34). Concurrently, there were no statistically significant differences in mean level scores for calendar/scheduling between age groups of 40 and younger (*M* = 4.09, *SD* = .97), 41-50 (*M* = 4.04, *SD* = 1.26), 51-60 (*M* = 3.88, *SD* = 1.24), and 61 and older (*M* = 3.59, *SD* = 1.26), research creation between age groups of 40 and younger (*M* = 3.23, *SD* = 1.42), 41-50 (*M* = 3.55, *SD* = 1.15), 51-60 (*M* = 4.00, *SD* = 1.05), and 61 and older (*M* = 3.14, *SD* = 1.28), for service committee work for age groups of 40 and younger (*M* = 3.69, *SD* = 1.11), 41-50 (*M* = 4.05, *SD* = 1.03), 51-60 (*M* = 3.93, *SD* = .96), and 61 and older (*M* = 3.25, *SD* = 1.12), usage during meetings between age groups of 40 and younger (*M* = 3.87, *SD* = 1.10), 41-50 (*M* = 4.10, *SD* = 1.00), 51-60 (*M* = 3.97, *SD* = .94), and 61 and older (*M* = 3.65, *SD* = 1.03), and creating and updating course materials between age groups of 40 and younger (*M* = 3.64, *SD* = 1.18), 41-50 (*M* = 3.62, *SD* = 1.24), 51-60 (*M* = 3.93, *SD* = 1.08), and 61 and older (*M* = 3.33, *SD* = 1.20). These data are presented in Table 11.

Table 11

Self-efficacy level based on Age

	<40		41-50		51-60		61+		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.67(12)	.49	3.94(17)	1.20	4.23(30)	.73	4.00(22)	.98	1.94
Texts/ colleagues	4.23(22)	1.19	4.27(22)	.88	4.26(35)	.61	4.00(25)	.96	.51
Email to students	4.25(24)	.79	4.30(23)	1.02	4.50(32)	.57	4.27(26)	.83	.61
Email to colleagues	4.29(24)	.81	4.35(23)	1.03	4.48(31)	.57	4.26(27)	.76	.46
Social media	3.60(15)	1.50	4.24(17)	.90	3.68(28)	1.02	3.37(19)	1.34	1.70
Providing feedback	3.74(19)	1.10	3.67(21)	1.11	4.19(27)	1.00	3.87(22)	1.17	.36
Internet resources	3.90(21)	.89	3.96(23)	.98	4.06(32)	.95	3.56(25)	1.16	.29
Internet apps	3.94(17)	.90	3.43(21)	1.47	3.21(28)	1.40	3.09(22)	1.34	.21
Creating audio/video	3.56(16)	1.15	3.72(18)	1.18	3.22(27)	1.53	3.04(23)	1.33	.36
Students resources	3.77(22)	1.07	3.82(22)	1.22	4.13(32)	.87	3.75(24)	1.19	.52
Students apps	3.64(14)	1.01	3.63(19)	1.12	3.23(26)	1.40	3.37(19)	1.34	.66
Calendar/scheduling	4.09(22)	.97	4.04(23)	1.26	3.88(32)	1.24	3.59(22)	1.26	.50
Research consumed	3.87(23)	1.10	4.18(22)	1.01	4.33(33)	.65	3.54(26)	1.03	.01*
Research creation	3.23(13)	1.42	3.55(20)	1.15	4.00(28)	1.05	3.14(21)	1.28	.07
Service committee	3.69(13)	1.11	4.05(19)	1.03	3.93(27)	.96	3.25(20)	1.12	.08
Meetings	3.87(23)	1.10	4.10(21)	1.00	3.97(29)	.94	3.65(23)	1.03	.52
Course materials	3.64(22)	1.18	3.62(21)	1.24	3.93(30)	1.08	3.33(21)	1.20	.35

N = 140. $*p < .05$. Scale: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very good. 5 = Exceptional.

Sex. An independent samples t-test was used to determine if there were differences in the self-efficacy levels for the 17 professional activities based on sex. No significant differences in sex were found for any of the 17 professional activities.

There were no significant differences in mean self-efficacy level scores for males (*M* = 2.73, *SD* = 1.12) and females (*M* =3.19, *SD* = 1.23) for sending text messages to students, (Males: *M* = 2.73, *SD* = .1.12; Females *M* =3.19, *SD* = 1.23) for sending text messages to colleagues, (Males: *M* = 4.13, *SD* = .89; Females *M* = 4.13, *SD* = .90) for sending email to students, (Males *M* = 4.20, *SD* = .75; Females *M* = 4.35, *SD* = .73) sending email to colleagues, (Males *M* = 2.86; *SD* = 1.56; Females *M* = 3.47, *SD* = 1.27) and using social media, (Males *M* =

3.19, *SD* = 1.30; Females *M* = 3.29, *SD* = 1.22). Concurrently, there were no significant differences in mean self-efficacy level scores for providing formal/informal feedback to students, (Males *M* = 3.20, *SD* = 1.16; Females *M* = 3.51, *SD* = 1.10) accessing Internet resources to deliver instruction, (Males *M* = 2.61, *SD* = 1.23; Females *M* = 2.94, *SD* = 1.39) accessing Internet apps to deliver instruction, (Males *M* = 2.67, *SD* = 1.39; Females *M* = 3.00, *SD* = 1.32) for creating audio/video for classroom lecture, discussion, presentations, etc…, (Males *M* = 3.20, *SD* = 1.11; Females *M* = 3.58, *SD* = .97) having students access Internet resources, for having students access Internet apps for in-class activities, discussions, presentations, etc…. (Males *M* = 2.73, *SD* = 1.25; Females *M* = 3.02, *SD* = 1.22); calendar/scheduling (Males *M* = 3.84, *SD* = 1.21; Females *M* = 3.97, *SD* = 1.08), scholarly research consumption (Males *M* = 3.39, *SD* = 1.22; Females *M* = 3.59, *SD* = 1.16), scholarly research creation (Males *M* = 3.18, *SD* = 1.25; Females *M* = 2.86, *SD* = 1.44),and service committee work (Males *M* = 2.93, *SD* = 1.10; Females *M* = 3.16, *SD* = 1.00). There were no significant difference in mean self-efficacy level scores for males (*M* = 3.20, *SD* = 1.41) and females (*M* = 3.30, *SD* = 1.15) program or department, college, university meetings, and uploading, developing, accessing course materials (Males *M* = 3.17, *SD* = 1.38; Females *M* = 3.15, *SD* = 1.32). These data are presented in Table 12.

Table 12

Self-efficacy level based on Sex

	Male		Female		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*t-value*
Texts/students	2.73(26)	1.12	3.19(48)	1.23	-1.57
Texts/ colleagues	2.73(26)	1.12	3.19(26)	1.23	-1.57
Email to students	4.13(39)	.89	4.13(68)	.90	-.02
Email to colleagues	4.20(41)	.75	4.35(68)	.73	-1.08
Social media	2.86(21)	1.56	3.47(45)	1.27	-1.69
Providing feedback	3.19(27)	1.30	3.29(56)	1.22	-.345
Internet resources	3.20(35)	1.16	3.51(65)	1.10	-1.32
Internet apps	2.61(28)	1.23	2.94(48)	1.39	-1.21
Creating audio/video	2.67(27)	1.39	3.00(50)	1.32	-1.04
Students resources	3.20(35)	1.11	3.58(64)	.97	-1.76
Students apps	2.73(26)	1.25	3.02(45)	1.22	-.96
Calendar/scheduling	3.84(37)	1.21	3.97(64)	1.08	-.56
Research consumed	3.39(38)	1.22	3.59(64)	1.16	-.82
Research creation	3.18(28)	1.25	2.86(51)	1.44	.98
Service committee	2.93(29)	1.10	3.16(45)	1.00	-.91
Meetings	3.20(35)	1.41	3.30(60)	1.15	-.38
Course materials	3.17(35)	1.38	3.15(59)	1.32	.07

N = 140. *p ≤.|05|. Scale: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very good. 5 = Exceptional.

Years of experience. A one-way ANOVA test was conducted to determine the effect of years of teaching experience on the self-efficacy levels for the 17 professional activities. Sample means were grouped into five categories: five or fewer years, 6-10 years, 11-15 years, 16-20 years, and more than 20 years.

No statistically significant differences in mean levels of scores were found in sending text messages to students for respondents with five or fewer years of experience (M = 4.21, SD = .85), 6-10 years of experience (M = 4.29, SD = 1.05), 11-15 years of experience (M = 4.16, SD = .90), 16-20 years of experience (M = 4.00, SD = 1.08), and more than 20 years of experience (M = 4.15, SD = .69), sending text messages to colleagues for respondents with five or fewer years of experience (*M* = 4.03, *SD* = 1.05), 6-10 years of experience (*M* = 4.56, *SD* = .62), 11-15 years of experience (*M* = 4.15, *SD* = 1.03), 16-20 years of experience (*M* = 4.31, *SD* = .75), and more than 20 years of experience (*M* = 4.06, *SD* = .66), sending email to students for respondents with five or fewer years of experience (*M* = 4.20, *SD* = .85), 6-10 years of experience (*M* = 4.37, *SD* = .96), 11-15 years of experience (*M* = 4.42, *SD* = .81), 16-20 years of experience (*M* = 4.70, *SD* = .48), and more than 20 years of experience (*M* = 4.18, *SD* = .64), and sending email to colleagues for respondents with five or fewer years of experience (*M* = 4.20, *SD* = .89), 6-10 years of experience (*M* = 4.33, *SD* = .97), 11-15 years of experience (*M* = 4.50, *SD* = .71), 16-20 years of experience (*M* = 4.69, *SD* = .48), and more than 20 years of experience (*M* = 4.17, *SD* = .62). Furthermore, no statistically significant differences in mean levels of scores were found using social media for respondents with five or fewer years of experience (*M* = 3.40, *SD* = 1.31), 6-10 years of experience (*M* = 3.86, *SD* = 1.41), 11-15 years of experience (*M* = 3.67, *SD* = 1.11), 16-20 years of experience (*M* = 3.79, *SD* = 1.25), and more than 20 years of experience (*M* = 4.10, *SD* = .74), providing feedback to students for respondents with five or fewer years of experience (*M* = 3.54, *SD* = 1.22), 6-10 years of experience (*M* = 3.94, *SD* = 1.14), 11-15 years of experience (*M* = 4.04, *SD* = 1.04), 16-20 years of experience (*M* = 4.08, *SD* = 1.12), or more than 20 years of experience (*M* = 4.00, *SD* = .77), and accessing Internet resources in-class for respondents with five or fewer years of experience (*M* = 3.64, *SD* = 1.10), 6-10 years of experience (*M* = 4.00, *SD* = .91), 11-15 years of experience (*M* = 4.11, *SD* = .89), 16-20 years of experience (*M* = 4.00, *SD* = 1.24), or more than 20 years of experience (*M* = 3.64, *SD* = .84).

No statistically significant differences in mean levels of scores were found in accessing Internet apps for in-class, with five or less years of experience (*M* = 3.21, *SD* = 1.41), 6-10 years of experience (*M* = 3.38, *SD* = 1.36), 11-15 years of experience (*M* = 3.43, *SD* = 1.34), 16-20 years of experience (*M* = 3.54, *SD* = 1.51), and more than 20 years of experience (*M* = 3.42, *SD* = 1.08), creating audio/video with five or less years of experience (*M* = 3.22, *SD* = 1.36), 6-10 years of experience (*M* = 3.20, *SD* = 1.74), 11-15 years of experience (*M* = 3.30, *SD* = 1.15), 16-20 years of experience (*M* = 3.38, *SD* = 1.39), and more than 20 years of experience (*M* = 3.64, *SD* = 1.21), having students access Internet resources in-class between respondents with five or fewer years of experience (*M* = 3.65, *SD* = 1.32), 6-10 years of experience (*M* = 3.68, *SD* = 1.25), 11-15 years of experience (*M* = 4.11, *SD* = .85), 16-20 years of experience (*M* = 4.31, *SD* = .75), or those with more than 20 years of experience (*M* = 3.80, *SD* = .86), and having students access Internet apps in-class between respondents with five or fewer years of experience (*M* = 3.33, *SD* = 1.28), 6-10 years of experience, (*M* = 3.06, *SD* = 1.48), 11-15 years of experience (*M* = 3.61, *SD* = 1.08), 16-20 years of experience (*M* = 3.75, *SD* = 1.14), and more than 20 years of experience (*M* = 3.44, *SD* = 1.33). In addition, no statistically significant differences in mean levels of scores were found in calendar/scheduling for respondents with five or fewer years of experience (*M* = 3.61, *SD* = 1.23), 6-10 years of experience (*M* = 4.06, *SD* = 1.26), 11-15 years of experience (*M* = 4.15, *SD* = .97), 16-20 years of experience (*M* = 4.23, *SD* = 1.17), or more than 20 years of experience (*M* = 3.50, *SD* = 1.34), research consumption for respondents with five or fewer years of experience (*M* = 3.66, *SD* = 1.17), 6-10 years of experience (*M* = 4.17, *SD* = .86), 11-15 years of experience (*M* = 4.15, *SD* = .82), 16-20 years of experience (*M* = 4.62, *SD* = .51), and more than 20 years of experience (*M* = 3.71, *SD* = .99), and research creation in respondents with five or fewer years of experience (*M* = 3.09, *SD* = 1.31), 6-10 years of experience (*M* = 3.77, *SD* = 1.24), 11-15 years of experience (*M* = 3.70, *SD* = 1.02), 16-20 years of experience (*M* = 3.82, *SD* = 1.54), or more than 20 years of experience (*M* = 3.67, *SD* = 1.07). Additionally, no statistically significant differences in mean levels of scores were found in service committee work with five or fewer years of experience (*M* = 3.37, *SD* = 1.12), 6-10 years of experience (*M* = 3.85, *SD* = 1.28), 11-15 years of experience (*M* = 3.87, *SD* = .89), 16-20 years of experience (*M* = 4.08, *SD* = 1.19), or more than 20 years of experience (*M* = 3.67, *SD* = .89), use during meetings with five or fewer years of experience (*M* = 3.71, *SD* = .99), 6-10 years of experience (*M* = 4.00, *SD* = 1.11), 11-15 years of experience (*M* = 4.00, *SD* = 1.07), 16-20 years of experience (*M* = 4.23, *SD* = .83), or more than 20 years of experience (*M* = 3.67, *SD* = .98), updating and creating course materials with five or fewer years of experience (*M* = 3.52, *SD* = 1.09), 6-10 years of experience (*M* = 3.65, *SD* = 1.41), 11-15 years of experience (*M* = 3.92, *SD* = .91), 16-20 years of experience (*M* = 4.00, *SD* = 1.22), or more than 20 years of experience (*M* = 3.08, *SD* = 1.31). These data are presented in Table 13.

Table 13

Self-efficacy Level Based on Years of Experience

	≤5		6-10		11-15		16-20		≥21		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.21(19)	.85	4.29(17)	1.05	4.16(19)	.90	4.00(13)	1.08	4.15(13)	.69	.20
Texts/ colleagues	4.03(29)	1.05	4.56(18)	.62	4.15(27)	1.03	4.31(13)	.75	4.06(17)	.66	1.14
Email to students	4.20(30)	.85	4.37(19)	.96	4.42(26)	.81	4.70(13)	.48	4.18(17)	.64	1.13
Email to colleagues	4.20(30)	.89	4.33(18)	.97	4.50(26)	.71	4.69(13)	.48	4.17(18)	.62	1.40
Social media	3.40(20)	1.31	3.86(14)	1.41	3.67(21)	1.11	3.79(14)	1.25	4.10(10)	.74	.66
Providing feedback	3.54(24)	1.22	3.94(17)	1.14	4.04(24)	1.04	4.08(13)	1.12	4.00(11)	.77	.85
Internet resources	3.64(28)	1.10	4.00(18)	.91	4.11(27)	.89	4.00(14)	1.24	3.64(14)	.84	1.06
Internet apps	3.21(24)	1.41	3.38(16)	1.36	3.43(23)	1.34	3.54(13)	1.51	3.42(12)	1.08	.15
Creating audio/video	3.32(22)	1.36	3.20(15)	1.74	3.30(23)	1.15	3.38(13)	1.39	3.64(11)	1.21	.18
Students resources	3.65(26)	1.32	3.68(19)	1.25	4.11(27)	.85	4.31(13)	.75	3.80(15)	.86	1.31
Students apps	3.33(18)	1.28	3.06(16)	1.48	3.61(23)	1.08	3.75(12)	1.14	3.44(9)	1.33	.68
Calendar/scheduling	3.61(28)	1.23	4.06(18)	1.26	4.15(26)	.97	4.23(13)	1.17	3.50(14)	1.34	1.47
Research consumed	3.66(29)	1.17	4.17(18)	.86	4.15(27)	.82	4.62(13)	.51	3.71(17)	.99	3.11
Research creation	3.09(23)	1.31	3.77(13)	1.24	3.70(23)	1.02	3.82(11)	1.54	3.67(12)	1.07	1.17
Service committee	3.37(19)	1.12	3.85(13)	1.28	3.87(22)	.89	4.08(13)	1.19	3.67(12)	.89	1.02
Meetings	3.71(27)	.99	4.00(19)	1.11	4.00(22)	1.07	4.23(13)	.83	3.67(15)	.98	.90
Course materials	3.52(27)	1.09	3.65(17)	1.41	3.92(25)	.91	4.00(13)	1.22	3.08(12)	1.31	1.44

N = 140. *p < .05. Scale: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very good. 5 = Exceptional.

Level taught. A one-way ANOVA test was conducted to determine the effects of level of course taught on the self-efficacy levels for each of the 17 professional activities. Sample means were grouped into three categories: undergraduate, graduate, or both undergraduate and graduate levels.

There were no statistically significant differences in mean self-efficacy level scores for sending text messages to students between undergraduate courses taught (*M* = 4.23, *SD* = .73), graduate courses taught (*M* = 4.15, *SD* = .96), and both undergraduate and graduate courses taught (*M* = 4.19, *SD* = .93), sending text messages to colleagues between undergraduate courses taught (*M* = 4.17, *SD* = .91), graduate courses taught (*M* = 4.14, *SD* = .85), and both undergraduate and graduate courses taught (*M* = 4.25, *SD* = .84), sending email to students between undergraduate courses taught (*M* = 4.24, *SD* = .70), graduate courses taught (*M* = 4.38, *SD* = .81), and both undergraduate and graduate courses taught (*M* = 4.35, SD = .84), and sending email to colleagues between undergraduate courses taught (*M* = 4.19, *SD* = .75), graduate courses taught (*M* = 4.40, *SD* = .77), and both undergraduate and graduate courses taught (*M* = 4.38, *SD* = .83). Similarly, there were no statistically significant differences in mean self-efficacy levels for using social media, between undergraduate courses taught (*M* = 4.25, *SD* = .86), graduate courses taught (*M* = 3.49, *SD* = 1.14), and both undergraduate and graduate courses taught (*M* = 3.71, *SD* = 1.40), providing feedback, between undergraduate courses taught (*M* = 3.71, *SD* = 1.20), graduate courses taught (*M* = 4.17, *SD* = .86), and undergraduate and graduate courses taught (*M* = 3.82, *SD* = 1.09), accessing Internet resources for class between undergraduate courses taught (*M* = 4.00, *SD* = .76), graduate courses taught (*M* = 3.90, *SD* = 1.07), and both undergraduate and graduate courses taught (*M* = 3.76, *SD* = 1.06), accessing Internet apps for class between undergraduate courses taught (*M* = 3.33, *SD* = 1.24), graduate courses taught, (*M* = 3.32, *SD* = 1.36), and undergraduate and graduate courses taught, (*M* = 3.50, *SD* = 1.39), creating audio/video between undergraduate courses taught (*M* = 2.89, *SD* = 1.32), graduate courses taught (*M* = 3.42, *SD* = 1.29), and both undergraduate and graduate courses taught (*M* = 3.57, *SD* = 1.43), having students use Internet resources in class between undergraduate courses taught (*M* = 3.82, *SD* = 1.01), graduate courses taught (*M* = 3.90, *SD* = 1.17), and both undergraduate and graduate courses taught (*M* = 3.93, *SD* = .98), and having students use Internet apps in class between undergraduate courses taught (*M* = 3.20, *SD* = 1.21), graduate courses taught (*M* = 3.38, *SD* = 1.27), and both undergraduate and graduate courses taught (*M* = 3.67, *SD* = 1.24).

There were no statistically significant differences in mean self-efficacy level scores for calendar/scheduling between undergraduate courses taught (*M* = 4.00, *SD* = .77), graduate courses taught (*M* = 3.85, *SD* = 1.35), and both undergraduate and graduate courses taught (*M* = 3.90, *SD* = 1.18), research consumption between undergraduate courses taught (*M* = 3.90, *SD* = 1.19), graduate courses taught (*M* = 3.86, *SD* = 1.01), and both undergraduate and graduate courses taught (*M* = 3.98, *SD* = 1.04), and research creation between undergraduate courses taught (*M* = 3.24, *SD* = 1.20), graduate courses taught (*M* = 3.67, *SD* = 1.13), and undergraduate and graduate courses taught (*M* = 3.55, *SD* = 1.44)   In addition, there were no statistically significant differences in mean self-efficacy level scores for service committee work between undergraduate courses taught (*M* = 3.79, *SD* = .97), graduate courses taught (*M* = 3.60, *SD* = 1.17), and both graduate and undergraduate courses taught (*M* = 3.96, *SD* = .93), usage during meetings between undergraduate courses taught (*M* = 3.76, *SD* = 1.14), graduate courses taught (*M* = 3.98, *SD* = .91), and both graduate and undergraduate courses taught (*M* = 3.85, *SD* = 1.10), and creating/updating course materials between undergraduate courses taught (*M* = 3.62, *SD* = 1.12), graduate courses taught (*M* = 3.72, *SD* = 1.21), and both undergraduate and graduate courses taught (*M* = 3.60, *SD* = 1.19). These data are presented in Table 14.

Table 14

Self-efficacy level Based on Level Taught

	Undergraduate		Graduate		Both UG and G		
Professional Activity	*m(n)*	*SD*	*m(n)*	*SD*	*m(n)*	*SD*	*F*
Texts/students	4.23(13)	.73	4.15(47)	.96	4.19(21)	.93	.05
Texts/ colleagues	4.17(81)	.91	4.14(21)	.85	4.25(52)	.84	.22
Email to students	4.24(21)	.70	4.38(53)	.81	4.35(31)	.84	.23
Email to colleagues	4.19(21)	.75	4.40(52)	.77	4.38(32)	.83	.57
Social media	4.25(16)	.86	3.49(39)	1.14	3.71(24)	1.40	2.37
Providing feedback	3.71(79)	1.20	4.17(18)	.86	3.82(45)	1.09	.73
Internet resources	4.00(22)	.76	3.90(50)	1.07	3.76(29)	1.06	.38
Internet apps	3.33(18)	1.24	3.32(44)	1.36	3.50(26)	1.39	.16
Creating audio/video	2.89(18)	1.32	3.42(45)	1.29	3.57(21)	1.43	1.43
Students resources	3.82(22)	1.01	3.90(48)	1.17	3.93(30)	.98	.07
Students apps	3.20(15)	1.21	3.38(39)	1.27	3.67(24)	1.24	.71
Calendar/scheduling	4.00(21)	.77	3.85(48)	1.35	3.90(30)	1.18	.11
Research consumed	3.90(21)	1.19	3.86(21)	1.01	3.98(54)	1.04	.52
Research creation	3.24(17)	1.20	3.67(43)	1.13	3.55(22)	1.44	.77
Service committee	3.79(14)	.97	3.60(40)	1.17	3.96(25)	.93	.88
Meetings	3.76(21)	1.14	3.98(48)	.91	3.85(27)	1.10	.37
Course materials	3.62(21)	1.12	3.72(43)	1.21	3.60(30)	1.19	.11

N = 140. $*p < .05$. Scale: 1 = Limited. 2 = Fair. 3 = Good. 4 = Very good. 5 = Exceptional.

Correlation between Level of Use and Self-efficacy level. A Spearman's correlation was conducted to determine the relationship between the levels of use for each of the 17 professional activities and the self-efficacy level for the corresponding professional activity. Correlations ranged from .016 to .670.

A significant correlation was found in the relationship between 15 professional activities. No significant correlations were found between the levels of use and the self-efficacy level of sending text messages to students (r = .039, n = 71, p = .747) and sending text messages to colleagues (r = .016, n = 70, p = .896).

A significant correlation was found in email to students (r = .457, n = 103, $p \leq .001$), email to colleagues (r = .435, n =,104, $p \leq .001$), social media (r = .596, n = 64, $p \leq .001$), providing feedback (r = .561, n = 81, $p \leq .001$), research consumption (r = .544, n = 97, $p \leq .001$), research creation (r = .616, n = 73, $p \leq .001$), and updating course materials (r = .670, n = 74, $p \leq .001$). Additionally, a significant correlation was found in accessing Internet resources (r = .577, n = 95, $p \leq .001$), accessing Internet apps (r = .587, n = 67, $p \leq .001$), creating audio/video (r = .551, n = 97, $p \leq .001$), having students access Internet resources (r = .466, n = 100, $p \leq .001$), having students access Internet apps (r = .530, n = 76, $p \leq .001$), calendar/scheduling (r = .422, n = 72, $p \leq .001$), service committee work (r = .541, n = 91, $p \leq .001$), and usage during meetings (r = .611, n = 90, p = .031). These data are presented in Tables 15 and 16.

Table 15

Correlation of Use and Self-efficacy for Professional Activities 1-8

Professional Activity	1	2	3	4	5	6	7	8
1. Texts/students	.039	-	-	-	-	-	-	-
2. Texts/ colleagues	-	.016	-	-	-	-	-	-
3. Email to students	-	-	.457*		-	-	-	-
4. Email to colleagues	-	-	-	.435*	-	-	-	-
5. Social media	-	-	-	-	.596*	-	-	-
6. Providing feedback	-	-	-	-	-	.561*	-	-
7. Internet resources	-	-	-	-	-	-	.544*	-
8. Internet apps	-	-	-	-	-	-	-	.616*

p ≤ .05

Table 16

Correlation of Use and Self-efficacy for Professional Activities 9-17

Professional Activity	9	10	11	12	13	14	15	16	17
9. Creating audio/video	.670*	-	-	-	-	-	-	-	-
10. Students resources	-	.577*	-	-	-	-	-	-	-
11. Students apps	-	-	.587*	-	-	-	-	-	-
12. Calendar/Scheduling	-	-	-	.551*	-	-	-	-	-
13. Research consumed	-	-	-	-	.466*	-	-	-	-
14. Research creation	-	-	-	-	-	.530*	-	-	-
15. Service Committee	-	-	-	-	-	-	.442*	-	-
16. Meetings	-	-	-	-	-	-	-	.541*	-
17. Course Materials	-	-	-	-	-	-	-	-	.611*

p ≤. 05

Challenges in Using mLearning Devices. One question in the *Faculty mLearning Device Survey* asked respondents to list the challenges they faced in using mLearning devices for professional activities. One hundred five responses were provided by the respondents.

Eleven respondents stated the small screen size of mLearning devices was a challenge for using mLearning devices for professional activities. Nine respondents felt the reliability of the connection was a challenge using mLearning devices for professional activities. Eight respondents indicated a challenge was mLearning devices were incompatible with the Learning Management Software (Blackboard Learn) used by the university. Seven respondents indicated a lack of time to learn about using mLearning devices was a challenge in using mLearning devices for professional activities. Seven respondents stated using the on-screen keyboard was a challenge in using mLearning devices for professional activities. Seven respondents indicated mLearning devices did not work as well as a computer. Five respondents stated a lack of training on how to use mLearning devices was a challenge. Five respondents indicated keeping up with technology advances was a challenge in using mLearning devices for professional activities. These data are presented in Table 17.

Table 17

Challenges in Using mLearning Devices

Challenge	Frequency*
Small screen	11
Connectivity	9
Incompatible with Blackboard	8
Lack of time to learn	7
Type quickly and efficiently	7
Doesn't work as well as computer	7
Training	5
Technology changes so fast	5
Battery life	4
Distraction for students	4
Lack of apps	4
No challenges	3
Upgrades	2
Lack of IT support	2
Security	2
Student access and skills vary	2
Getting students to use them	1
Students have different devices	2
Data charges	2
Retention of material	1

**Respondents could list more than one challenge*

Interview Findings

As part of the *Faculty mLearning Device Survey*, respondents were asked if they would consent to participate in a follow-up, post-survey interview. Twenty of the respondents consented. Of these 20, 11 were available to be interviewed. These interviews were conducted via telephone or in-person by the co-PI. Field notes were taken and later transferred to a Word file.

The first question asked respondents to walk through the ways, if any, they used mLearning devices professionally, outside of the classroom. Seven of the respondents discussed checking email or communicating with students and other faculty members. Four of the respondents mentioned checking their courses with mLearning devices. One respondent stated, "Always use Blackboard on smartphones, [for] blogs and discussions, [and] keep up with what students are doing." Two of the four did mention they did not use mLearning devices to grade assignments, specifically mentioning a laptop or PC to grade was easier. Four respondents discussed looking up information on mLearning devices.

The second question asked respondents how they used mLearning devices in the classroom. Four respondents indicated they used mLearning devices for using apps in the classroom. One respondent used Skype or Facetime as needed; explanations for questions (too long to email) or personal issues (more support than phone)." Three respondents indicated they have students access Blackboard course material for use in the face-to-face classroom. Three respondents indicated they did not use mLearning devices in the classroom.

Question three asked respondents why they chose to use the mLearning device they used. Two respondents discussed the way Apple devices work together well. One respondent stated, "[I] have trouble with phones that weren't Apple iPhones." Two respondents indicated their use of a specific mLearning device was due to personal preference. Three respondents did not have an opinion.

Question four asked respondents if they considered using other mLearning devices. Four respondents did not provide an opinion. Two respondents indicated they would use what the university would fund. One respondent mentioned the college was willing to provide iPads. Apple has more in app store compared to others. Two respondents indicated they did not consider any other mLearning device.

Question five asked respondents which way(s) of using mLearning devices either personally or professionally were most successful. Six of the respondents indicated using apps were most successful. Two of these respondents specifically mentioned Skype and Facetime. One respondent mentioned Skype/Facetime was good for students who cannot travel, as they become a mobile person. Four respondents mentioned communication.

Question six referred to the biggest challenges facing faculty members using mLearning devices. Three of the respondents mentioned connectivity, or the Wi-Fi not working correctly. One respondent commented, “connectivity is biggest challenge, can’t connect to wireless; updates interfere with other connections; connection not good at some venues.” Another respondent commented, “... [school] hasn’t invested in bandwidth; students get kicked off Internet; Wi-Fi goes down; lose power in storms.” Reliability of the technology was mentioned by three of the respondents. One respondent replied “Technology doesn’t work; pushed out too quickly to market.” A second respondent commented, “Technology will malfunction; [we] used [projector] screens in classrooms-all four out for a month and a half.”

The seventh question asked respondents the types of training they received in using mLearning devices professionally and in the classroom. Five respondents indicated they received no formal training with mLearning devices. Three of the respondents mentioned trainings offered by the university. One respondent stated, “University did some training on apps to check attendance.” A second person mentioned training is based on the products the university has approved. I don’t want to use a product Marshall University does not support; we need a list of what is approved and training.”

Question eight asked respondents which training was most effective. Four respondents indicated informal training was the most effective. Two of these respondents indicated Youtube specifically. One respondent answered, “Probably pull it up on Youtube—check with IT to see if it’s ok to use; not sure who to ask. We need people to sign up in each department saying ‘I can train.’ Four respondents had no opinion.

The ninth question asked respondents what types of training they would like to see in the future. Four respondents mentioned training on different apps to use. One respondent stated, “[Trainings tried to teach] 50 apps in 50 minutes in past; [we should] go deeper into a smaller number of apps].” Two respondents suggested Blackboard training. A second respondent commented, “Software we have is amazing but no one knows how to use it; it’s like having an iPhone and only using it as a phone.”

The tenth question asked for other comments. Two respondents indicated technology could be a huge resource if used. One respondent stated, “I think there needs to be more of an emphasis to use technology; we’re kind of behind in technology; might be more resources that we’re not aware of.” One respondent stated, “I don’t know what we did without our phones; it is so convenient to do so many things.”

Summary of Findings

There were significant differences in mean level of use scores for each of the 17 professional activities, when compared to a hypothetical normal distribution. The means of the 17 professional activities ranged from M = 3.35 for creating audio/video to M = 4.35 for email to colleagues. There were no overall significant differences in mean level of use scores based on sex, age, years of teaching experience, or level taught for any of the 17 professional activities.

There were no statistically significant differences in mean self-efficacy scores for each of the 17 professional activities, when compared to a hypothetical normal distribution. There were no statistically significant differences in the self-efficacy level scores for the 17 professional activities based on sex, years of experience, or level taught. Statistically significant differences were found in self-efficacy levels for one professional activity, research consumption, based on age.

Statistically significant differences were found in the relationship between levels of use and self-efficacy level for 15 professional activities: email to students, email to colleagues, social media, providing feedback, research consumption, research creation, updating course materials, accessing Internet resources, accessing Internet apps, creating audio/video, having students access Internet resources, having students access Internet apps, calendar/scheduling, service committee work, and use during meetings. All seventeen activities had a positive correlation, ranging from r = .016 for sending texts to colleagues to r = .670 for creating audio/video.

Challenges of using mLearning devices included the small screen size, the reliability of the connection, incompatibility with Blackboard, lack of time to learn, the on-screen keyboard, comparison to computers, lack of training, and keeping up with technology advances. In the interviews, reliability of the Wi-Fi connection and reliability of the technology used were cited as the two major challenges to using mLearning devices in the classroom. A lack of training was also cited.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

This chapter reviews the purpose of the study, demographic data, and summarizes the methods and findings. The chapter ends by presenting the study conclusions, implications, and recommendations for future study.

Purpose of the Study

The primary purpose of this study was to explore faculty members' experiences with mLearning devices as a representative of technological innovation. The data and results from this study will help technology support professionals and administration in efforts to integrate mLearning devices, and to understand faculty perceptions of mLearning devices. This research will add to the understanding of faculty experiences with a single technological innovation.

Research Questions

The following research questions were investigated:

1. What are faculty members' levels of use of mLearning devices for professional activities?
2. What are the differences, if any, in levels of faculty members' use of mLearning devices for professional activities based on selected demographic/attribute variables (age, sex, level taught, teaching experience, and activity category)?
3. What are faculty members' levels of self-efficacy for using mLearning devices for professional activities?
4. What are the differences based on selected demographic/attribute variables (age, sex, level taught, delivery method, teaching experience, and activity category), if any, of the levels of faculty self-efficacy in using mLearning devices for professional activities?
5. What is the relationship, if any, between faculty levels of use and self-efficacy for using mLearning devices for professional activities?

6. What are the biggest challenges facing faculty members in using mLearning devices for professional activities?

Data Collection

In April, 2017, and May, 2017, the self-report survey, *Faculty mLearning Device Survey*, was distributed via email to 1,067 Marshall University faculty members. Overall, 140 surveys were usable. The *Faculty mLearning Device Survey* also included a request to participate in a follow-up interview with the co-PI. Eleven faculty members were successfully contacted and interviewed using the *Faculty mLearning Interview Protocol.*

Thirty-seven percent (*n* = 52) of the respondents were male, and 62.6% (*n*=87) were female. Six respondents (4.3%) were 30 or younger, 22.1% (*n*=31) were 31-40 years of age, 22.1% (*n*=31) were 41-50 years of age, 31.4% (*n*=44) were 51-60 years of age, and 20.0% (*n*-=28) were 61 years of age or older. Thirty-two (22.9%) respondents taught undergraduate courses only, 47.1% (*n*=66) taught graduate courses only, and 30.0% (*n*=42) taught both undergraduate and graduate courses. Forty-four (31.4%) had five years or less experience as a faculty member in higher education, 15.7% (*n*=22) had 6-10 years of experience, 22.1% (*n*=31) had 11-15 years of experience, 12.1% (*n*=17) had 16-20 years of experience, and 18.6% (*n*=26) had more than 20 years of higher education experience. Sixty-one (56.4%) respondents reported teaching face-to-face courses only, 12 (8.6%) taught online courses only, eight (5.7%) taught hybrid courses only, 16 (11.4%) taught face-to-face and online courses only, 17 (12.1%) taught face-to-face and hybrid courses only, eight (5.7%) taught online and hybrid courses only, and 15 (10.7%) taught face-to-face, online, and hybrid courses.

Summary of Findings

The percentage response for not using mLearning devices ranged from a low of 7.9% for email to colleagues to a high of 26.4% for having students access Internet apps for in-class activities, discussions, presentations, etc. Professional activities with scores of 10% or less were email to colleagues, text messages to colleagues, email to students, and research consumption. Professional activities with means scores between 10.1% and 19.9% were having students use Internet resources, calendar/scheduling, access Internet resources, meetings, course materials, providing feedback, and access Internet apps. Professional activities with scores of 20.0% or greater were creating audio/video, research creation, text messages to students, social media, service committee work, and having students access Internet apps.

There were no statistically significant differences in mean level of use scores or levels of self-efficacy based on sex or years of experience for any of the 17 professional activities. Statistically significant differences in mean level of use scores and levels of self-efficacy scores based on age were found for one professional activity, research consumption. Significant differences were found in the relationship between levels of use and self-efficacy levels for 15 professional activities.

Challenges of using mLearning devices included the small screen size, the reliability of the connection, incompatibility with Blackboard, lack of time to learn, the on-screen keyboard, comparison to computers, lack of training, and keeping up with technology advances. In the interviews, reliability of the Wi-Fi connection and reliability of the technology used were cited as the two major challenges to using mLearning devices in the classroom. A lack of training was also cited. During the interviews, reliability of the Internet connection and/or technology was the most-mentioned challenge facing faculty members in using mLearning devices for professional activities. A lack of training was the second most-mentioned challenge facing faculty members in using mLearning devices for professional activities.

Conclusions

The data collected for this study provided sufficient evidence to support the following conclusions.

Research question one. What are faculty members' levels of use of mLearning devices for professional activities?

Overall, faculty reported use levels of Sometimes – Almost Always with 14 of the 17 mean scores falling in the 3.50 – 4.35 range (on a five point Likert scale). Significant differences were found between the obtained sample mean levels of use scores in all 17 of the professional activities when compared to the mean of a hypothetical normal distribution.

Research question two. What are the differences, if any, in levels of faculty members' use of mLearning devices for professional activities based on selected demographic/attribute variables (age, sex, level taught, and teaching experience)?

No statistically significant differences were found in levels of use of mLearning devices based on sex, level taught, or years of experience for any of the 17 professional activities. One statistically significant difference was found in mean levels of use scores of mLearning devices based on age if the participants were aged 61 or older concerning the professional activity - research consumption. Overall, age, sex, level taught and years of teaching experience do not appear to influence levels of use of mLearning devices for selected professional activities.

Research question three. What are faculty members' levels of self-efficacy for using mLearning devices for professional activities?

The mean level of use scores ranged from 2.82 for using Internet apps to 4.30 for sending email to colleagues. Participants rated themselves Good to Exceptional for 13 of the 17 professional activities. Overall, significant differences were found between the mean self-efficacy level scores for seven professional activities when compared to the mean of a hypothetical normal distribution: sending email to students, sending email to colleagues, using Internet resources, having students use Internet resources, calendar/scheduling, consuming research, and meetings.

Research question four. What are the differences based on selected demographic/attribute variables (age, sex, level taught, and teaching experience), if any, of the levels of faculty self-efficacy in using mLearning devices for professional activities?

There were no statistically significant differences in self-efficacy levels of mLearning devices based on age, sex, level taught, or years of experience of the participants for any of the 17 professional activities. Overall, age, sex, level taught and years of teaching experience do not appear to influence self-efficacy levels of mLearning devices for selected professional activities.

Research question five. What is the relationship, if any, between faculty levels of use and self-efficacy for using mLearning devices for professional activities?

According to Cohen (1988) an r of 0.1 is classified as small, an r of 0.3 is classified as medium and an r of 0.5 is classified as large. A large correlation ($r = 0.5$) between levels of use and self-efficacy was found with social media, providing feedback, using Internet resources, using Internet apps, creating audio/video, having students use Internet resources, having students use Internet apps, calendar/scheduling, creating research, meetings, and updating course materials. A medium correlation ($r = 0.3$) between levels of use and self-efficacy was found with sending email to colleagues, consuming research, and service committee work. Statistically significant differences were found in the relationship between email to students, email to colleagues, social media, accessing Internet resources, accessing Internet apps, creating audio/video, providing feedback, having students access Internet resources, having students access Internet apps, calendar/scheduling, research consumption, research creation, service committee work, meetings, and updating course materials. A small correlation ($r = .10$) between levels of use and self-efficacy was found with sending email to students. Overall, there are medium to large positive correlations between levels of use and self-efficacy of mLearning devices for most of the 17 selected professional activities.

Research question six. What are the biggest challenges facing faculty members in using mLearning devices for professional activities?

Findings from the survey suggested the biggest challenges facing faculty members in using mLearning devices for professional activities were the small screen size of mLearning devices, the reliability of the connection, incompatibility with the Learning Management Software (Blackboard Learn™), lack of time to learn how to use mLearning devices, the on-screen keyboard, preference for using a computer, lack of training, and keeping up with technological advances. Findings from the interviews suggested the biggest challenges facing faculty members were two challenges mentioned in the survey: reliability of the connection and a lack of training.

Discussion and Implications

Overall, the faculty members who use mLearning devices tend to use the devices for consumption, rather than creation (Cochrane, 2010). Faculty members also have more self-efficacy to use mLearning devices for consumption-related activities, rather than creation activities. It can be speculated this may be due to the challenges of the mLearning devices as creation devices, as stated by 14 of the participants in this study. In the classroom, faculty members tend to use mLearning devices for repackaging existing knowledge, which supports the results found by Buckley and Du Toit's (2010) study of 54 management faculty members. Faculty members also tend to use mLearning devices for communication. Sending email to students, and sending email to colleagues were the professional activities in which mLearning devices were used most frequently in this study, which supports Sahin and Thompson's (2006) study, in which 117 faculty members were asked if they used technology for instructional purposes. The mean level of use score for sending email was $M = 4.2$, on a 5.0 Likert Scale (Sahin & Thompson, 2006). The results of the current study are also consistent with Groves and Zemel's (2000) findings of faculty use of technology. Of 41 faculty members and 23 graduate teaching assistants, 86% rated their knowledge of using email as good to expert (Groves & Zemel, 2000). In the current study, activities involving the creation of audio/video, research creation, having students use Internet apps, and using Internet apps were the professional activities in which mLearning devices were used the least, among those who used mLearning devices for professional activities. This result is consistent with the conclusions reached by Santilli and Beck (2005), who found 47 graduate faculty members who used educational technologies in the classroom reported communication with students as being the most-often used technology.

It was interesting that 91.4% of faculty used mLearning devices to text colleagues, but only 25% used mLearning devices to text students. As the procedure is the same for either professional activity, it can be argued faculty were not comfortable with students having access to faculty's personal cellphones. Faculty seemed more comfortable with students having access to faculty email addresses; 91.4% of faculty used mLearning devices to email students, and 92.1% of faculty used mLearning devices to email colleagues.

There were no statistically significant differences in levels of use of mLearning devices based on sex, years of experience, or level taught of the participant. Males and females rated themselves Sometimes to Almost Always for all 17 professional activities. Participants age 40 and younger, 41-50, 51-60, and 61 and older rated themselves Sometimes to Almost Always for all 17 professional activities. Participants with five or less years of experience, 6-10 years of experience, 11-15 years of experience, 16-20 years of experience, and 20 or more years of experience rated themselves Sometimes to Almost Always for all 17 professional activities. Participants who taught undergraduate courses exclusively rated themselves Sometimes to Almost Always for 16 of the 17 activities, while those who taught graduate courses, and those who taught both undergraduate and graduate courses rated themselves Sometimes to Almost Always for all 17 professional activities. These results support findings of Rousseau and Rogers (1998), and Spotts, et al. (1997) concerning technology use. Rousseau and Rogers (1998) found no significance difference of technology use between a sample of 104 males and 166 female faculty members. For the current study, a statistically significant difference was found in mean levels of use scores of mLearning devices based on age if the participants were aged 61 or older concerning research consumption. This is inconsistent with the results reached by Rousseau and Rogers (1998). Except for databases and scheduling, Rousseau and Rogers (1998) found no significant differences between age groups of 25 -34, 35 -45, 45-54, and 55-64 when it came to technology levels of use when looking at 11 different professional activities. Spotts, et al. (1997) surveyed 367 full-time faculty and found no significant differences between male and female faculty members regarding instructional technology use. The results of the current study are also consistent with the findings of Vodanovich and Piotrowski (2005) who found no differences concerning implementation of Internet based instruction at one university concerning years of experience for 250 faculty members.

Study findings suggest faculty members who taught undergraduate courses exclusively used mLearning devices for social media more than faculty members who taught either graduate courses exclusively, or both undergraduate and graduate courses, but not at a significantly statistically different level. This finding contradicted the results found by Roblyer, McDaniel, Webb, Herman, and Witty (2010), who indicated 53.2% of faculty believed Facebook™ to be personal/social, and not for education. Twenty-one percent of faculty was in favor of connecting with faculty and/or students on Facebook™. Although not significant, faculty members who taught graduate courses only tended to use mLearning devices for sending email to colleagues, providing feedback, creating research, meetings, and updating course materials than their counterparts who taught undergraduate courses exclusively or both undergraduate and graduate courses. Study findings suggest faculty members who taught graduate courses exclusively used mLearning devices for service committee work, using Internet apps, and having students using Internet apps more than faculty members who taught either undergraduate courses exclusively, or both undergraduate and graduate courses, but not at a significantly statistically different level. These results support the conclusions reached by Marrs, (2013), who found no statistically significant differences between 161 graduate faculty members and 439 undergraduate faculty members as related to acceptance of mLearning devices.

Sending email to students and to colleagues were the professional activities in which faculty members had the most self-efficacy in using mLearning devices in this study. This supports the findings of Sharin and Thompson (2006) in which the mean self-efficacy scores for using email for 177 faculty members was *M* = 3.7 on a 5.0 Likert scale. This study is also consistent with John (2015), who reported 261 faculty members answered Agree or Strongly Agree when asked about self-efficacy with email (*M* = 4.08).

Although not significant, faculty members had the lowest self-efficacy in using mLearning devices for creating audio/video, and accessing Internet apps in this study. This result supports the conclusions reached by Groves and Zemel (2000). Groves and Zemel reported 21% of faculty members and graduate teaching assistants viewed their knowledge of using computer-aided instruction as good to expert. Georgina and Olson (2008) found similar results; 236 faculty members felt they were not proficient in more complicated software programs, such as web creation software, MS Publisher™, presentation software, and iMovie™ or MS MovieMaker™.

There are conflicting studies concerning years of experience and self-efficacy with mLearning devices. Of 1,115 college faculty members, those with 1-5 years of teaching experience rated themselves more comfortable with mLearning devices (3.39 on a 5-point Likert scale) compared to those with 6-10 years teaching experience (3.02), 11-20 years teaching experience (2.86), and 20+ years teaching experience (3.02) (Georgina & Hosford, 2009). A second study suggests as the number of years of experience increased for 91 faculty members, a professor's self-efficacy in using technology also increased (Horvitz, Beach, Anderson, & Xia, 2015). Although not significant, the current study supported this for one of the professional activities, but there were some professional activities in which the self-efficacy level decreased between certain levels of experience. The mean score for level of use for using social media increased between each of the five categories of experience.

Although not statistically significant, the self-efficacy level for sending email to students, sending email to colleagues, providing feedback, using Internet apps, having students use Internet resources, calendar/scheduling, service committee work, and updating course materials increased between less than five years' experience, 6-10 years of experience, 11-15 years of experience, and 16-20 years of experience before decreasing for more than 20 years of experience. These results support Klassen and Chiu (2010) and Huberman's (1989) study, finding the self-efficacy of teachers increased through 23 years of experience, then began to decline as experience increased. This also supports the results of Myers, et al. (2004) who found faculty members with more than 10 years' experience teaching were less likely to use online learning environments than those with less than two years' experience. Overall, there were no statistically significant differences in self-efficacy levels based on age, sex, years of teaching, or level taught for any of the 17 professional activities. Females rated themselves from Good to Exceptional on 15 of the 17 professional activities, while males rated themselves from Good to Exceptional on 10 of the 17 professional activities. Participants age 40 or younger, 41-50, 51-60, and 61 and older rated themselves Good to Exceptional on all 17 professional activities. Participants with 5 or less years of experience, 6-10 years of experience, 11-15 years of experience, 16-20 years of experience, and 21 and more years of experience rated themselves Good to Exceptional on all 17 professional activities. Participants who taught undergraduate courses exclusively rated themselves Good to Exceptional on 16 of 17 professional activities, while participants who taught graduate courses exclusively, and participants who taught both undergraduate and graduate courses rated themselves Good to Exceptional on all 17 professional activities.

A correlation coefficient of $r \geq .50$ was found with social media, providing feedback, using Internet resources, using Internet apps, creating audio/video, having students use Internet resources, having students use Internet apps, calendar/scheduling, creating research, meetings, and updating course materials. This correlates with Hason, (2003) who found a medium to strong correlation of nine specific computer experiences with computer self-efficacy using 151 undergraduate students, and Potosky's, (2002) findings using 55 newly-hired computer programmers, that self-efficacy has a positive relationship with the adoption of new technology. A correlation coefficient between $r = .49$ and $r = .30$ was found with sending email to students, sending email to colleagues, consuming research, and service committee work. These results support the work of Sahin and Thompson (2006), who indicated a high, positive correlation between use and self-efficacy concerning the use of technology for instructional purposes with 117 full-time College of Education faculty members. Three activities (email, consuming Internet content, and word processing) had mean level of scores between 4.1 – 4.2, with self-efficacy levels between 3.5 – 3.7. These same three items had correlation coefficients between $r = .943$ and $r = .986$ (Sahin & Thompson, 2006).

Eleven respondents of the current study stated the small screen size of mLearning devices was a challenge for using mLearning devices for professional activities, which is consistent with the findings of Maniar, Bennett, Hand, and Allan (2008), who found students had a lower overall opinion of the small screen size of mLearning devices using a pilot study of 15 students. Respondents of the current study also felt the reliability of the connection was a challenge using mLearning devices for professional activities. Reliability of the Internet connection and/or technology was one of the most-mentioned challenges facing faculty members during the interviews. Either the technology did not work correctly or the Internet connection did not function correctly was reported for six of the 11 respondents. This conclusion supports the work of Butler and Sellbom (2002) who indicated reliability was the most cited issue mentioned by 125 faculty members in the College of Sciences and Humanities at Ball State University. The results of the current study are consistent with Andrews, Smyth, and Caladine's (2010); Rossing, et al., (2012); Cuban, (2001); and Al-Fahad (2009) findings of student frustration with lack of connectivity.

Eight respondents of the current study indicated a challenge was mLearning devices were incompatible with the Learning Management Software (Blackboard Learn™) used by the university, which was consistent with the findings of Mathur (2011) who found only Announcements, Information, Contacts, and My Grades were useful on the Blackboard Mobile Learn™ app. Respondents of the current study indicated a lack of time to learn about using mLearning devices was a challenge in using mLearning devices for professional activities. This result is consistent with Peluchette and Rust (2005) who found 51% of 124 faculty members across the United States cited a lack of time to learn new technologies as a factor in using technology in the classroom. Respondents in the current study stated using the on-screen keyboard was a challenge in using mLearning devices for professional activities, which is consistent with Rossing, et al. (2012) findings that the on-screen keyboard was the most mentioned challenge of 209 students at one university concerning mLearning devices.

Respondents of the current study stated a lack of training on how to use mLearning devices was a challenge. During the interviews, the second most-mentioned barrier was a lack of training. Five of the 11 respondents indicated having no formal training in using mLearning devices. Of those that had some type of training, four indicated informal training was the most effective. This result supports Rogers (1995) findings of interdependence between faculty members of a department. Interview findings suggested faculty members from different academic departments had different training needs. Some wanted basic training in using mLearning devices, while others, more comfortable with the technology, felt more advanced training would benefit that particular department. Universities may want to provide training based on Rogers' (1983) technology adopter categories (early adopters, early majority, late majority, and laggards). Related, faculty members in India were concerned with a lack of training on mLearning, among other barriers of 120 faculty members surveyed (Kalyani, et al., 2012). Administrators, faculty, and IT departments at this university should work together to discuss professional development opportunities for different academic departments. Five respondents indicated keeping up with technology advances was a challenge in using mLearning devices for professional activities. The on-screen keyboard and small screen size may hinder the adoption of mLearning devices in creation activities, when compared to a desktop computer. If the Internet connection is unreliable, faculty members may have more trust in using teaching methods that do not involve Internet-connected technology.

A practical implication of this study is the study informs university administration about the types of professional activities in which faculty use mLearning devices to complete. Second, the study reveals the challenges faced by faculty concerning the use of mLearning devices for professional activities.

Implications for Future Research

The study's population consisted of full-time faculty at one university. Additional research could focus on broadening the population to include adjunct faculty. Research could also focus on broadening the population to include faculty at multiple institutions. Students could also be surveyed and interviewed to determine their use and self-efficacy of mLearning devices for relevant instructional activities.

The role of prior experience should be studied to determine if a correlation exists with the use of mLearning devices in higher education. Adopter categories “(1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards” (Rogers, 1983. p. 22) should be studied to determine if a correlation exists with the use and self-efficacy levels toward mLearning devices in higher education.

The survey instrument only measured the levels of use and levels of self-efficacy for mLearning devices. Future studies may want to explore motivation of faculty members to use mLearning devices. The use of mLearning devices in online courses and programs should be studied. Computer anxiety has been found to have a negative impact on perceived ease of use (John, 2015). Studying computer anxiety may provide further insight into self-efficacy levels.

Additional studies should be conducted in the area of professional development related to the use of mLearning devices for professional activities to determine the areas of weakness. Other studies should examine factors that contribute to the use of mLearning devices for professional activities.

As 91.4% of faculty used mLearning devices to text colleagues, but only 25% used mLearning devices to text students, while 91.4% of faculty using mLearning devices to email students, and 92.1% of faculty using mLearning devices to email colleagues further research is needed concerning the disparity, as the procedure is the same for either professional activity.

REFERENCES

Acquaro, P., & Fadjo, C. (2008, March). Near-Time Podcasting: Using iTunes U to Increase Academic Content Distribution. In *Society for Information Technology and Teacher Education International Conference* (Vol. 2008, No. 1, pp. 2492-2496).

Adams, D. A., Nelson, R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: A replication. *MIS Quarterly*, *16*(2), 227-247. http://dx.doi.org/10.2307/249577.

Agarwal, R. & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology use. *MIS Quarterly, 24*(4). 665-694.

Al-Fahad, F. N. (2009). Students' Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia. *Online Submission*, *8*(2).

Albion, P. R. (2001). Some factors in the development of self-efficacy beliefs for computer use among teacher education students. *Journal of Technology and Teacher Education, 9*(3), 321-347.

Albright, M. J., & Graf, D.L. (1992). *Teaching in the information age: The role of educational technology*. San Francisco: Jossey-Bass.

Allsopp, D. H., Alvarez McHatton, P., & Cranston-Gingras, A. (2009). Examining perceptions of systematic integration of instructional technology in a teacher education program. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children, 32*(4), 337.

Almasri, A. K. M. (2014). Usage of mobile devices as learning tools among higher education and undergraduate student in Amman University College. *International Journal of Innovation Research in Computer and Communication Engineering*, *2*(12), 7125-7130.

Andrews, T., Smyth, R., & Caladine, R. (2010). Utilizing students' own mobile devices and rich media: Two case studies from the health sciences. *Proceedings of the Second International Conference on Mobile, Hybrid, and on-Line Learning*, 71-76. https://dx.doi.org/10.1109/eLmL.2010.15.

Apple®. (2015). *iPad in Education.* Retrieved from http://www.apple.com/education/ipad/apps-books-and-more/.

Armor, D., Conroy-Oseguera, P., Cox, M., King, N., McDonnell, L., Pascal, A., Pauly, E., & Zellman, G. (1976). *Analysis of the school preferred reading programs in selected Los Angeles minority schools*, REPORT NO. R-2007-LAUSD. Santa Monica, CA: Rand Corporation (ERIC Document Reproduction Service No. 130 243).

Baldridge, S. & McAdams, A. (2012). *Remote teaching: Using mobile devices to teach outside of the classroom walls*. ACU Mobile Learning Research Documents. Retrieved from http://www.acu.edu/technology/mobilelearning/documents/research/baldridge/baldridge-ml-paper-11-12.pdf.

Baker, W. M., Lusk, E. J., & Neuhauser, K. L. (2012). On the Use of Cell Phones and Other Electronic Devices in the Classroom: Evidence From a Survey of Faculty and Students. *Journal Of Education For Business*, *87*(5), 275-289. http://dx.doi.org/10.1080/08832323.2011.622814.

Balash, F., Yong, Z. & bin Abu, B. (2011). Lecturers and educational technology: Factors affecting educational technology adoption in teaching. *Proceedings of the 2nd International Conference on Education and Management Technology. IPEDR, 13. IACSIT Press, Singapore.*

Bandura, A. (Ed.). (1971). *Psychological modeling: Conflicting theories*. New York, NY: Aldine-Atherton.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 191 – 215. http://dx.doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist 37*(2), 122-147. http://dx.doi.org/10.1037/0003-066X.37.2.122.

Bandura, A. (1986a). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura A (1986b). The explanatory and predictive scope of self-efficacy theory. *Journal of Social Clinical Psychologist. 4*(3), 359-373. http://dx.doi.org/10.1521/jscp.1986.4.3.359.

Bandura, A. (1989). Regulation of cognitive processes through perceived self-efficacy. *Developmental Psychology*, 729-735. http://dx.doi.org/10.1037/0012-1649.25.5.729.

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1-45). New York: Cambridge University. http://dx.doi.org/10.1017/CBO9780511527692.003.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology*, *52*(1), 1-26. http://dx.doi.org/10.1146/annurev.psych.52.1.1.

Bandura, A., Caprara, G. V., Barbaranelli, C., Gerbino, M., & Pastorelli, C. (2003). Role of affective self-regulatory efficacy in diverse spheres of psychosocial functioning. *Child Development*, *74*(3), 769-782. http://doi:10.1111/1467-8624.00567.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In T. Urban, and F. Pajares (Eds.), *Self-efficacy beliefs of adolescents.*

Barbour, M. K. (2012). Teachers perceptions of mLearning devices in the classroom. *MACUL Journal*, *32*(4). 25-26.

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human relations*, *61*(8), 1139-1160. http://dx.doi.org/10.1177/0018726708094863.

Baya'a, N. F., & Daher, W. M. (2009). Learning Mathematics in an Authentic Mobile Environment: the Perceptions of Students. *iJIM*, *3*(S1), 6-14.

Bekhet, A. K., & Zauszniewski, J. A. (2012). Methodological triangulation: an approach to understanding data. *Nurse Researcher*, *20*(2), 40-43.

Benz, C. R., Bradley, L., Alderman, M. K., & Flowers, M. A. (1992). Personal Teaching Efficacy: Developmental Relationships in Education. *Journal of Educational Research*, *85*(5), 274.

Berman, P. & McLaughlin, M. W. (1974). Federal programs supporting educational change, vol. 1:a. Model of educational change. Santa Monica, CA, Rand Corporation, Report. E(E).

Berman, P., McLaughlin, M., Bass, G., Pauly, E., and Zellman, G. (1977). *Federal programs supporting educational change. Vol. VII: Factors affecting implementation and continuation (Report No. R-1589/7-HEW)*. Santa Monica, CA: The Rand Corporation (ERIC Document Reproduction Service No. 140 432).

Berson, M. J., & Balyta, P. (2004). Technological thinking and practice in the social studies: Transcending the tumultuous adolescence of reform. *Journal of Computing in Teacher Education, 20*(4), 141-150.

Bimber, B. (2000). Measuring the gender gap on the Internet. *Social science quarterly*, 868-876.

Brand, J., Kinash, S., Mathew, T., & Kordyban, R. (2011, December). iWant does not equal iWill: Correlates of mobile learning with iPads, e-textbooks, BlackBoard Mobile Learn and a blended learning experience. In *Ascilite* (Vol. 1, pp. 168-178).

Bransford, J. D., Brown, A., & Cocking, R. (2000). How people learn: Mind, brain, experience and school, expanded edition. *DC: National Academy Press, Washington*.

Brosnan, M., & Lee, W. (1998). A cross-cultural comparison of gender differences in computer attitudes and anxieties: The United Kingdom and Hong Kong. *Computers in Human Behavior*, *14*(4), 559-577. http://dx.doi.org/10.1016/S0747-5632(98)00024-7.

Brown, A. & Campione, J. (1996). Psychological theory and design of innovative learning environments: On procedures, principles, and systems. In: Schauble, L., Glaser, R. (Eds.), Innovations in learning: New environments for education, Lawrence Erlbaum Associates, Mahwah, NJ.

Brown, I., & Inoye, D. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *Journal of Personality and Social Psychology, 36*, 900-908. http://dx.doi.org/10.1037/0022-3514.36.8.900.

Buckley, S., & Du Toit, A. (2010). Academics leave your ivory tower: Form communities of practice. Educational Studies, 36, 493–503. https://dx.doi.org/10.1080/03055690903425532.

Butler, D. L., & Sellbom, M. (2002). Barriers to adopting technology. *Educause Quarterly*, *2*, 22-28.

Bybee, R. W., & Starkweather, K. N. (2006). The twenty-first century workforce: a contemporary challenge for technology education. *The Technology Teacher*, *65*(8), 27-33.

Carlsson, C., Carlsson, J., Hyvonen, K., Puhakainen, J., & Walden, P. (2006, January). Adoption of mobile devices/services-searching for answers with the UTAUT. In *System Sciences, 2006. HICSS'06. Proceedings of the 39th Annual Hawaii International Conference on* (Vol. 6, pp. 132a-132a). IEEE.

Cassidy, S., & Eachus, P. (2002). Developing the computer user self-efficacy (CUSE) scale: Investigating the relationship between computer self-efficacy, gender and experience with computers. *Journal of Educational Computing Research*, *26*(2), 133-153. http://dx.doi.org/10.2190/JGJR-0KVL-HRF7-GCNV.

Cavus, N., & Uzunboylu, H. (2009). Improving critical thinking skills in mobile learning. *Procedia-Social and Behavioral Sciences*, *1*(1), 434-438. http://dx.doi.org/10.1016/j.sbspro.2009.01.078.

Celsi, R. L., & Wolfinbarger, M. (2002). Discontinuous classroom innovation: Waves of change for marketing education. *Journal of Marketing Education*, *24*(1), 64-72. http://dx.doi.org/10.1177/0273475302241008.

Cervone, D. & Peake, P. K. (1986). Anchoring, efficacy, and action: The influence of judgmental heuristics on self-efficacy judgments and behavior. *Journal of Personality and Social Psychology*, *50*(3), 492-501. http://dx.doi.org/10.1037/0022-3514.50.3.492.

Chao, P. Y., & Chen, G. D. (2009). Augmenting paper-based learning with mobile phones. *Interacting with Computers*, *21*(3), 173-185. http://dx.doi.org/10.1016/j.intcom.2009.01.001.

Chase, M. E., & Herrod, M. (2005). College student behaviors and attitudes toward technology on campus. *Computer*, *94*, 98.

Chen, B., & Denoyelles, A. (2013). Exploring students' mobile learning practices in higher education. *Educause Review.* Retrieved from http://www.educause.edu/ero/article/exploring-students-mobile-learning-practices-higher-education.

Chen, J., Yen, D., & Chen, K. (2009). The acceptance and diffusion of the innovative smart phone use. Information and Management, 46, 241–248.

Chen, K., Chen, J. V., & Yen, D. C. (2011). Dimensions of self-efficacy in the study of smart phone acceptance. *Computer Standards and Interfaces*, *33*(4), 422-431. http://doi:10.1016/j.csi.2011.01.003.

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers and Education*, *59*(3), 1054-1064. http://dx.doi.org/10.1016/j.compedu.2012.04.015.

Cochrane, T. D. (2010). Exploring mobile learning success factors. *Alt-j*, *18*(2), 133-148.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

College Factual (n.d.). Marshall University Huntington, West Virginia. Retrieved from http://www.collegefactual.com/colleges/marshall-university/academic-life/faculty-composition/#.

Compeau, D. R., & Higgins, C. A. (1995a). Application of social cognitive theory to training for computer skills. *Information systems research*, *6*(2), 118-143. https://doi.org/10.1287/isre.6.2.118.

Compeau, D. R., & Higgins, C. A. (1995b). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-211. https://doi.org/10.2307/249688.

Cooper, J. (2006). The digital divide: The special case of gender. *Journal of Computer Assisted Learning*, *22*(5), 320-334. https://doi.org/10.1111/j.1365-2729.2006.00185.x.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Crompton, H. (2013). A historical overview of mobile learning: Toward learner-centered education. In *Handbook of mobile learning* (pp. 3-14).

Croop, F. J. (2009). *Student perceptions related to mobile learning in higher education.* Unpublished Dissertation, Northcentral University, Prescott Valley, Arizona.

Cuban, L. (1993). Computers meet classroom: Classroom wins. *Teachers College Record, 95*(2), 185–210.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Harvard University Press.

Culp, K. M., Honey, M., & Mandinach, E. (2005). A retrospective on twenty years of education technology policy. *Journal of Educational Computing Research, 32*(3), 279-307. https://doi.org/10.2190/7W71-QVT2-PAP2-UDX7.

Dahlstrom, E. & Brooks, D.C. (2014). *ECAR study of faculty and information technology*. Research Report, Louisville, CO: ECAR. Retrieved from http://castle.eiu.edu/~eiucaa/2014-15CAA/FA14/08-28-14/CATSPresentation/ECAR2014FacultyStudy.pdf.

Dahlstrom, E., Brooks, D. C., & Bichsel, J. (2014). *The current ecosystem of learning management systems in higher education: Student, faculty, and IT perspectives* (p. 3). Research report. Louisville, CO: ECAR.

Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter? *Higher Education, 62*(3), 279-301. https://doi.org/10.1007/s10734-010-9387-6.

Davis, F. (1985). *A technology acceptance model for empirically testing new end-user information systems: theory and results*. (Unpublished Doctoral dissertation), MIT Sloan School of Management, Cambridge, MA.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science, 35*(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of applied social psychology, 22*(14), 1111-1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x.

Dean, J. (2010). *Smartphone user survey: a glimpse into the mobile lives of college students*. Retrieved from http://testkitchen.colorado.edu/projects/reports/smartphone/smartphone survey/.

Dillman, D. A. (1978). *Mail and telephone surveys: The total design method* (Vol. 19). New York: Wiley.

Dillman, D. A. (2007). Mail, and Internet surveys: the tailored design method (2nd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Dodds, K., Callender, D., & Henry, C. (2014). Making a case for technology in academia. *College and Research Libraries, 75*(1), 51-65.

Drouin, M., Vartanian, L. R., & Birk, S. (2014). A community of practice model for introducing mobile tablets to university faculty. *Innovative Higher Education*, *39*(3), 231-245. https://doi.org/10.1007/s10755-013-9270-3.

Dwyer, D. C., Ringstaff, C., Haymore, J., & Sandholtz, P. D. (1994). Apple classrooms of tomorrow. *Educational leadership*, *51*(7), 4-10.

El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. *Journal of Educational Technology and Society*, *13*(3), 12-21.

Elias, P. K., Elias, M. F., Robbins, M. A., & Gage, P. (1987). Acquisition of word-processing skills by younger, middle-age, and older adults. *Psychology and Aging*, *2*(4), 340-348. https://doi.org/10.1037/0882-7974.2.4.340.

Enriquez, A. G. (2010). Enhancing student performance using tablet computers. *College Teaching*, *58*(3), 77-84. https://doi.org/10.1080/87567550903263859.

Ertmer, P.A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, *53*(4), 25. https://doi.org/10.1007/BF02504683.

Evans, C. (2008). The effectiveness of mLearning in the form of podcast revision lectures in higher education. *Computers and education*, *50*(2), 491-498. https://doi.org/10.1016/j.compedu.2007.09.016.

Fagan, M. & Neill, S. (2004). An empirical investigation into the relationship between computer self-efficacy, anxiety, experience, support, and usage. *Journal of Computer Information Systems*, *44*, (2), 95–104.

Fairweather, J. S. (1993). Academic values and faculty rewards. *Review of Higher Education*, *17*(1), 43-68. https://doi.org/10.1353/rhe.1993.0002.

Feenberg, A. (1993). 7 7 Building a global network: The WBSI experience. *Global networks: Computers and international communication*, 185.

Fishbein, M. & Ajzen, L. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Addison-Wesley, Reading, MA.

Franklin, T., & Peng, L. W. (2008). Mobile math: Math educators and students engage in mobile learning. *Journal of Computing in Higher Education*, *20*(2), 69-80. https://doi.org/10.1007/s12528-008-9005-0.

Fulk, J. (1993). Social construction of communication technology. *Academy of Management journal*, *36*(5), 921-950.

Garnham, C. & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with Technology Today*, *8*(6). Retrieved from http://www.uwsa.edu/ttt/articles/garnham.htm.

Geist, E. (2011). The game changer: Using mLearning devices in college teacher education classes. *College Student Journal, 45*(4), 758-768.

Geoghegan, W. (1994). Stuck at the barricades: Can information technology really enter the mainstream faculty, *AAHE Bulletin, 47*(1), 13-16.

Georgina, D. (2007). *Integration of technology in higher education pedagogy*. (Unpublished doctoral dissertation.) University of North Dakota, Grand Forks, ND.

Georgina, D. A., & Hosford, C. C. (2009). Higher education faculty perceptions on technology integration and training. *Teaching and Teacher Education*, *25*(5), 690-696. https://doi.org/10.1016/j.tate.2008.11.004.

Georgina, D. A., & Olson, M. R. (2008). Integration of technology in higher education: A review of faculty self-perceptions. *The Internet and Higher Education*, *11*(1), 1-8. https://doi.org/10.1016/j.iheduc.2007.11.002.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*, *19*, 18-26. https://doi.org/10.1016/j.iheduc.2013.06.002.

Gong, Z., & Wallace, J. D. (2012). A comparative analysis of iPad and other MLearning technologies: Exploring students' view of adoption, potentials, and challenges. *Multiple Literacies in the Technical Editing Classroom: An Approach to Teaching*, *13*(2), 2.

Groves, M. M., & Zemel, P. C. (2000). Instructional technology adoption in higher education: An action research case study. *International Journal of Instructional Media*, *27*(1), 57.

Gukibau, S., Davidson, J., Williams, A., & Corker, W. (n.d.). Allied staff in a mobile world: School of education iPad research project. Retrieved from https://www.aut.ac.nz/__data/assets/pdf_file/0010/454924/Educational-Provocations-2013.pdf#page=73.

Hanley, M. (2013). *College student smartphone usage hits 74%; Tablet Ownership at 30%*. Mobile Media Research. Ball State University. Muncie, IN.

Hargis, J., Cavanaugh, C., Kamali, T., & Soto, M. (2014). A federal higher education iPad mobile learning initiative: Triangulation of data to determine early effectiveness. *Innovative Higher Education*, *39*(1), 45-57. https://doi.org/10.1007/s10755-013-9259-y.

Harris Interactive (2013). *Pearson student mobile device survey 2013.* Pearson Education. Retrieved from http://www.pearsoned.com/wp-content/uploads/Pearson-Student-Mobile-Device-Survey-2013-National-Report-on-College-Students-public-release.pdf.

Hartman, J. L., Dziuban, C., & Brophy-Ellison, J. (2007). Faculty 2.0. *Educause Review*, *42*(5), 62-76.

Hasan, B. (2003). The influence of specific computer experiences on computer self efficacy beliefs. *Com-puters in Human Behavior*, *19*(4), 443-450. doi:10.1016/s0747-5632(02)00079-1.

Hasan, B., & Ahmed, M. U. (2010). A path analysis of the impact of application-specific perceptions of computer self-efficacy and anxiety on technology acceptance. *Journal of Organizational and End User Computing*, *22*(3), 82-95. https://doi.org/10.4018/joeuc.2010070105.

Haymes, T. (2008). The three-e strategy for overcoming resistance to technological change. *Educause Quarterly, 4*, 67-69.

Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment*, *7*(3), 238-247 https://doi.org/10.1037/1040-3590.7.3.238.

Hemmings, B., & Kay, R. (2009). Lecturer self efficacy: Its related dimensions and the influence of gender and qualifications. *Issues in Educational Research*, *19*(3), 243-254.

Henderson, M., Selwyn, N., Finger, G., & Aston, R. (2015). Students' everyday engagement with digital technology in university: exploring patterns of use and 'usefulness'. *Journal of Higher Education Policy and Management, 37*(3), 308-319.

Hoffmann, M. (2015). *An exploratory study: Mobile device use for academics* (Unpublished doctoral dissertation). Pepperdine University, Malibu, CA.

Horvitz, B. S., Beach, A. L., Anderson, M. L., & Xia, J. (2015). Examination of faculty self-efficacy related to online teaching. *Innovative Higher Education*, *40*(4), 305-316.

Huck, S. W. (2012). *Reading statistics and research*. New York, NY: Harper and Row.

Hurtado, S., Eagan, K., Pryor, J. H., Whang, H., & Tran, S. (2012). Undergraduate teaching faculty: The 2010–2011 HERI faculty survey. *Higher Education Research Institute: University of California, Los Angeles*.

IBM, (2009). *IBM To Acquire SPSS Inc. To Provide Clients Predictive Analytics Capabilities*. Retrieved from http://www-03.ibm.com/press/us/en/pressrelease/27936.wss.

Isman, A., & Celikli, G. E. (2009). How does student ability and self-efficacy affect the usage of computer technology?. *TOJET: The Turkish Online Journal of Educational Technology*, *8*(1).

Jacob, S. M., & Issac, B. (2007). Mobile learning culture and effects in higher education. *IEEE Multidisciplinary engineering Education Magazine (MEEM)*.John, S. P. (2015). The integration of information technology in higher education: A study of faculty's attitude towards IT adoption in the teaching process. *Contaduría y Administración*, *60*, 230-252.

Jacobsen, D. Y. (2017). Dropping out or dropping in? A connectivist approach to understanding participants' strategies in an e-Learning MOOC pilot. T*echnology, Knowledge and Learning*, (pp. 1-21). http://dx.doi.org/10.1007/s10758-017-9298-z.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. Educational Researcher, 33(7), 14-26.

Kalyani, L., Singh, A., & Pandey, P. N. (2012). An exploratory study of adoption of m-learning by management faculty: Attitudes, barriers and motivators. *International Journal of Global Management*, *2*(2).

Karlson, A. K., Meyers, B. R., Jacobs, A., Johns, P., & Kane, S. K. (2009). Working overtime: Patterns of smartphone and PC usage in the day of an information worker. In *Pervasive Computing* (pp. 398-405). Springer Berlin Heidelberg.

Kaplowitz, M. D., Hadlock, T. D., & Levine, R. (2004). A comparison of web and mail survey response rates. *Public opinion quarterly*, *68*(1), 94-101.

Kay, A., & Goldberg, A. (1977). Personal dynamic media. IEEE *Computer*, 10(3), 31-41.

Keegan, D. (2002). The future of learning: From eLearing to mLearning. ZIFF papiere 119. Retrieved from ERIC database.

Keegan, D. (2005, October). *The incorporation of mobile learning into mainstream education and training.* Paper presented at mLearn 2005, the 4th World Conference on Mobile Learning. Cape Town, South Africa.

Kenny, R. F., Park, C. L., Van Neste-Kenny, J. M. ., & Burton, P. A. (2010). Mobile Self Efficacy in Canadian Nursing Education Programs. *Proceedings of mLearn 2010, the 9th World Conference on Mobile Learning*. Valletta, Malta. Retrieved from http://hdl.handle.net/2149/2767.

Khaddage, F., Müller, W., & Flintoff, K. (2016). Advancing mobile learning in formal and informal settings via mobile app technology: Where to from here, and how?. *Journal of Educational Technology & Society*, *19*(3), 16.

Kinash, S., Brand, J., Mathew, T., & Kordyban, R. (2011). Uncoupling mobility and learning: When one does not guarantee the other. In *Enhancing Learning Through Technology. Education Unplugged: Mobile Technologies and Web 2.0* (pp. 342-350). Springer Berlin Heidelberg.

Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of educational Psychology*, *102*(3), 741. https://doi.org/10.1037/a0019237.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental detectives: PDAs as a window into a virtual simulated world. In *Wireless and Mobile Technologies in Education, 2002. Proceedings. IEEE International Workshop on* (pp. 95-98). IEEE.

Kukulska-Hulme, A. (2007). Mobile usability in educational contexts: what have we learnt?. *The International Review of Research in Open and Distributed Learning*, *8*(2).

Lacohée, H., Wakeford, N., & Pearson, I. (2003). A social history of the mobile telephone with a view of its future. *BT Technology Journal*, *21*(3), 203-211.

Leydens, J. A., Moskal, B. M., & Pavelich, M. J. (2004). Qualitative methods used in the assessment of engineering education. *Journal of Engineering Education*, *93*(1), 65-72. https://doi.org/10.1002/j.2168-9830.2004.tb00789.x.

Lindsey, J. L. (2011). Leading change:"going green" with iPads. *International Journal of Business, Humanities and Technology*, *1*(2), 10-16.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology*.

Litchfield, S. (2010). *Defining the smartphone*. Retrieved from http://www.allaboutsymbian.com/features/item/Defining_the_Smartphone.php.

Littrell, A. B., Zagumny, M. J., & Zagumny, L. L. (2005). Contextual and psychological predictors of instructional technology use in rural classrooms.*Educational Research Quarterly*, *29*(2), 37.

López, J. G., Royo, T. M., Laborda, J. G., & Calvo, F. G. (2009). Methods of adapting digital content for the learning process via mobile devices. *Procedia-Social and Behavioral Sciences*, *1*(1), 2673-2677.

Loucks, S. (1983). The concerns-based adoption model. *Chapel Hill, NC: North Carolina University, Chapel Hill.(ERIC Document Reproduction Service No. ED 233 524).*

Lu, M. (2008). Effectiveness of vocabulary learning via mobile phone. *Journal of computer assisted learning*, *24*(6), 515-525. https://doi.org/10.1111/j.1365-2729.2008.00289.x.

Mac Callum, K. (2010). *Attitudes of educators to the introduction of mobile technology*. Paper presented at the 1st annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2010), Dunedin, New Zealand.

Maddux, J. E., Norton, L. W., & Stoltenberg, C. D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: Relative effects on behavioral intentions. *Journal Of Personality And Social Psychology*, *51*(4), 783-789. https://doi.org/10.1037/0022-3514.51.4.783.

Mahat, J., Ayub, A. F. M., & Luan, S. (2012). An assessment of students' mobile self-efficacy, readiness and personal innovativeness towards mobile learning in higher education in Malaysia. *Procedia-Social and Behavioral Sciences*, *64*, 284-290. https://doi.org/10.1016/j.sbspro.2012.11.033.

Maibach, E., & Murphy, D. A. (1995). Self-efficacy in health promotion research and practice: conceptualization and measurement. *Health Education Research*, *10*(1), 37-50. https://doi.org/10.1093/her/10.1.37.

Major, C.H., & Dolly, J.P. (2003). The importance of graduate program experiences to faculty self-efficacy for academic tasks. *The Journal of Faculty Development*, *19*(2), 89-100.

Mang, C. F., & Wardley, L. J. (2012). Effective adoption of tablets in post-secondary education: Recommendations based on a trial of iPads in university classes. *Journal of Information Technology Education*, *11*(1), 301-317. https://doi.org/10.28945/1720.

Maniar, N., Bennett, E., Hand, S., & Allan, G. (2008). The effect of mobile phone screen size on video based learning. *JSW*, *3*(4), 51-61.

Manuguerra, M., & Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: The role of the iPad. *Asian Social Science, 7*(11), p 61. https://doi.org/10.5539/ass.v7n11p61.

Marrs, K. (2013). *An investigation of the factors that influence faculty and student acceptance of mobile learning in online higher education* (Unpublished doctoral dissertation). Nova Southeastern University, Fort Lauderdale, FL.

Mathur, R. (2011). *Students' perceptions of a mobile application for college course management systems* (Doctoral thesis). (UMI No: 3466835).

McConathat, D., Praul, M., & Lynch, M. J. (2008). Mobile Learning in Higher Education: An Empirical Assessment of a New Educational Tool. *Online Submission, 7*(3).

Mehdinezhad, V. (2012). Faculty Members' Understanding of Teaching Efficacy Criteria and It Relation to Their Characteristics. *Online Submission,5*(2), 213-236.

Melhuish, K. & Falloon, G. (2010). Looking to the future: MLearning with the iPad. *Computers in New Zealand Schools: Learning Leading, Technology, 22*(3), 1-16.

Milrad, M., & Spikol, D. (2007). Anytime, anywhere learning supported by smart phones: Experiences and results from the MUSIS project. *Journal of Educational Technology and Society, 10*(4), 62-70.

Miller, G. (2014). History of Distance Learning. *World Wide Learn.* Retrieved from http://www.worldwidelearn.com/education-articles/history-of-distance-learning.html

Miller, W. (2012). iTeaching and learning: Collegiate instruction incorporating mobile tablets. *Library Technology Reports, 48*, 54-59.

Mitra, A., Hazen, M. D., LaFrance, B., & Rogan, R. G. (1999). Faculty Use and Non-Use of Electronic Mail: Attitudes, Expectations and Profiles. *Journal of Computer-Mediated Communication*, *4*(3), 0-0.

Mobile Technology Fact Sheet (2014). Pew Research Center, Washington, DC. Retrieved from http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/.

Mobile Technology Fact Sheet (2015). Pew Research Center, Washington, DC. Retrieved from http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information systems research*, *2*(3), 192-222. https://doi.org/10.1287/isre.2.3.192.

Moser, F. Z. (2007). Faculty adoption of educational development. *Educause Quarterly*, *1*. Retrieved from http://www.educause.edu/ero/article/faculty-adoption-educational-technology .

Motiwalla, L. (2007). Mobile learning: A framework and evaluation. *Computers and Education*, *49*(3). 581-596. https://doi.org/10.1016/j.compedu.2005.10.011.

Murphy, G. D. (2011). Post-PC devices: A summary of early iPad technology adoption in tertiary environments. *E-Journal of Business Education and Scholarship of Teaching*, *5*(1), 18-32.

Myers, C. B., Bennett, D., Brown, G., & Henderson, T. (2004). Emerging Online Learning Environments and Student Learning: An Analysis of Faculty Perceptions. *Educational Technology & Society*, 78.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2005). Literature review in mobile technologies and Learning, NESTA Futurelab Series.

Needle, D. (2013, October 28). *Apple claims iPad holds a staggering 94% of the education market for tablets*. Retrieved from http://tabtimes.com/news/education/2013/10/28/apple-claims-ipad-holds-staggering-94-education-market-tablets.

Nguyen, L., Barton, S. M., & Nguyen, L. T. (2015). iPads in higher education—Hype and hope. *British Journal of Educational Technology*, *46*(1), 190-203. https://doi.org/10.1111/bjet.12137.

O'Malley, C., Vavoula, G., Glew, J., Taylor, J., Sharples, M., Lefrere, P., ... & Waycott, J. (2005). Guidelines for learning/teaching/tutoring in a mobile environment.

Olsen, C., & St George, D. M. M. (2004). Cross-sectional study design and data analysis. *College Entrance Examination Board*.

Online Schools Offering Laptops. (n.d.). Retrieved from Pajares, F., Hartley, J., & Valiente, G. (2001). Response format in writing self-efficacy assessment: Greater discrimination increases prediction. *Measurement and Evaluation in Counseling and Development, 33* 214-221.

Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In Tashakkori, A. and Teddlie, C., (Eds.*) Handbook of mixed methods in social and behavioral research.*. pp. 351-383. Thousand Oaks, CA: Sage.

Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *The International Review Of Research In Open And Distributed Learning*, *12*(2), 78-102. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/791/1699. https://doi.org/10.19173/irrodl.v12i2.791.

Park, S. Y., Nam, M. W., & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British Journal of Educational Technology*, *43*(4), 592-605. https://doi.org/10.1111/j.1467-8535.2011.01229.x.

Patten, B., Arnedillo, Sánchez, I. A., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & education*, *46*(3), 294-308. https://doi.org/10.1016/j.compedu.2005.11.011.

Pea, R. & Maldonado, H. (2006). WILD for learning: Interacting through new computing devices anytime, anywhere. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 427-441). Cambridge: Cambridge University Press.

Peluchette, J. V., & Rust, K. A. (2005). Technology use in the classroom: Preferences of management faculty members. *Journal of Education for Business*, *80*(4), 200-205. https://doi.org/10.3200/JOEB.80.4.200-205.

Peng, H., Su, Y. J., Chou, C., & Tsai, C. C. (2009). Ubiquitous knowledge construction: Mobile learning re-defined and a conceptual framework. *Innovations in Education and Teaching International*, *46*(2), 171-183. https://doi.org/10.1080/14703290902843828.

Perkins, S., & Saltsman, G. (2010). Mobile learning at Abilene Christian University: Successes, challenges, and results from year one. *Journal of the Research Center for Educational Technology*, *6*(1), 47-54.

Perry, E. H., & Pilati, M. L. (2011). Online learning. *New Directions For Teaching & Learning*, *2011*(128), 95-104. doi:10.1002/tl.472. https://doi.org/10.1002/tl.472.

Pettit, J. & Kukulska-Hulme, A. (2007). Going with the grain: Mobile devices in practice. *Australasian Journal of Educational Technology*, *23*(1). 17-33. https://doi.org/10.14742/ajet.1271.

Pianfetti, E. (2001). Focus on research: Teachers and technology: Digital literacy through professional development. *Language Arts*, *78*(3), 255-262.

Pollara, P. (2011). *Mobile Learning in Higher Education: A Glimpse and a comparison of student and faculty readiness, attitudes and perceptions* (Doctoral dissertation, Duquesne University).

Potosky, D. (2002). A field study of computer efficacy beliefs as an outcome of training: The role of com-puter playfulness, computer knowledge, and performance during training. *Computers in Human Be-havior*, *18*(3), 241-255. https://doi.org/10.1016/S0747-5632(01)00050-4.

Prensky, M. R. (2010). *Teaching digital natives: Partnering for real learning*. Corwin Press.

Reiser, R. A. (2001). A history of instructional design and technology: Part II: A history of instructional design. *Educational technology research and development*, *49*(2), 57-67.

Rieger, R., & Gay, G. (1997, December). Using mobile computing to enhance field study. In *Proceedings of the 2nd international conference on Computer support for collaborative learning* (pp. 218-226). International Society of the Learning Sciences.

Ritchie, J., Lewis, J., & Elam, G. (2003). Designing and selecting samples. In Jane Ritchie & Jane Lewis (Eds.), *Qualitative research practice. A guide for social science students and researchers* (pp.77-108) Thousand Oaks, CA: Sage.

Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *The Internet and higher education*, *13*(3), 134-140.

Roettgers, J. (2013, October 22). *Apple event snapshot: 9M iPhones sold at launch, 60B apps downloaded, 170M mLearning devices sold.* Retrieved from http://gigaom.com/2013/10/22/apple-event-statshot-9-million-iphones-sold-at-launch-60-billion-apps-downloaded/.

Rogers, E. M. (1983). *Diffusion of innovations*. New York: Free Press.

Rogers, E. M. (1995). Lessons for guidelines from the diffusion of innovations. *Joint Commission Journal on Quality and Patient Safety*, *21*(7), 324-328.

Rogers, E. M. (2010). *Diffusion of innovations*. New York, NY: Simon and Schuster.

Rogers, Y., Connelly, K., Hazlewood, W., & Tedesco, L. (2010). Enhancing learning: a study of how mobile devices can facilitate sensemaking. *Personal and Ubiquitous Computing*, *14*(2), 111-124. https://doi.org/10.1007/s00779-009-0250-7.

Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The Future of Higher Education? Student Perceptions on Learning with Mobile Tablets. *Journal of the Scholarship of Teaching and Learning*, *12*(2), 1-26.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, *80*(1), 1. https://doi.org/10.1037/h0092976.

Rousseau, G. K., & Rogers, W. A. (1998). Computer usage patterns of university faculty members across the life span. *Computers in Human Behavior*, *14*(3), 417-428.

Russell, M., Bebell, D., O'Dwyer, L. & O'Connor, K. (2003) Examing teacher technology use: Implications for preservice and inservice teacher preparation. *Journal of Teacher Education, 54*(4), 297-310. https://doi.org/10.1177/0022487103255985.

Sahin, I., & Thompson, A. (2006). Using Rogers' theory to interpret instructional computer use by COE faculty. *Journal of Research on Technology in Education, 39*(1), 81-104. https://doi.org/10.1080/15391523.2006.10782474.

Santilli, S. & Beck, V. (2005). Graduate Faculty Perceptions of Online Teaching. *The Quarterly Review of Online Teaching*, 6(2), 155-160.

Schlosser, L. A., & Simonson, M. R. (2009). *Distance education: Definitions and glossary of terms*. Iap.

Schrum, L., Shelley, G., & Miller, R. (2008). Understanding tech-savvy teachers: Identifying their characteristics, motivation, and challenges. *International Journal of Technology in Teaching and Learning, 4(1), 1–20*.

Sevillano-García, M. L., & Vázquez-Cano, E. (2015). The Impact of Digital Mobile Devices in Higher Education. *Journal of Educational Technology and Society, 18*(1), 106-118.

Sharma, S.K.& Kitchens, F.L. (2004). Web Services Architecture for MLearning. *Electronic Journal on e-Learning*, (2)1:203-216.

Sharples, M. (2000). The design of mobile technologies for lifelong learning. *Computers and Education, 34*(3-4). 177-193. https://doi.org/10.1016/S0360-1315(99)00044-5.

Sharples, M., Taylor, J., & Vavoula, G. (2005). Towards a theory of mobile learning. *Proceedings of mLearn 2005*, *1*(1), 1-9.

Shepherd, I. J., & Reeves, B. (2012). iPad or iFad–The Mobile Classroom. *Journal of Higher Education Theory and Practice*, *12*(5), 40-53.

Shoffner, M. (2009). Personal attitudes and technology: Implications for Preservice teacher reflective practice. *Teacher Education Quarterly*, *36*(2), 143-161.

Shen, R., Wang, M., & Pan, X. (2008). Increasing interactivity in blended classrooms through a cutting-edge mobile learning system. *British Journal of Educational Technology*, *39*(6), 1073-1086. https://doi.org/10.1111/j.1467-8535.2007.00778.x.

Smith, A. (2015). U.S. smartphone use in 2015. Pew Research Center. Retrieved from http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/.

Smith, A. (2017). Record shares of Americans now own smartphones, have home broadband. Pew Research Center. Retrieved from http://www.pewresearch.org/fact-tank/2017/01/12/evolution-of-technology/.

Souleles, N., Savva, S., Watters, H., Annesley, A., & Bull, B. (2015). A phenomenographic investigation on the use of iPads among undergraduate art and design students. *British Journal of Educational Technology*, *46*(1), 131-141. https://doi.org/10.1111/bjet.12132.

Spotts, T. H. (1999). Discriminating factors in faculty use of instructional technology in higher education. *Educational Technology and Society 2*(4), 92-99.

Spotts, T. H., Bowman, M. A., & Mertz, C. (1997). Gender and use of instructional technologies: A study of university faculty. *Higher Education*, *34*(4), 421-436. https://doi.org/10.1023/A:1003035425837.

Stajkovic, A. D., & Luthans, F. (1998). Social cognitive theory and self-efficacy: Goin beyond traditional motivational and behavioral approaches. *Organizational dynamics*, *26*(4), 62-74. https://doi.org/10.1016/S0090-2616(98)90006-7.

Sung, H. N., Jeong, D. Y., Jeong, Y. S., & Shin, J. I. (2015). The relationship among self-efficacy, social influence, performance expectancy, effort expectancy, and behavioral intention in mobile learning service. *Interventions (Including Training, Marketing, etc.,)*, *8*(9).

Surry, D. W., & Land, S. M. (2000). Strategies for motivating higher education faculty to use technology. I*nnovations In Education and Training International*, *37*(2), 145-153. https://doi.org/10.1080/135580000050034501.

Taylor, S., & Todd, P. (1995). Assessing IT usage: The role of prior experience. *MIS quarterly*, 561-570. https://doi.org/10.2307/249633.

Taylor, P, Parker, K., Lenhart, A., & Patten, E. (2011). The Digital Revolution and Higher Education, Pew Research Center.

Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers and Education*, *57*(4), 2432-2440. https://doi.org/10.1016/j.compedu.2011.06.008.

Thatcher, A., & Mooney, G. (2008). Managing Social Activity and Participation in Large Classes with Mobile Phone Technology. *iJIM*, *2*(3), 41-51.

Then, K. A., & Amaria, P. (2013). Factors related to the adoption of IT emerging technologies by research and non-research based higher education institutions. *Research in Higher Education Journal, 19*. Retrieved from http://www.www.aabri.com/manuscripts/121400.pdf.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: toward a conceptual model of utilization. *MIS quarterly*, 125-143. https://doi.org/10.2307/249443.

Thorndike, E. (1911). *Animal intelligence: Experimental studies.* New York, NY: Macmillian.

Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of computer assisted learning*, *21*(3), 217-228. https://doi.org/10.1111/j.1365-2729.2005.00129.x.

Tindell, D. R., & Bohlander, R. W. (2012). The use and abuse of cell phones and text messaging in the classroom: A survey of college students. *College Teaching*, *60*(1), 1-9. https://doi.org/10.1080/87567555.2011.604802.

Torkzadeh, G., & Koufteros, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer training. *Educational and psychological measurement*, *54*, 813-813. https://doi.org/10.1177/0013164494054003028.

Traxler, J. (2005, June). Defining mobile learning. In *IADIS International Conference Mobile Learning* (pp. 261-266).

Triandis, H. C. (1979). Values, attitudes, and interpersonal behavior. In *Nebraska symposium on motivation*. University of Nebraska Press.

Tront, J. G. (2007). Facilitating pedagogical practices through a large-scale tablet PC deployment. *Computer*, (9), 62-68. https://doi.org/10.1109/MC.2007.310.

Tufan, F. (2016). Internet usage habits as a part of distance higher education. *Contemporary Educational Technology*, *7*(2), 160-173.

U.S. Department of Education Office of Educational Technology U.S. Department of Education. (2010, March). *Transforming American Education: Learning: Powered by Technology, National Educational Technology Plan 2010.* Retrieved from http://tech.ed.gov/wp-content/uploads/2013/10/netp2010.pdf.

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers and Education*, *52*(2), 381-389. https://doi.org/10.1016/j.compedu.2008.09.008.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management science*, *46*(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Vodanovich, S. J., & Piotrowski, C. (2005). Faculty attitudes toward web-based instruction may not be enough: Limited use and obstacles to implementation. *Journal of Educational Technology Systems*, *33*(3), 309-318.

Wafa'N, M., & Abu-Al-Sha'r, A. M. (2009). University Students' Attitudes towards Cell Phone Learning Environment. *iJIM*, *3*(4), 35-40.

Wagoner, T., Hoover, S., & Ernst, D. (2011). CEHD iPad initiative. Retrieved from http://www.cehd.umn.edu/Mobile/PDF/CEHDiPadReportYear2.pdf.

Wains, S. I., & Mahmood, W. (2008, October). Integrating mLearning with e-learning. In *Proceedings of the 9th ACM SIGITE conference on Information technology education* (pp. 31-38). ACM.

Wakefield, J., & Smith, D. (2012). From Socrates to satellites: iPad learning in an undergraduate course. *Creative Education*, *3*(05), 643.

Walker, H. (2011). Evaluating the effectiveness of apps for mobile devices. *Journal of Special Education Technology*, *26*(4), 59-63.

Wang, M., Shen, R., Novak, D., & Pan, X., 2009. The Impact of Mobile Learning on Students' Learning Behaviours and Performance: Report from a Large Blended Classroom. *British Journal of Educational Technology, 40*(4), 673-695. https://doi.org/10.1111/j.1467-8535.2008.00846.x.

Yang, S. H. (2012). Exploring College Students' Attitudes and Self-Efficacy of Mobile Learning. *Turkish Online Journal of Educational Technology-TOJET*, *11*(4), 148-154.

Young, B. J. (2000). Gender differences in student attitudes toward computers. *Journal of research on computing in education*, *33*(2), 204-216. https://doi.org/10.1080/08886504.2000.10782310.

Yuker, H. E. (1984). *Faculty Workload: Research, Theory, and Interpretation. ASHE-ERIC Higher Education Research Report No. 10, 1984*. Association for the Study of Higher Education, Department PR-10, One Dupont Circle, Suite 630, Washington, DC.

Yurt, E., Kurnaz, A., & Sahin, I. (2014). Analysis of Education Faculty Students' Attitudes towards E-Learning According to Different Variables. *Social Studies*, *28*(25), 53.

Zhao, Y., & Cziko, G. A. (2001). Teacher adoption of technology: A perceptual control theory perspective. *Journal of Technology and Teacher Education*, 91), 5-30.

APPENDIX A: IRB FORMS

MARSHALL UNIVERSITY
www.marshall.edu

Office of Research Integrity
Institutional Review Board
One John Marshall Drive
Huntington, WV 25755

FWA 00002704

IRB1 #00002205
IRB2 #00003206

March 13, 2017

Ronald Childress, Ed.D.
College of Education and Professional Development

RE: IRBNet ID# 1028473-1
At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Childress:

Protocol Title:	[1028473-1] mLearning Device Usage and Self-efficacy by Higher Education Faculty for Professional Activities	
Expiration Date:	March 13, 2018	
Site Location:	MUGC	
Submission Type:	New Project	APPROVED
Review Type:	Exempt Review	

In accordance with 45CFR46.101(b)(2), the above study and informed consent were granted Exempted approval today by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee for the period of 12 months. The approval will expire March 13, 2018. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date.

This study is for student Elbert Davis.

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/ Behavioral) Coordinator Bruce Day, ThD, CIP at 304-696-4303 or day50@marshall.edu. Please include your study title and reference number in all correspondence with this office.

- 1 -

Generated on IRBNet

APPENDIX B: PERMISSION TO CONDUCT STUDY

From:	Childress, Ronald
To:	Davis, Elbert
Subject:	FW: Prospectus Package
Date:	Wednesday, January 31, 2018 11:51:55 AM
Attachments:	image002.png

From: Felder, Bruce
Sent: Friday, March 10, 2017 1:30 PM
To: Davis, Elbert <davis513@marshall.edu>
Cc: Childress, Ronald <rchildress@marshall.edu>
Subject: RE: Prospectus Package

Hello All:

It is my understanding that you guys need employee email addresses for a survey distribution. This shouldn't be an issue and I will be available the week of spring break if you want to set up an appointment. I'm more than happy to help out.

Take care,

B. Felder, MS, SPHR
Director HRS
felder1@marshall.edu

-

From: Davis, Elbert
Sent: Friday, March 10, 2017 10:35 AM
To: Felder, Bruce <felder1@marshall.edu>
Cc: Childress, Ronald <rchildress@marshall.edu>
Subject: RE: Prospectus Package

Mr. Felder,

I wanted to follow up with you regarding the email from Provost Ormiston. If you are available the week of spring break, I would like to meet with you on the Huntington campus to discuss what you need me to complete in order to distribute the survey, and one follow-up email, to all faculty members, including the Joan C. Edwards School of Medicine faculty.
Please let me know the best time for your schedule for us to meet.

Thank you,

From: Childress, Ronald
To: Davis, Elbert
Subject: FW: Prospectus Package
Date: Wednesday, January 31, 2018 11:51:55 AM
Attachments: image002.png

From: Felder, Bruce
Sent: Friday, March 10, 2017 1:30 PM
To: Davis, Elbert <davis513@marshall.edu>
Cc: Childress, Ronald <rchildress@marshall.edu>
Subject: RE: Prospectus Package

Hello All:

It is my understanding that you guys need employee email addresses for a survey distribution. This shouldn't be an issue and I will be available the week of spring break if you want to set up an appointment. I'm more than happy to help out.

Take care,

B. Felder, MS, SPHR
Director HRS
felder1@marshall.edu

-

From: Davis, Elbert
Sent: Friday, March 10, 2017 10:35 AM
To: Felder, Bruce <felder1@marshall.edu>
Cc: Childress, Ronald <rchildress@marshall.edu>
Subject: RE: Prospectus Package

Mr. Felder,

I wanted to follow up with you regarding the email from Provost Ormiston. If you are available the week of spring break, I would like to meet with you on the Huntington campus to discuss what you need me to complete in order to distribute the survey, and one follow-up email, to all faculty members, including the Joan C. Edwards School of Medicine faculty.
Please let me know the best time for your schedule for us to meet.

Thank you,

Elbert Davis, Ed.S.
Assistant Professor
Elementary and Secondary Education
Marshall University

From: Eagle, Teresa
Sent: Tuesday, March 7, 2017 2:03 PM
To: Childress, Ronald <rchildress@marshall.edu>
Cc: Davis, Elbert <davis513@marshall.edu>
Subject: FW: Prospectus Package

From: Ormiston, Gayle
Sent: Tuesday, March 7, 2017 1:57 PM
To: Eagle, Teresa <thardman@marshall.edu>
Cc: Felder, Bruce <felder1@marshall.edu>
Subject: Re: Prospectus Package

Teresa,

I approve Ron Childress's request to conduct the study comprising three faculty surveys, as described in the attached proposal. For permission to access the main listserv database, Ron should contact Bruce Felder in Human Resources to discuss the specifics of that request.

Gayle

Gayle L. Ormiston
Provost and Senior Vice President, Academic Affairs
Marshall University

From: "Eagle, Teresa" <thardman@marshall.edu>
Date: Thursday, February 23, 2017 at 3:07 PM
To: "Ormiston, Gayle" <ormiston@marshall.edu>
Subject: FW: Prospectus Package

Gayle,
Ron Childress is the chair for a doctoral student who wishes to survey Marshall faculty to collect data. The attachment includes the justification and description of the study, as well as the survey instrument. In order to get IRB approval, he needs written permission to conduct the survey. Would you please take a look at this and let me know if you are willing to provide this? If you are okay with the research, I would be happy to draft a letter for you.
Thanks!
Teresa

From: Childress, Ronald
Sent: Wednesday, February 22, 2017 9:14 PM
To: Eagle, Teresa <thardman@marshall.edu>
Cc: Davis, Elbert <davis513@marshall.edu>
Subject: FW: Prospectus Package

Teresa:
I have attached the abstract, instruments, and consent forms for Elbert's proposed study. It has been reviewed and approved by his committee. We need written permission (I assume from Academic Affairs) to conduct the study as a part of the package that goes to the IRB. As you can see, the survey is fairly bland and does not address any sensitive issues. Assuming we can get permission to do this, would Rachael Ward be the best source of assistance in actually getting the survey distributed? Any assistance you can provide with this will be greatly appreciated.
Let us know if you have any questions or need additional information.
Thanks.
Ron

APPENDIX C: ANONYMOUS SURVEY CONSENT

Anonymous Survey Consent

Marshall University IRB

Approved on:	3/13/17
Expires on:	3/13/18
Study number:	1028473

You are invited to participate in a research project entitled *"mLearning Device Usage and Self-efficacy by Higher Education Faculty for Professional Activities."* The purpose of this study is to investigate the self-efficacy levels and frequency of use for mLearning devices such as smartphones and tablets as they relate to professional activities of faculty. Mobile learning (mLearning) is defined as "the provision of education and training on smartphones and mobile phones" (Keegan, 2005, p. 3). The study is being conducted by Elbert Davis (Co-I) and Dr. Ronald Childress (PI) from Marshall University and has been approved by the Marshall University Institutional Review Board (IRB). This research is being conducted as part of the dissertation requirements for Elbert Davis.

Specifically, we are requesting that you access and complete the survey available at the link listed below. This survey consists of a 16-item scale to collect information on the frequency of use, and the self-efficacy level of faculty concerning the use of mLearning devices in professional activities. There are two open ended questions that ask about challenges in incorporating mLearning devices into the classroom, and the differences between face-to-face courses and online learning as it relates to mLearning devices. Completing the survey is expected to take ten minutes. Your replies will be anonymous, so do not type your name anywhere on the form. No IP addresses will be collected. There are no known risks involved with this study. Participation is completely voluntary and there will be no penalty or loss of benefits if you choose to not participate in this research study or to withdraw. If you choose not to participate you can leave the survey site. You may choose to not answer any question by simply leaving it blank. Once you complete the survey you can delete your browsing history for added security. Completing the on-line survey indicates your consent for use of the answers you supply. If you have any questions about the study you may contact Dr. Ronald Childress at 304-746-1904, or rchildress@marshall.edu, or Elbert Davis at 304-746-2024 or davis513@marshall.edu.

If you have any questions concerning your rights as a research participant you may contact the Marshall University Office of Research Integrity at (304) 696-4303.

By completing this survey you are also confirming that you are **18** years of age or older.

Please print this page for your records.

Thank you in advance for your assistance with this request.

Please click the following link to begin the survey:
https://marshall.az1.qualtrics.com/SE/?SID=SV_5vFIprVPAksQc97

Version 04/30/14

APPENDIX D: FACULTY MLEARNING DEVICE SURVEY

Faculty mLearning Device Survey

1. Please indicate your sex

- ◯ male
- ◯ female

2. What is your age range

- ◯ 30 or younger
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ 61+

3. What level of courses do you teach?

- ◯ undergraduate only
- ◯ graduate only
- ◯ both undergraduate and graduate

4. How many years have you been a faculty member (adjunct/full time) at any college/university?

- ◯ Less than 5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ more than 20 years

5. My primary faculty position is in the

- ◯ College of Business
- ◯ College of Education and Professional Development
- ◯ College of Arts and Media
- ◯ College of Health Professions
- ◯ College of Information Technology and Engineering
- ◯ College of Liberal Arts
- ◯ College of Physical Therapy
- ◯ College of Science
- ◯ Joan C Edwards School of Medicine
- ◯ School of Pharmacy

6. What types of mLearning devices do you use for professional activities? (Check all that apply)

- ☐ smartphone
- ☐ iPad
- ☐ tablet
- ☐ none--I do not use mLearning devices for professional activities.
- ☐ Other (please specify)

7. How often do you use an mLearning device for each of the listed activity?

	rarely	occassionally	sometimes	often	almost always	I do not use an mLearning device for this activity
1. text messages to students	◯	◯	◯	◯	◯	◯
2. text messages to colleagues	◯	◯	◯	◯	◯	◯
3. email to students	◯	◯	◯	◯	◯	◯
4.email to colleagues	◯	◯	◯	◯	◯	◯
5. social media (Facebook, Twitter, Instagram, etc...)	◯	◯	◯	◯	◯	◯
6. providing formal/informal feedback to students	◯	◯	◯	◯	◯	◯
7. access Internet resources/apps for in-class activities/discussions/lectures/presentations	◯	◯	◯	◯	◯	◯
8. calendar/scheduling	◯	◯	◯	◯	◯	◯
9. scholarly research consumption (examples: reading a journal articles/conference presentations/books/book chapters, etc...)	◯	◯	◯	◯	◯	◯
10. scholarly research creation (examples: creating articles/conference presentations/books/book chapters, etc...)	◯	◯	◯	◯	◯	◯
11. during program/department/college/university meetings (examples: taking notes, finding relevant resources to topics discussed, etc...)	◯	◯	◯	◯	◯	◯
12. service committee work (all activities except email/text messages)	◯	◯	◯	◯	◯	◯
13. using a Course Management System (such as Blackboard) for uses other than grading/feedback, such as uploading course materials, updating courses, designing courses, etc...	◯	◯	◯	◯	◯	◯

8. Rate your confidence level for using mLearning devices for the listed activity.

	limited	fair	good	very good	exceptional	I do not use an mLearning device for this activity
1. text messages to students	○	○	○	○	○	○
2. text messages to colleagues	○	○	○	○	○	○
3. email to students	○	○	○	○	○	○
4. email to colleagues	○	○	○	○	○	○
5. social media (Facebook, Twitter, Instagram, etc...)	○	○	○	○	○	○
6. providing formal/informal feedback to students	○	○	○	○	○	○
7. access Internet resources/apps for in-class activities/discussions/lectures/presentations	○	○	○	○	○	○
8. calendar/scheduling	○	○	○	○	○	○
9. scholarly research consumption (examples: reading a journal articles/conference presentations/books/book chapters, etc...)	○	○	○	○	○	○
10. scholarly research creation (examples: creating articles/conference presentations/books/book chapters, etc...)	○	○	○	○	○	○
11. during program/department/college/university meetings (examples: taking notes, finding relevant resources to topics discussed, etc...)	○	○	○	○	○	○
12. service committee work (all activities except email/text messages)	○	○	○	○	○	○
13. using a Course Management System (such as Blackboard) for uses other than grading/feedback, such as uploading course materials, updating courses, designing courses, etc...	○	○	○	○	○	○

9. Do you wish to be contacted for a possible follow-up interview? If so, please follow thelink and provide your name, and an email or phone number so that you can be contacted. If you do not wish to be contacted for a possible follow-up interview, please continue to the final question. The personal contact information in the link will be separated from the survey so your survey responses will not identify you in any way.

10. What are the biggest challenges you face in using mLearning devices for professional activities?

Q1 If you are interested in participating in a follow-up interview that should last no more than 30 minutes, please provide your name, and either a phone number or email address. If you came to this survey by mistake, or have decided against a follow-up interview, please close your browser window without providing the information.

APPENDIX E: FACULTY MLEARNING INTERVIEW PROTOCOL

1) Can you walk me through the ways, if any, you use mLearning devices (tablets, smartphones, etc…) professionally?
2) What types of mLearning devices, if any, are you using in your face-to-face classroom?
   a. Why did you choose to use this/these particular device(s)?
   b. Did you consider using other devices? Why/Why not?

3) In what ways are you using the mLearning device(s) in the classroom?
   a) Which of these were the most successful? Why?
   b) What were the biggest challenges of using mLearning devices?

4) What was the greatest challenge you experienced in using mLearning professionally?

5) What was the greatest success in using mLearning devices professionally?

6) What types of training, if any, did you receive in using mLearning devices professionally and in the classroom?
   a. Which training was the most effective for you concerning using mLearning devices in the classroom?
   b. Which training was the most effective for you concerning using mLearning devices professionally?

c. What types of training would you like to see in the future?

7) In what ways are you using the mLearning device professionally? RQ 1

8) What types of, if any, mLearning devices are you using in your face-to-face classroom? RQ 1

9) In what ways are you using the mLearning device in the classroom? RQ 1

10) What was the greatest challenge you experienced in using mLearning professionally? RQ 6

11) What was the greatest challenge you experienced in using mLearning devices in the classroom? RQ 6

APPENDIX F: INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

MLEARNING DEVICE USAGE AND SELF-EFFICACY BY HIGHER EDUCATION FACULTY FOR PROFESSIONAL ACTIVITIES: A CASE STUDY

Ron Childress, Ph.D., Principal Investigator
Elbert Davis, Ed.S. Co-Principal Investigator

Introduction

You are invited to be in a research study. Research studies are designed to gain scientific knowledge that may help other people in the future. You may or may not receive any benefit from being part of the study. Your participation is voluntary. Please take your time to make your decision, and ask your research investigator or research staff to explain any words or information that you do not understand.

Why Is This Study Being Done?

The purpose of this study is to *examine the relationship of self-efficacy levels and frequency of use for mLearning devices such as smartphones and tablets as they relate to professional activities of faculty. Previous literature has focused primarily on mLearning devices and student use for academic activities. To date, no systematic investigation has considered faculty usage and selfefficacy levels concerning mLearning devices.*

How Many People Will Take Part In The Study?

About *nine* people will take part in this study. A total of *20* subjects are the most that would be able to enter the study.

What Is Involved In This Research Study?

1) You will be asked six questions related to professional use of mLearning devices. In what ways are you using the mLearning device professionally?
2) What types of, if any, mLearning devices are you using in your face-to-face classroom?
3) In what ways are you using the mLearning device in the classroom?
4) What was the greatest challenge you experienced in using mLearning professionally?
5) What was the greatest challenge you experienced in using mLearning devices in the classroom?
6) What types, if any, training did you receive in using mLearning devices professionally and in the classroom?
There may be follow-up questions based on the answers given.

Subject's Initials ________

How Long Will You Be In The Study?

You will be in the study for about *one hour.*

You can decide to stop participating at any time. If you decide to stop participating in the study we
encourage you to talk to the study investigator or study staff as soon as possible.

The study investigator may stop you from taking part in this study at any time if he/she believes it is
in your best interest; if you do not follow the study rules; or if the study is stopped.

What Are The Risks Of The Study?

There are no known risks to those who take part in this study.

There may also be other side effects that we cannot predict. You should tell the researchers if any of
these risks bother or worry you.

Are There Benefits To Taking Part In The Study?

If you agree to take part in this study, there may or may not be direct benefit to you. We hope the information learned from this study will benefit other people in the future. The benefits of participating in this study may be:

What About Confidentiality?

We will do our best to make sure that your personal information is kept confidential. However, we
cannot guarantee absolute confidentiality. Federal law says we must keep your study records private. Nevertheless, under unforeseen and rare circumstances, we may be required by law to allow
certain agencies to view your records. Those agencies would include the Marshall University IRB,
Office of Research Integrity (ORI) and the federal Office of Human Research Protection (OHRP).

This is to make sure that we are protecting your rights and your safety. If we publish the information
we learn from this study, you will not be identified by name or in any other way.

What Are The Costs Of Taking Part In This Study?

There are no costs to you for taking part in this study. All the study costs, including any study tests,
supplies and procedures related directly to the study, will be paid for by the study.

Will You Be Paid For Participating?

Subject's Initials ________

You will receive no payment or other compensation for taking part in this study.

What Are Your Rights As A Research Study Participant?

Taking part in this study is voluntary. You may choose not to take part or you may leave the study
at any time. Refusing to participate or leaving the study will not result in any penalty or loss of benefits to which you are entitled. If you decide to stop participating in the study we encourage you
to talk to the investigators or study staff first.

Whom Do You Call If You Have Questions Or Problems?

For questions about the study or in the event of a research-related injury, contact the study investigator, *Dr. Ron Childress, 304-746-1904, rchildress@marshall.edu or Elbert Davis, 304-746-2024, davis513@marshall.edu.* You should also call the investigator if you have a concern or complaint about the research.

For questions about your rights as a research participant, contact the Marshall University IRB#2 Chairman Dr. Christopher LeGrow or ORI at (304) 696-4303. You may also call this number if:

- You have concerns or complaints about the research.
- The research staff cannot be reached.
- You want to talk to someone other than the research staff.

You will be given a signed and dated copy of this consent form.

SIGNATURES

You agree to take part in this study and confirm that you are 18 years of age or older.

You have had a chance to ask questions about being in this study and have had those questions answered. By signing this consent form you are not giving up any legal rights to which you are entitled.

____

Subject Name (Printed)

____ __________________

Subject Signature Date

____

Person Obtaining Consent (Printed)

____ __________________

APPENDIX H: PANEL OF EXPERTS

The panel of experts who reviewed the Faculty MLearning Device Survey included the following professionals:

Dr. Jeanette Farmer
Assistant Professor
Marshall University, South Charleston, WV

Dr. Jessica Hanna
Assistant Professor
Marshall University, South Charleston, WV

Ms. Paula Kaplan
Instructional Designer
Marshall University, South Charleston, WV

Ms. Leeann Price
Doctoral Graduate Assistant
Marshall University, South Charleston, WV

APPENDIX I: VITA

Elbert Davis
davis513@marshall.edu

EDUCATION

EdD, Curriculum and Instruction 2018
Educational Technology
Marshall University, Huntington WV
Dissertation: *Mlearning Device Usage and Self-Efficacy by Higher Education Faculty for Professional Activities: A Case Study*

Education Specialist, Curriculum and Instruction 2013
Marshall University, Huntington, WV

Master of Arts, Early Childhood Education 2007
West Virginia University, Morgantown, WV

Master of Arts, Reading 2007
West Virginia University, Morgantown, WV

Master of Arts, Elementary Education 2005
West Virginia University, Morgantown, WV

HIGHER EDUCATION EXPERIENCE

Marshall University, Huntington, WV 2015-Present

- Assistant Professor, Elementary and Secondary Education
    - Taught graduate level Educational Psychology course for 18 semesters
    - Co-taught LS 719, Intro to Doctoral Program Studies for two semesters.
    - Taught/co-taught CIEC 534 Educational Technology course, (Microsoft Word, PowerPoint, Access, Web Design, and Excel modules) for 17 semesters
    - Taught EDF 665 Sociology of American Schools for 5 semesters
    - Redesigned EDF 619, Educational Psychology to align with Quality Matters
    - Extensive experience designing courses in Blackboard 9.x
    - Developed additional areas of emphasis in Elementary and Secondary Education
    - Researched program development and marketing of Elementary and Secondary Education program

- Doctoral Graduate Assistant in Curriculum and Instruction 2011-2014
    - Volunteered at semi-annual hooding ceremony for College of Education Masters' and Doctoral graduates (6 times)

SCHOLARLY ACTIVITIES

Davis, E. (2017). *Handheld device usage by higher education faculty in a professional context*. Unpublished doctoral dissertation. Marshall University, South Charleston, WV. Manuscript in preparation.

Davis, E. (2016). *Elbert Davis: Arbitrary data caps on Internet use are unfair.* The Herald Dispatch. Retrieved from http://www.herald-dispatch.com/opinion/elbert-davis-arbitrary-data-caps-on-internet-use-are-unfair/article_800ed506-ef51-57cd-a978-04ab087bb8db.html

Heaton, L. & Davis, E. (2016). *Potential effects of data caps on education.* Poster presented at West Virginia Higher Education Technology Conference. Morgantown, WV.

INSTITUTIONAL SERVICE

Faculty Search Committee 2015-2017
Marshall University

- Reviewed candidates' CV's and cover letters for EdF/Math faculty position

COMMUNITY SERVICE

- West Virginia Young Writer's Contest judge

CERTIFICATES EARNED

- Advanced Blackboard Teaching and Learning Online Certification 2015
    - Monitoring Student Performance
    - Building Online Communities
    - Designing Engaging Content
- Quality Matters Peer Reviewer status 2012
- Applying the Quality Matters Rubric Certificate 2012