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An Investigation of Faculty Perceptions About Mobile Learning in Higher Education

Serena Brown
Nova Southeastern University, sb2473@mynsu.nova.edu

An Investigation of Faculty Perceptions About Mobile Learning in Higher Education

by
Serena Brown

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Approval Page

This applied dissertation was submitted by Serena Brown under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Jared Bucker, PhD
Committee Chair

Karen Kimball, PhD
Committee Member

Kimberly Durham, PsyD
Interim Dean

Statement of Original Work

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I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

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Serena Brown
Name

April 10, 2018
Date

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To my Mom and Dad: I dedicate this manuscript. To my brother, you got next?

Abstract

An Investigation of Higher Education Faculty About Mobile Learning. Serena Brown, 2018; Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: mobile learning, mobile devices, technology integration, learning engagement, instructor perceptions, MLPS, UTAUT.

This applied dissertation was designed to investigate instructor perceptions about mobile learning among instructors in higher education. The study included the areas of influences of mobile technologies over the approaches of teaching and learning, use of mobile learning technologies to develop class instruction, use of mobile learning for professional learning, influences of mobile learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and mobile learning to facilitate teacher-student communications. An additional objective of this study was to add a more current literature source to the existing literature addressing instructor perceptions about mobile learning in higher education.

The writer used the Mobile Learning Perception Scale, a quantitative survey, using a cross-sectional survey design collecting data at one point in time during the study with nonprobability convenience sampling.

An overall analysis of the data revealed higher education instructors agreed (mean = 3.81, median = 4.00, mode = 4) with K12 teachers (mean = 4.09, median = 4.00, mode = 4) mobile learning techniques and tools were beneficial for use in the approaches to teaching and learning, influential in the development of classroom instruction strategies, useful for professional learning, influential over the restrictions of time when acquiring knowledge anytime, anywhere, and useful for facilitating teacher-student communication.

The results of this study provide administrators the benefit of insight into instructors' perceptions and attitudes of mobile learning at the higher education level. Knowing higher education instructors' perceptions and attitudes about mobile learning afford the institution a much-needed understanding of the direct determinants and influencing key moderators which inform behavioral intention and use of mobile learning technologies (Venkatesh, Morris, Davis, & Davis, 2003).

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Chapter 1: Introduction

"We live in a world of technology. But, it is not the technology that is mobile. It is you" (Microsoft, 2015).

The last two decades of technological advancements have caused changes in teaching and learning dynamics (Henderson & Chapman, 2012). Mobile learning affects both students and educators. Nonetheless, little has been done to understand the preferences and sensitivities of educators regarding the use of mobile learning (Al-Fahad, 2009; Barton, Corbitt, & Nguyen, 2009; Henderson & Chapman, 2012; Hill, Nuss, Middendorf, Cervero, & Gaines, 2012; Marrs, 2013; Mohamad, Maringe, & Woollard , 2013; Nguyen, Barton, & Nguyen, 2015; Ortiz-Rivera, 2013).

Children are beginning to use technology in their primary years and, because of this, engaging students in the classroom in their later years in education could become more difficult (Guthrie & Carlin, 2004; Johnson, Adams, & Haywood, 2011). As Handal, MacNish, and Petocz (2013a) emphasized, "Students now use mobile tablets and smartphones everywhere to engage with their studies" (p. 361). Further, Handal et al. (2013a) noted, "Academic staff members are being placed at the center of the scene from the changes in student behavior and institutional drives" (p. 362). Consequently, educators are expected to integrate and use technology that will meet the needs of the 21st Century student, thereby connecting with this generation of digital learners (Haythornthwaite & Andrews, 2011; Khaddage, Lattemann, & Bray, 2011).

Mobile technologies, having become too capable and too ubiquitous, offer an avenue in which changes to teaching and learning will evolve as rapidly as the technologies themselves which cannot go unheeded (Johnson et al., 2013; Wakefield & Smith, 2012). As the Bring Your Own Device (BYOD) generation enters higher

education, perceptions and attitudes are once again in need of understanding. More importantly, higher education instructors' perceptions and attitudes toward providing mobile learning for the BYOD generation are important to understand.

Background and Justification

According to Traxler (2007), different stakeholders, and other factors in the process of conceptualizing mobile education, remain unclear because it is still emerging and "however innovative, technically feasible, and pedagogically sound, may have no chance of sustained, wide-scale institutional deployment in higher education in the foreseeable future, at a distance or on-site" (p. 9). Mobile learning is considered a relatively young research area with a still-developing theoretical framework (Kearney, Schuck, Burden, & Aubusson, 2012). Grant et al. (2015) stated, technologies have become synonymous with living and learning; accessing information where it is wanted, when it is wanted. Furthermore, a common belief exists that learning is enhanced by offering the instructor and the learner a new avenue for learning in education with technology such as computers, smartphones, e-readers, tablets, video games, webcams, and digital music players (Black, 2010; Davies & West, 2014; Johnson et al., 2013; Johnson, Adams, & Cummins, 2012; Prensky, 2001).

Given labels such as the Net Generation, Millennials, Generation M, and digital natives, today's K-12 students are growing up surrounded by technology such as computers, smartphones, e-readers, tablets, video games, webcams, and digital music players (Black, 2010; Davies & West, 2014; Johnson et al., 2011; Johnson et al., 2012; Prensky, 2001). Upon entering college, the BYOD generation of K-12 students will be looking to higher education to afford them with mobile learning as they enjoy their mobility. Today's mobile devices come populated with productivity apps, which help

students to organize better notes, syllabi, and schedules on campus, to name a few of the uses of mobile devices (Johnson, Adams, Estrada, & Freeman, 2015). Nevertheless, for successful integration of technology into education, Uzunboylu and Ozdamli (2011) stated, teachers' perceptions of mobile learning should be determined beforehand.

It is not the students who seem to have a problem adapting to these new technologies. Instead, the educators seem to be the constraining factor (Khaddage et al., 2011). Moreover, Khaddage, Lattemann, and Bray (2011) and Lauricella and Kay (2013) suggested, mobile devices are so much accepted and supported by the student populations within education, ignoring it in any learning environment would be foolish. Therefore, as Uzunboylu and Ozdamli (2011) and others (AL-Fahad, 2009; Alrasheedi & Capretz, 2015; Barton et al., 2009; Henderson & Chapman, 2012; Hill et al., 2012; Irby & Strong, 2015; Marrs, 2013; Nguyen et al., 2015; Ortiz-Rivera, 2013; Strong, Irby, & Dooley, 2013) agreed, teachers' perceptions of mobile learning is of great significance.

The research problem. Bring Your Own Device, or better known as BYOD, is on the rise in K-12 systems allowing educators incorporation of mobile devices into the schooling experience (Davies & West, 2014; Johnson et al., 2011; Johnson et al., 2012; Kiger & Herro, 2015). Given the rise in popularity of mobile computing with K-12 students (Johnson et al., 2012), an opportunity exists for higher education to leverage mobile technology for instructional purposes. Therefore, it becomes a necessity in understanding the perceptions and attitudes held by the higher education academia regarding mobile learning.

Knowing higher education instructors' perceptions and attitudes about mobile learning afford institutions a much-needed preface for the approaches of teaching and learning, development of class instruction, participation in professional activities,

understanding the influences of mobile learning on acquiring knowledge, and facilitating teacher-student communications. Therefore, this study investigated faculty perceptions about mobile learning in higher education.

Deficiencies in the evidence. Mobile learning impacts both students and educators. However, little has been done to understand the preferences and sensitivities of educators, while a plethora of studies exists concerning students' perceptions of mobile learning (AL-Fahad, 2009; Alrasheedi & Capretz, 2015; Barton et al., 2009; Henderson & Chapman, 2012; Hill et al., 2012; Irby & Strong, 2015; Marrs, 2013; Nguyen et al., 2015; Ortiz-Rivera, 2013; Strong, Irby, & Dooley, 2013). Therefore, given the lack of studies concerning teacher's perceptions of mobile learning in higher education and the rise in popularity of mobile devices available for education, determining teachers' perceptions of mobile learning prior to integration of mobile learning techniques is priority (AL-Fahad, 2009; Alrasheedi & Capretz, 2015; Barton et al., 2009; Henderson & Chapman, 2012; Hill et al., 2012; Irby & Strong, 2015; Marrs, 2013; Nguyen et al., 2015; Ortiz-Rivera, 2013; Strong, Irby, & Dooley, 2013; Uzunboyln and Ozdamli, 2011).

Traxler (2007) states, factors other than technology or pedagogy have the potential to affect the widespread adoption of mobile learning in higher education. Institutions must consider the social, cultural, and organizational factors of institutions and how those factors influence the perceptions of educators in the adoption of technologies. However, in contrast to available research involving student perceptions of mobile learning, little has been done to understand the preferences and sensitivities of higher education instructors in regard to mobile learning techniques (Al-Fahad, 2009; Barton et al., 2009; Hill et al., 2012; Marrs, 2013; Nguyen et al., 2015; Ortiz-Rivera, 2013).

The design of the study was cross-sectional through a quantitative survey presented to online communities in which higher education instructors are members. The instrument used for this study was the Mobile Learning Perception Survey (MLPS). The MLPS, developed by Uzunboylu and Ozdamli (2011), addressed influences of mobile technologies over the approaches to teaching and learning, use of m-learning technologies to develop class instruction, use of m-learning for professional learning, influences of m-learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and m-learning to facilitate teacher-student communication.

The theoretical framework support of this study was the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT framework "provides a powerful empirical tool with which to examine attitudes towards and use of mobile learning" (Wang, Wu, & Wang, 2009, p. 170). Direct determinants of the UTAUT are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). According to Venkatesh et al. (2003), the direct determinants of the UTAUT have a direct impact on perceptions instructors have regarding technology and the adoption of technology.

Audience

Yesterday's K-12 student is tomorrow's higher education student. According to Pew Research Center (2018), nearly three-quarters of U.S. adults own some form of mobile technology, traditional broadband service has declined, and smartphones are becoming the primary access to online activities. Given these statistics about mobile technology, understanding the perceptions and attitudes held by the higher education academia regarding mobile learning is fundamental.

Using the Mobile Learning Perception Scale (MLPS), topics such as: (a) how mobile learning influences the approaches of teaching and learning, (b) using mobile technologies to develop class instruction, (c) using mobile learning for professional development training, (d) how mobile learning influences the restrictions of acquiring knowledge due to time and space, and (e) using mobile learning to facilitate teacher-student communications were surveyed to investigate higher education instructor perceptions about mobile learning. The results of this study provided administrators insight into instructors' perceptions and attitudes of mobile learning at the higher education level. Knowing higher education instructors' perceptions and attitudes about mobile learning afford the institution a much-needed understanding of the direct determinants and influencing key moderators that inform behavioral intention and use of mobile learning technologies (Venkatesh, Morris, Davis, & Davis, 2003).

Definition of Terms

Considering, per Januszewski (2008), practitioners desire for legitimization through certainty in the meaning and use of terminology in educational technology, determining what constitutes the definition of mobile learning, as well as determining what constitutes a mobile device, can be somewhat unclear. Cause for this is seen in the debates among scholars as attempts in determining what constitutes mobile learning and mobile devices are made realizing that mobile learning is still a relatively young area of research with its roots in distance education (Colorado, 2012; Crompton & Burke, 2015; Traxler, 2007; Traxler, 2009). Further adding to the lack of clarity, Kim, Mims, and Holmes (2006) stated and Al-Fahad (2009) agreed, strictly speaking, mobile wireless technologies are different from mobile or wireless technologies basically because not all mobile technologies are wireless and not all wireless technologies are mobile. However,

according to Colorado (2012), “to achieve mobility, one of the characteristics of mobile learning is the use of devices” (p. 2247). Devices that people, as Keegan (2005) suggested,use to carry ubiquitously with them, regard as friendly and personal, inexpensive and simple to use, use ceaselessly in all walks of life, and use in a diversity of different settings.

The following definitions from the literature apply to this study.

Mobile Learning or m-learning. The term refers to using mobile technology which allows access to learning materials anywhere and at any time which results in learners having control over the location and time learning takes place (Lan & Sie, 2010; Pisey, Ramteke, & Burghate, 2012).

Mobile Learning Devices. The term refers to mobile phones, iPod, iPad, smartphones, palmtops, handheld computers (PDAs), tablet PCs, laptop computers, personal media players (Kadirie, 2009; Kukulksa-Hulme, 2005).

Mobile Wireless Technologies. The term refers to “any wireless technology that uses a radio frequency spectrum in any band to facilitate transmission of text data, voice, video, or multimedia services to mobile devices with freedom of time and location limitation” (Al-Fahad, 2009, p. 2).

Purpose of the Study

Technological advancements over the last two decades produced changes in the teaching and learning dynamics (Henderson & Chapman, 2012; Wakefield & Smith, 2012). Children are beginning to use technology in their primary years, and because of this, engaging students in the classroom in their later years in education could become more difficult (Guthrie & Carlin, 2004; Johnson et al., 2011). Consequently, educators are expected to integrate and use technology which will meet the needs of the 21st

Century student, thereby connecting with this generation of digital learners (Haythornthwaite & Andrews, 2011; Khaddage et al., 2011).

There was a lack of research concerned with the perceptions and attitudes of higher education instructors and mobile learning (AL-Fahad, 2009; Alrasheedi & Capretz, 2015; Barton et al., 2009; Henderson & Chapman, 2012; Hill et al., 2012; Irby & Strong, 2015; Marrs, 2013; Nguyen et al., 2015; Ortiz-Rivera, 2013; Strong, Irby, & Dooley, 2013). Thus, "further research should be conducted in a higher education learning environment to determine if similar or equal perceptions are found among instructors teaching adult students" to those who teach K-12 students (Ortiz-Rivera, 2013, p. 60). Therefore, the purpose of this quantitative cross-sectional designed study was to investigate perceptions about mobile learning among higher education instructors in the areas of influences of mobile technologies over the approaches of teaching and learning, use of mobile learning technologies to develop class instruction, use of mobile learning for professional learning, influences of mobile learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and mobile learning to facilitate teacher-student communications. An additional objective of this study was to add a more current literature source to the existing literature addressing instructor perceptions about mobile learning in higher education.

Summary

The last 20 years of technological advancements called for modifications in education. One of those changes is the inclusion of mobile learning techniques. However, not much has been completed to understand the perceptions about mobile learning by higher education instructors.

Khaddage et al. (2011) noted instructors seem to be the constraining factor

towards the adoption of mobile learning techniques, not students. The purpose of this study was to investigate perceptions about mobile learning among instructors in higher education. Additionally, this study adds a more current source to the existing literature addressing instructor perceptions about mobile learning in higher education.

The design of the study was cross-sectional through a quantitative survey presented to online communities in which higher education instructors were members. The instrument used for this study was the Mobile Learning Perception Survey (MLPS). The MLPS, developed by Uzunboylu and Ozdamli (2011), addressed influences of mobile technologies over the approaches to teaching and learning, use of m-learning technologies to develop class instruction, use of m-learning for professional learning, influences of m-learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and m-learning to facilitate teacher-student communication.

The theoretical framework support of this study was the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT framework "provides a powerful empirical tool with which to examine attitudes towards and use of mobile learning" (Wang, Wu, & Wang, 2009, p. 170). Key moderators of the UTAUT are gender, age, experience, and voluntariness of use (Venkatesh et al., 2003). Direct determinants of the UTAUT are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

The Unified Theory of Acceptance and Use of Technology (UTAUT) was the framework for this study. The UTAUT framework includes demographics, social influence, and facilitating conditions that, seen as external variables, may impact educators' perceptions (Yun, Han, & Lee, 2011) of mobile learning. Addtionally, Irby

and Strong (2015) stated, the ”UTAUT may provide researchers potential constructs to understand mobile learning acceptance among . . . instructors” (p. 14).

Chapter 2: Literature Review

The focus of this chapter is to present the literature as it concerns higher education instructors perceptions of mobile learning and the theoretical framework for this study. The literature in this chapter and throughout this study are peer-reviewed, full-text articles from academic journals from available databases through Nova Southeastern University. This literature review chapter begins with an explanation concerning the generation of sources for this literature review and, in general, this study. Presented are various mobile learning definitions, as are various mobile devices. A description of the theoretical framework UTAUT, developed by researchers Venkatesh, Morris, Davis, and Davis (2003), along with articles regarding instructor perceptions of mobile learning in higher education, comprise Chapter 2.

Literature Review Search Method

Before utilizing the available databases through the university, a list of mobile learning concepts was made keeping in mind the topic of the literature review. An initial Boolean equation search was performed using an ‘and’ statement containing the terms instructors’ perceptions and mobile learning and higher education. The specificity of the equation was necessary to narrow return results appropriate to this study. As suggested by Crompton and Burke (2015), further searches with synonyms of the original concept language were made keeping as close to the major topics as possible to prevent the databases from broadly interpreting the terms relevant to this study. An additional Boolean equation search was performed using ‘and/or’ statements containing the terms teachers’ perceptions or faculty’s perceptions and mobile education or mobile learning and tertiary education or community college or university or postsecondary education. For results of both Boolean equation searches, only journal articles that were peer-

reviewed and full-text were extracted from the searches of available databases through Nova Southeastern University. Specific databases utilized in the search were Gale, ERIC, EBSCOhost, ProQuest, Ed/ITLib of both the education area and computer science and information area. Articles generated from the database search were manually scanned using the 'find' option in PDF software to verify each author's use of the terms and context which applied.

Following the same procedure for the topic of this research, an initial Boolean equation search for literature related to the chosen theoretical framework for this study was performed using an 'and' statement containing the terms UTAUT and instructors' perceptions and higher education. Again, the specificity of the equation was necessary to narrow return results appropriate to this study. Once again, following a suggestion by Crompton and Burke (2015), further searches with synonyms of the original concept language were made keeping as close to the major topics as possible to prevent the databases from broadly interpreting the terms relevant to this study. Further, an additional Boolean equation search was performed using 'and/or' statements containing the terms UTAUT and teachers' perceptions or faculty's perceptions and tertiary education or community college or university or post-secondary education. Finally, for results of both Boolean equation searches, only journal articles which are peer-reviewed and full-text were extracted from the searches of available databases through Nova Southeastern University: Gale, ERIC, EBSCOhost, ProQuest, Ed/ITLib of both the education area and computer science and information area and manually scanned using the 'find' option in PDF software to verify each author's use of the terms and context which applied.

While reading the journal articles, additional sources were identified which met the initially prescribed criteria, noted above, through the reference lists and Google

Scholar, a process recommended by Carah and Louw (2015). Additionally, as advised by Galvan (2013) and Nguyen, Barton, and Nguyen (2015) complied note cards, for each source, indicated the author's last name, year of publication, title of the article, the research methods used, sampling and procedures, key findings, and which section of this study the source applied.

Mobile Learning Definitions

The articles in this section of the literature review establish a timeline in the many ways mobile learning is defined and conceptualized and expresses "mobile learning is defined differently by different people" (Keskin & Metcalf, 2011, p. 302). Establishing a timeline requires using articles from as far back as can be located through the search parameters described above to get a thorough understanding of how defining mobile learning has remained ever evolving.

"In exploring the literature of mobile learning, it is easier to get a sense of the breadth of mobile learning than it is to get a stable definition" (Traxler, 2010, p. 129). As the field of mobile learning and mobile devices develops, determining which devices are included in mobile learning as well as how mobile learning can be defined will continue to develop in the debates among scholars (Crompton & Burke, 2015; Keskin & Kuzu, 2015). The continual development attributes to the diversity of technology, technical aspects of mobile devices, nature of work, and gear types such as smartphones, tablets, e-readers, and iPads, to name a few (Gong & Wallace, 2012; Low & O'Connell, 2006; Pollara & Broussard, 2011; Traxler, 2007; Traxler, 2009).

Quinn (2000) identifies mobile learning as "e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone" (p. 1). Eventually, Quinn (2000) called these devices informational appliances (IAs) which

allowed “learning to move from an organizational function to an individual necessity” (p. 4). Abernathy (2001), proposing an even broader definition of mobile learning states, “mobile learning can include anything from job aids, courseware downloads, to instructor-facilitated net-based training via laptop” (p. 1); this explanation focused on PDA’s (Personal Digital Assistants).

The emphasis of mobile learning, Abernathy (2001) further states, is on learning materials accessed wirelessly. Similarly, Gong and Wallace (2012) state, learning and performance are still the main points of the instruction, and the ‘M’ only represents learning materials delivered in specialized contexts. Additionally, Abernathy states mobile learning should prove to be a useful tool for blended learning. Michael Dell, Chairman, and CEO of Dell Computer acknowledged “the rapid move from fixed to mobile computing,” (as cited by Abernathy, 2001) however, does not believe workers will become hooked on handhelds or cell phones. Dell believes because the screens of handhelds are not user-friendly enough, wireless notebooks will be the hot tools and will change the way work is done (Abernathy, 2001).

Keegan (2005) defines mobile learning as “the provision of education and training on PDAs/palmtops/handhelds, smartphones, and mobile phones” (p. 3) and mobile learning definitions should focus on mobility. Whereas, Attewell, Savill-Smith, and Couch (2009) state mobile learning is “the exploration of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning” (p.1). In a definition which seems to bring together those of Keegan (2005), Attewell et al. (2009), and Wang, Wu, and Wang (2009), mobile learning is described as “the delivery of learning to students anytime and anywhere through the use of wireless Internet and mobile devices” (p. 1).

While Ally (2009) merely defines mobile learning as using mobile devices and hand-held wireless computers for the delivery of learning. However, Kadirire (2009) defines mobile learning "as a form of e-learning, which can take place anytime, anywhere with the help of a mobile communication device such as a mobile phone, a personal digital assistant (PDA), iPod or any such small portable device" (p. 15). Jeng, Wu, Huang, Tan, and Yanh (2010) define mobile learning as "learning that happens on any pervasive computing device" (p. 6). Park (2011) defines mobile learning as "the use of mobile or wireless devices for the purpose of learning while on the move" (p.79), adding to the list of mobile devices, personal media players, and laptops.

Lan and Sie (2010) and Pisey, Ramteke, and Burghate (2012) define mobile learning as using wireless mobile technology which allows access to learning materials anywhere and at any time which results in learners having control over location and time learning take place. Conversely, Cochrane (2010) and Traxler (2007, 2009) argue mobile learning is not as simple as learning information through mobile devices while on the move. Further, Cochrane (2010) and Traxler (2007, 2009) contend mobile learning is also authentic, learner-generated, learner-centered, situated, and formal. Even further, Cochrane (2010) and Traxler (2007, 2009) state mobile learning is personal, collaborative, context-aware, continuous, opportunistic, spontaneous, informal, and ubiquitous.

Humes and Raisner (2010) state mobile learning to be an educational technology tool which helps deliver and receive information between the educator and learner. In agreement with Cochrane (2010), Humes and Raisner (2010) define mobile learning as learning which "involves the use of wireless-enabled mobile digital devices (WMDs) within and between pedagogically designed learning environments or contexts" (p. 134).

However, Driscoll and van Barneveld (2015) warn, mobile learning is not as simple as porting e-learning over to a mobile device. Instead, educators should figure out a way to design for mobile learning whether it can be defined consistently or not.

In reading through the different ways mobile learning has been defined, it is understandable why, as Januszewski (2008) states, practitioners desire for legitimization through certainty in the meaning and use of terminology in educational technology. However, as Ally (2009) points out, dissimilar hardware and software platforms will support numerous interpretations of what mobile learning is and how it will become defined. The sharpest difference between mobile learning and other forms of learning is learners can be on the move continually (Serin, 2012; Sharples, Taylor, & Vavoula, 2005). Meaning, learning can take place from anywhere at any time, wirelessly.

Mobile and wireless devices allow for different ways of communicating between educator and learner, and the delivery of instructional materials; a trend of digital learning experienced through portable technologies in a mobile context. Given the numerous ways mobile learning has been defined, mobile learning is, at the least, learning from new methods of delivery which are highly suited to "just enough, just in time, and just for me" demands of 21st Century learners (Peters, 2007). Moreover, as Traxler (2007) posits, perceptions of mobile learning will be determined by how it is eventually conceptualized.

Mobile Learning Perceptions

The market offers a broad range of mobile devices such as mobile phones, smartphones, iPads, iPods, laptops, and tablets to name a few. Today's students, commonly called Millennials, Generation Y, or G2, perceive mobile devices as an integral part of improving their access to learning materials (Khaddage et al., 2011).

Khaddage et al. (2011) further state, mobile learning can be operative, engaging, and efficient for students on and off campus. However, Uzunboylu and Ozdamli (2011) state, teachers' perceptions of mobile learning should be determined before these technologies can successfully be integrated into education.

For consideration of inclusion in this section of the literature review, the article must address instructors' perceptions regarding mobile learning in higher education, be peer-reviewed from scholarly journals, and published in the year 2007 or after. The year 2007 coincides with the timeframe of the chosen literature for the literature review of the original study. No preference was given to whether a study was quantitative, qualitative, or mixed method to offer a broader background on the topic. The articles below represent a collection of the experiences, opportunities, acceptance, effectiveness, limitations, and concerns of the implementation of mobile learning in teaching and learning in higher education.

Peters (2007) interviewed 29 respondents representing manufacturers and software developers of mobile devices, business and education providers "to establish the status of m-technology use and m-Learning uptake to form the basis of a discussion paper for vocational education practitioners" (p. 8). Using findings from a literature search, Peters (2007) developed three different survey instruments. The first survey developed was for two large international manufacturers and two software developers. The second survey developed was for six businesses representing large corporations, medium-sized firms, and small companies. The third survey developed was for "nineteen educational providers representing universities, high schools, private training providers, TAFE (the largest public provider of vocational education and training in Australia), and industry skills councils (the organizations that determine the content of national vocational

curriculum)" (p. 8).

The survey developed for the manufacturer interview asked questions pertaining to using mobile technologies for business and personal use, unexpected uses not part of the product design, new product development drivers, mobile technologies future trends, and "whether mobile devices were being produced specifically for educational uses" (Peters, 2007, p. 8). The results of the survey revealed that hardware and operating producers often work together to maximize product development while minimizing costs and that consumer demand influences the type of product developed. Manufacturers interviewed further stated that the future of mobile devices will be "smaller, faster, better, cheaper, and developing wireless technology to send bigger files faster" (Peters, 2007, p. 17). When asked the ratio of business purchased wireless technologies to personal use purchases, manufacturers stated that while marketing higher-end products to business clients, with the simplest of phones used for business and personal purposes, the cross-over between personal and business is high enough it is hard to tell them apart (Peters, 2007). When asked about the potential of mobile learning, manufacturers and software developers stated, "flash-based mobile interfaces were currently in production for mobile learning allowing animated material use on mobile phones" and the technology is "moving quickly to respond to increasing mobile learning uptake" (Peters, 2007, p. 17). However, manufacturers went on to further state, "mobile learning will not replace other forms of e-learning because screens are too small and hard to read, and if [mobile phones] are made bigger, the device is not as mobile, and mobile learning is most useful when it is in a mobile, field environment" (Peters, 2007, p. 17).

The survey developed for the business interview examined using mobile technologies during regular business, if mobile technologies contributed to business

efficiencies and higher productivity, the value to the business of mobile technologies, and using mobile technologies for learning (Peters, 2007). The results of the survey revealed businesses saw significant benefits from mobile technologies such as accessing large numbers of staff throughout the world with more flexibility, speed, more efficient working environment and customer service, increased efficiencies in training staff, data storage improvements and risk reduction, time and money savings, and a better responsiveness to change (Peters, 2007). Further, Peters (2007) tested the value of mobile technologies categories regarding business culture, finance, staff satisfaction, and competitive edge by finding the mean rating (*M*), with one being not important and five being essential, of each of the categories. Peters (2007) reported the findings of each of the categories as: "the value of mobile technologies in creating a business culture that values new technology" (p. 10), $M = 4.6$; "the financial value of mobile technologies to the organization" (p. 10), $M = 4.6$; "the value of mobile technologies to staff satisfaction" (p. 10), $M = 4.1$; "the value of mobile technologies in establishing a competitive edge" (p. 10), $M = 4.0$. Additionally, even though the business interviews report a significant benefit of mobile technologies, it is reported by the businesses to not be a core part of the business (Peters, 2007).

Finally, the education providers answered interview questions probing whether discussions took place between students and teachers regarding mobile technologies, what types of mobile technologies were used as learning aids, and how students were most likely to use mobile technologies (Peters, 2007). The results of the survey revealed, "despite the high level of student use of mobile phones, less than half of the educational providers engaged in discussions with students about the use of mobile technologies for learning" (Peters, 2007, p. 11). However, becoming more frequent of a topic is getting

access to learning without coming to the classroom and which mobile technologies can be used to receive and store information (Peters, 2007).

Half of the educational providers reported the organization is forcing mobile technologies and learning to become an issue by causing the educational providers to learn about and understand how to use the technologies in the classroom and to understand how industries are integrating mobile technologies (Peters, 2007). Educational providers further reported, students most common mobile technology is the mobile phone and that the devices are mainly used by the students to SMS parents regarding attendance and other family communications (Peters, 2007). Moreover, educational providers stated it would be good if students used mobile phones for learning since the students already had them, but further stressed the importance of using the devices for learning more than what type of device it is and that "resourceful teachers are incorporating SMS because young people are using it anyway, it is a great motivational tool" (Peters, 2007, p. 11). Educational providers also stated, "mobile learning is ideally suited for adult education if it is used to extend the reach of the programs" (Peters, 2007, p. 12). Additionally, educational providers stated mobile technologies present cost barriers for students as well as the organization providing the infrastructure for the mobile technologies (Peters, 2007).

Other findings reported by Peters (2007) are that five educational providers feel students are ready for other wireless options beyond laptops, whereas one educational provider felt students were not ready for mobile technologies, along with teacher readiness for mobile learning being a barrier as some teachers have not even mastered the use of a desktop system. Further, even though mobile phones are ubiquitous, many teachers do not use mobile technologies, and the "uptake of mobile learning depends on

the teacher and the curriculum coordinator" (p. 14). One educational provider stated, "mobile learning needs to fit within a whole matrix of curriculum and assessment, the positioning of this mode of delivery needs to be thought through before it is implemented" (p. 14). While, Another educational provider stated, "the education of school teachers about mobile learning needs to come first...at this stage, teachers are still very negative about students using mobile phones in the classroom for learning" (p. 14). Conversely, one educational provider stated, mobile learning,

> is experimental at the moment, and providers are looking at all ways to deliver subjects, so that students can choose how they would like to learn ... and while mobile learning is not formally included in courses, students would experience it in most subjects . . . so that students have access to learning without having to come to campus, which provides financial savings. However, issues such as whether mobile learning allows higher quotas for courses and how to structure lecturers' pay are still to be resolved (p.14).

Link, Sintjago, and McKay (2011) furnished iPads to 22 instructors in a higher education learning environment for professional and personal use. The instructors were asked to "experiment with ways to incorporate the use of iPads into undergraduate-level courses" (p. 1112) thereby "incorporating iPads into the student learning experience" (p. 1113). With access to periodic training workshops during the academic year, instructors were encouraged to spontaneously discover how best to employ iPads within the undergraduate courses. Some instructors integrated ipad related activities into interdisciplinary courses for first-year undergraduate students where all students were equipped with iPads, while some instructors integrated iPad related activities with mixed-year undergraduate student courses where there was less than a one-to-one ratio of

devices to students (Link, Sintjago, & McKay, 2012).

Qualitative research was chosen by Link et al. (2012) as this type of research "emphasizes the importance of context and the lived experience of the individual (p. 1116). Further stating "contextual nuance is an important part of any study on technology adoptions—particularly when it comes to emerging technologies in educational settings" (p. 1116). The questions posed to the instructors during semi-structured interviews were: if the ipads were used in any of the courses during the fall semester, how the ipads were used, what were some challenges and benefits of integrating the ipads within the courses, which kinds of support was received for using the ipad and what steps were taken to learn how to use the iPad in courses, were instructors planning to integrate the ipads in another semester and how, reflections on how iPads affect teaching with respect to student learning, student behavior and classroom management, administrative tasks and prep work for classes. Finally, the instructors were asked about any instructor concerns on using iPads in courses, and if there were additional resources, the instructors would like to see made available to support use in teaching with iPads (Link et al., 2012). The collected data was analyzed from semi-structured qualitative interviews and represents ideas, innovations, fears, and concerns the instructors raised during the first year of the study (Link et al., 2012).

According to Link et al. (2102), "the most prominent theme was instructors' nearly universal concern about what to do when not all students in the class had personal access to an iPad" (p. 1114). Even though instructors stated another prominent concern was figuring out how to fit the iPad into their pedagogical style, the research did not provide enough contextual information to explore this concern (Link et al., 2012). However, instructors reported administering online quizzes, looking up materials during

class, staying on top of personal email and organization was more efficient using an iPad. Some instructors reported “using the iPad as a virtual whiteboard during lectures, allowing students to conduct survey field research with tablet devices, and using iPads to encourage e-reading and electronic annotation of documents, to name a few” (Link et al., 2012, p. 1114).

Conversely, other instructors expressed concerns about needing defined a precise role of the iPads use within the classroom and communicating these expectations to students as the iPads presented a distraction in the classroom (Link et al., 2012). However, other instructors stated that the iPads only represented one of many possible other devices that students could bring into the classroom that could also represent a distraction. Furthermore, according to one instructor, “computers in the classroom in general changes the conundrum for teachers about distractibility” with students setting the tone for technology and tablet use in the classroom” (p. 1114-1115).

One instructor, Link et al. (2012) reported, found it interesting that even though the students were able to receive a free e-book for the course, most proceeded to purchase the paper text instead. Further stating, the students’ lack of enthusiasm for the e-book causing the instructors’ enthusiasm to wane regarding using the iPad in class. Additionally, there was a firm consensus regarding the iPads lack in supporting Flash video stating, “it’s also really helpful to know what the iPad can’t do, so you don’t try to make it into a laptop” (p. 1115).

Henderson and Chapman (2012) used mixed method research to conduct a study of 195 higher education business educators to determine their perceptions of the use of mobile phones in the classroom. The participants in the study were active Delta Pi Epsilon (DPE) educators with professional knowledge and teaching experience. The M-

Learning Integration in Teaching and Learning Survey was used to collect responses to questions which asked the participants their personal and employment demographics, perceptions of mobile phones for teaching and learning, the extent of mobile phones considered being a distraction, and suggestions for using mobile devices in teaching and learning.

Demographic data revealed for this study 153 of the participants were female, 42 were male. Of the participants, 108 taught business in a 4-year institution, 87 taught in other institutions such as community college, middle school, and high school. The number of participants with more than 20 years teaching experience was 80. Having more than 20 years of instruction experience is relevant, as a broad range of theories, concepts, designs, experiments, and evaluations have developed during that time (Park, 2014). A total of 115 participants' teaching experience was in the range of 1 and 20 years. The number of participants with a master's degree was 87, while a total of 108 participants had either a Ph.D., Ed.D, postdoctorate or bachelor's degree (Henderson & Chapman, 2012).

Data of the study revealed perceptions of mobile phone utilization in teaching and learning, statistical significance was not reached (p=.785; p=.492; $p > .05$). In regards to mobile phones as a distraction in the classroom, a Scheff Test revealed there was a statistically significant difference. Associate professors more than instructors saw mobile phones ringing in class as a distraction. Instructors more than associate professors saw talking and texting in class as a distraction. Additionally, associate professors saw leaving the class to answer an urgent phone call okay, whereas, instructors were undecided (Henderson & Chapman, 2012).

Suggestions expressed by business educators for using mobile phones in class for

teaching and learning showed participants agreed mobile phones were useful for showing students how they can market products and services, price comparisons, evolve business communication practices, conduct research, communicate with students through social media, and provide students with continuous learning during emergency weather conditions and travel. Additionally, the participants felt mobile phones in teaching and learning would be useful for replaying lectures after class, a way to inform students of their grades and course content, ability to beam information from mobile devices to desktop computers, extend the computer lab allowing use of technology to support unusual programs, and generally access programs and features within the mobile device such as the camera, Excel, Word, handwriting recognition, and email. Overall associate professors tend to be more accepting of mobile phones in the classroom than the other ranking participants. Moreover, 46% of the participants said they had used a mobile device for educational purposes, communicating with students through social media, and encouragement of students using online conferencing in virtual teams thereby providing continuous learning opportunities for their students away from campus (Henderson & Chapman, 2012).

Hargis et al. (2013) conducted a study to ascertain faculty perceptions on mobile learning in higher education through a study of the initial implementation of iPads in a mobile learning program. Chosen for the study were three categories of participants using three different methods: Case Study of four teachers, Self-Reporting Dispositional Survey of Foundations (FATSLE survey) across 17 Higher Colleges of Technology teachers, and 19 of the 30 iChampions feedback collected via Basecamp online project management site. The results were presented as a SWOT (strengths, weaknesses, opportunities, and threats) analysis.

Hargis et al. (2013) reported strengths from the Case Study Interviews indicating "informal learning increased as teachers engaged in ways to implement iPads by searching and finding apps, seeking advice from other teachers, and exploring what they could do with the iPad" (p. 51). Weaknesses reported were a "need to overcome student perceptions of school, students used to being told what to do, some faculty members not being technologically inclined, and faculty and students needing storage and training in sending and receiving files" (p. 52). Opportunities reported were "providing support for teachers, providing a safe environment to exchange ideas, a place to develop professional learning networks, time for more collaboration, options for alternative assessments such as rubrics, identifying apps they could use and start developing their own" (p. 52). The only threat reported was the "misalignment between assessments and teaching" (p. 52).

Using the FATSLE survey, Hargis et al. (2013) reported, 62% of the participants were comfortable and confident in their iPad use, 73% of the participants were satisfied with support from campus technology, 64% of the participants felt their iPad training was adequate, 55% of the participants feel they were prepared to use iPads in their classroom, and 95% of the participants feel their administration was active in encouraging use of iPads in classrooms. Additionally, from the survey, 80% of the participants felt the iPad's most frequent use of classroom technology was in promoting student-centered learning and as a communication tool.

Hargis et al. (2013) reported strengths from the iChampion feedback data to show student engagement and collaboration as a strength in iPad use in the classroom. Additionally, the perceptions of teachers were optimistic, energetic, and confident in regards to iPad use in the classroom. However, weaknesses and limitations reported were only having PDF versions of books, finding solutions for sharing materials was

challenging, problems with passwords and emails, and the stronger iPad student users are taking the iPads from the novice users and doing the task for them. Opportunities reported were “learning about the reading and listening resources that work at the other institutions, engaging in ongoing communications, support, and development, and implementing a process for identifying, recommending, purchasing, and distributing apps further down the line” (p. 55). Threats reported were focused on teaching core material as some of the returning students were not as adept using an iPad beyond a text reader.

Handal et al. (2013b) reported the qualitative findings of a mixed methods study. The study was conducted at an Australian university with nine academic schools spanning three states and serving over 11,000 students. The study sought to look “at the instructional, curricular, and organizational factors impacting on the adoption of mobile learning in a higher education institution” (Handal et al., 2013a, p. 359).

Handal et al. (2013b) stated that the qualitative portion of the mixed methods study reinforced the findings of the quantitative portion (presented below, Handal et al., 2013a) of the mixed methods study. The final response rate was 17% (N=177). Despite the low response rate, the internal reliability coefficient resulted in a moderately high alpha (α=.707). The gender ratio was nearly balanced with 43% female and 57% male. Additionally, similarly balanced was the employment status with 48% part-time and 52% full-time.

For the Handal et al. (2103b) study, mobile devices were defined as “portable handheld devices providing computing, information storage, and retrieval functionalities as well as multimedia and communication capabilities” (p. 352). Regarding academics’ perception about the potential of mobile learning devices in teaching and learning, Handal et al. (2013b) found through the qualitative portion of the mixed method study

that academics are “of the opinion that mobile learning tools are effective to promote autonomous learning” (p. 363). Additionally, academics “believe that mobile learning devices are beneficial to generate more course engagement due to their anywhere, anytime capabilities as well as to promote collaboration beyond the physical campus” (Handal et al., 2013b, p. 363). Moreover, “the portability of the devices allowed transporting and working with files at any location was seen as a distinctive advantage” (Handal et al., 2013b, p. 363). However, academics also perceived some limitations of mobile learning. The main limitations perceived by academics were the “lack of time to articulate m-learning into course delivery, shortage of the number of devices owned by academics and students as well as poor familiarity with use and navigation” (Handal et al., 2013b, p. 363).

Handal et al. (2013b) further reported findings of the study revealed some controversial findings warranting further research. One of these was the perception of academics that students cannot use mobile devices as word-processors. Misconceptions such as this led to a negative predictor of using mobile learning even though iPads can be used for such a task and warranted further qualitative exploration. (Handal et al., 2013b). Additionally, academics “did not commonly report articulating the use of mobile educational applications and multimedia into specific teaching and learning experiences, including real-time experiences during lectures and tutorials, online quizzes and discussion boards” (Handal et al., 2013b, p. 363).

A more in-depth qualitative analysis performed and examined by Handal et al. (2013b) revealed, “academics’ perceptions of m-learning in three major educational areas, namely, instructional, curricular, and organizational” (p. 364). The issues which emerged from mobile learning in the instructional area were the perceived positive

educational benefits of mobile learning, the seriousness of mobile learning being a distraction to teachers, mobile devices diminishing the quality of student-instructor communication, and concerns over mobile learning encouraging quick, shallow learning (Handal et al., 2013b). The issues which emerged from mobile learning in the curriculum area were differing academics' preferred training delivery style, various uses and issues for teachers and students therefore a multitude of professional development requirements, a multitude of disciplinary contexts which pose requirements, and the availability of "just in time assistance" utilizing the mobile devices in learning design and assessment (Handal et al., 2013b). The issues which emerged from mobile learning in the organizational area were the financial burden and access to new technology by academics, connectivity issues with existing infrastructure on campus and the metro area, and new workload requirements crucial to the development of mobile learning instruction and curriculum (Handal et al., 2013b).

Nguyen et al. (2015) wanted to discern the current state of research in exploring iPad use in higher education through conducting a systematic literature review (SLR). Cook, Mulrow, and Haynes (1997) state that an SLR is a research approach in its own right. The literature collected for review by Nguyen et al. (2015) focused on traditional teaching and learning rather than distance teaching and learning. Following a step-by-step process outlined by Okoli and Schabram (2010), Nguyen et al. (2015) agreed on the purpose and protocol, searched for and screened papers, extracted content for analysis, and finally analyzed and reported the findings using a qualitative summary of the content analysis.

Searching up to the year March 2013, Nguyen et al. (2015) retrieved 2764 articles from searching the following databases: EBSCOhost, Scopus, Informit A+ Education,

ProQuest Academic Research Library, and Google Scholar. After reviewing the titles and abstracts of the articles generated, 91 were retrieved for further examination of the full-text, leaving 20 articles for inclusion. All 20 articles, based on higher education, involved iPads as the research project, and conclusions based on empirical data.

The breakdown of the 20 articles was as follows: 12 papers involved students only, four papers involved academics only, and four papers involved both students and academics. Further metrics of the 20 articles revealed 16 were conducted in the USA, two in Australia, one in Canada, and one in the Philippines (Nguyen et al., 2015). Given the few amounts of useful articles, Nguyen et al. (2015) deemed "current research was still at an early stage of exploration, that there is no established teaching and learning practice reported, and the need for future large-scale and longitudinal studies" (p. 197).

The methods of the data collected included case studies by Geist (2011), Hargis, Cavanaugh, Kamali, and Soto (2013), Lindsey (2011), Link et al. (2012), and Yeung and Chund (2011). Also included were an experiment by Rossing, Miller, Cecil, and Stamper (2012) and a multiple case study by Hill, Nuss, Middendorf, Cervero, and Gaines (2012). Additionally included was a survey by Gong and Wallace (2012).

Results reported regarding academics indicated overall there was interest in adopting iPads and exploring how it to use it in a classroom setting (Hargis, Cavanaugh, Kamali, & Soto, 2013; Hill et al., 2012; Link et al., 2012; Rossing, Miller, Cecil, & Stamper, 2012). However, academics hold more mixed attitudes with 22 interviewed indicating a less positive attitude and were found to be more skeptical than students of using iPads for learning, citing perceptions of iPads to be a distraction in giving full attention to classroom activities (Geist, 2011; Gong & Wallace, 2012). Results reported regarding students was an overall acceptance of iPads and motivation with a positive

attitude about using an iPad in their learning even though it could cause a distraction (Brand, Kinash, Mathew, & Kordyban, 2011; Kinash, Brand, & Mathew, 2012; Perez et al., 2011; Rossing et al., 2012; Wakefield & Smith, 2012).

In regards to students' learning, Nguyen et al. (2015) found 16 papers in which students used iPads, four of which involved students and academics, potentially engaging and enhancing outcomes. Some students did not feel the iPad made any difference in their learning, even though 209 students felt like a high level of iPad engagement correlated to a high level of learning (Brand et al., 2011; Diemer, Fernandez, & Streepy, 2012; Fontelo, Faustorilla, Gavino, & Marcelo, 2012). In regards to academics, Nguyen et al. (2015) found, overall there was interest in adopting iPads and exploring how to use it in a classroom setting (Hill et al., 2012; Hargis et al., 2013; Link et al., 2012; Rossing et al., 2012).

Other reasons reported by academics, in regards to their skepticism, were those of specific technical issues, such as no technical support, no connectivity, unstable apps, challenges switching between iPads and desktops/laptops, and a lack of university policies in regard to iPad technology in the classroom (Link et al., 2012; Rossing et al., 2012; Yeung & Chung, 2011). Additionally, academics had concerns not all their students have iPads and how to best-fit iPads into their pedagogical strategies (Link et al., 2012). In contrast to their concerns, academics saw the iPad as a motivational tool, easy to use, an excellent communication tool, and convenient for quick access to course and library materials (Yeung & Chung, 2011; Gong & Wallace, 2012).

Additionally, academics felt using iPads, and social apps would foster collaboration between academics, enable them to retrieve email, calendars, meeting notes, and potentially save on printing costs (Lindsey, 2011; Yeung & Chung, 2011).

Concern was also expressed about applications costs and the rate at which technology becomes outdated. Moreover, according to Nguyen et al. (2015), academics were confused about using iPads in teaching, and concerned the symbolic value and relevancy of iPads, as a form of mobile learning, were the driving factors in iPad adoption (Gong & Wallace, 2012; Hill et al., 2012; Link et al., 2012).

Keskin and Kuzu (2015) developed a mobile learning system and "examined the perceptions and experiences of academics using the system" (p. 194) for professional development of academics at the scientific research level. Phases one through three developed, tested, and participants evaluated the developed mobile learning system. Phase four reported results regarding the perceptions and experiences of academics using the mobile learning system for professional development.

In general, Keskin and Kuzu (2015) reported,

> The use of the mobile learning system for professional development purposes was found to provide independence of time and place to academics. It was seen that the system was portable, personal, accessible, useful, affordable, appealing, adaptable, practical, appropriate to purpose and easy to use. (p. 214)

Specifically, in this research, Keskin and Kuzu (2015) reported, conditions of interaction, discussion, and cooperation were only partly met while observation of the participant academics saw "a preference of the mobile learning system for developing professional performances and revising background knowledge with new information rather than communication and interaction purposes" (p. 214) maintaining mobile learning including performance support and learning. Additionally, Keskin and Kuzu (2015) reported, "portable media players supporting the wireless Internet were used, and mobility remained limited" (p. 214). However, Keskin and Kuzu (2015) noted, "as the

overall design of the mobile learning system allowed access via 3G-supported smartphones; the system could be said to be successful in terms of mobility and accessibility" (p. 214).

Further reported by participant academics was concern about the higher costs of mobile technologies and putting in place solutions to technological infrastructure problems to support a mobile learning system (Keskin & Kuzu, 2015). Additionally, the participant academics preferred video content over visual content, however," the small screen size of the mobile device decreased interest in watching the videos" (Keskin & Kuzu, 2015, p. 213). In addition to the participant academics feeling negatively towards the small screen size of the mobile devices, the small screen contributed to user errors when utilizing virtual keyboards, and technical problems installing mobile software on the devices which required the help of a technical team (Keskin & Kuzu, 2015).

Power, Cristol, Gimbert, Bartoletti, and Kilgore (2016) wanted to measure perceptions of self-efficacy with mobile learning amongst higher education instructors using the Mobile Teacher's Sense of Efficacy Scale (mTSES) instrument, stating "the impact of targeted professional development activities on teacher's perceptions of self-efficacy with mobile learning remains understudied" (p. 350). The study specifically looked at changes in perceptions of self-efficacy amongst participants in an open professional development course about instructional design for mobile learning (ID_4ML) using an experimental design collecting quantitative data. Reminding, "a teachers' adoption of new instructional technologies and pedagogical strategies is influenced by confidence in their ability to do so effectively" (p. 351).

Power et al. (2016) sought to analyze the effects of precourse ID_4ML and postcourse ID_4ML application using the mTSES instrument. Mainly, the researchers

wanted to know the result of participation in ID$_4$ML had upon the participants' perception of self-efficacy with using mobile learning strategies in teaching, difference with respect to demographic characteristics regarding self-efficacy perceptions of effects of ID$_4$ML participation, and "how do changes in ID$_4$ML participants' perceptions of self-efficacy with mobile learning strategies compare to those reported by Power (2015).

Power et al. (2016) reported the mean scores obtained for the three sub-domains pre-course mTSES administration participants in ID$_4$ML were consistent with those reported by Power (2015). Specifically, for the sub-domain efficacy in student engagement with mobile learning, efficacy in instructional strategies with mobile learning, and efficacy in classroom management with mobile learning, Power (2015) reported changes in the mean of pre and post mTSES as M = .57, M = .68, and M = .11 respectively, and for the ID$_4$ML participants in Power et al. (2016), changes in mean of M = .64, M = .62, and M = .45 respectively were reported. Given the findings, Power et al. (2016) summarized "changes in participants' mean scores on the mTSES scale sub-domains appear consistent between the ID$_4$ML participants and those reported by Power (2015).

Regarding demographic analyses of participant gender, status (within the teaching professional), years of teaching experience, and geographic region, again results from Power et al. (2016) were compared to Power (2015). Power (2015) did not report on gender. Both male and female participants reported an increase in the mean scores for the three sub-domains of the mTSES. Specifically, for student engagement M = .52 for female participants and M = .46 for male participants, for instructional strategies M = .59 for female participants and M = .66 for male participants, and for classroom management M = .49 for female participants and M = .42 for male participants. In short, increases in

mean were greater for females than males concerning gender.

Concerning participant status, Power (2015) participant members were teachers and students. Power et al. (2016) participants were undergraduate and graduate education students, K-12 teachers, high education instructors, private sector training professionals, and others. Regarding sub-domains student engagement, instructional strategies, and classroom management, Power (2015) reported changes in mean of pre and post mTSES as *M* = .28, *M* = .56, and *M* = -.01 respectively for teachers and *M* = 1.19, M = .85, and *M* = .35 respectively for students. For Power et al. (2016), sub-domains student engagement, instructional strategies, and classroom management, reported changes in mean of pre and post mTSES as *M* = -.07, *M* = .04, and *M* = -.37 respectively for undergraduate education students, *M* = .06, *M* = -.31, and M = -.10 respectively for graduate education students, *M* = .31, *M* = -.18, and *M* = .01 respectively for K-12 teachers, *M* = .24, *M* = .04, and *M* = .01 respectively for higher education instructors, *M* = -.22, *M* = -.41, and *M* = .37 respectively for private sector training professionals, and finally *M* = .28, M = .05, and *M* = -.13 rerspectively for others. In summary, overall changes in mean in relation to participant status were higher for Power (2015) than for Power et al. (2016).

Relating years of services, Power (2015) and Power et al. (2016) grouped teaching experience into the following groups: 0-5 years, 5-10 years, 10-15 years, and > 15 years. Regarding sub-domains student engagement, instructional strategies, and classroom management, Power (2015) reported changes in mean of pre and post mTSES for 0-5 years as *M* = -.15, *M* = .06, and *M* = -.31 respectively and Power et al. (2016) *M* = .17, *M* = -.05, and *M* = -.10 respectively; 5-10 years as *M* = 1.25, *M* = 1.49, and *M* = .48 respectively and Power et al. (2016) *M* = .02, *M* = -.08, and *M* = .14 respectively; 10-

15 years as *M* = .39, *M* = .39, and *M* = .14 respectively and Power et al. (2016) *M* = .20, *M* = .14, and *M* = -.15 respectively; >15 years as *M* = .49, *M* = .60, and *M* = -.09 respectively and Power et al. (2016) *M* = .23, *M* = -.28, and *M* = .09 respectively. Put simply, reporting changes in mean, teachers with less than 5 years of services "were the least likely to show increases in their perceptions of self-efficacy" (Power et al., 2016, p. 361) while the participants in the Power (2015) study for the 5-10 years were showing the biggest change in mean in perceptions of self-efficacy, followed by >15 years (Power, 2015), 10-15 years (Power, 2015), 10-15 years (Power et al., 2016), 5-10 years (Power et al., 2016), >15 years (Power et al., 2016), and then 0-5 years (Power et al., 2016).

The final demographic for which Power (2015) and Power et al. (2016) reported changes in mean was geographic region. Power (2015) only had one geographic region, North America, while Power et al. (2016) reported findings for six geographic regions; Africa-Middle East, Asia (Far East), Australia/New Zealand, Europe, North America, and South/Central America. The biggest overall change in mean for the three sub-domains (student engagement, instructional strategies, and classroom management) was reported for Power (2015) North America (*M* = 1.36), followed by Asia (Far East) (*M* = .13), Europe (*M* = .12), South/Central America (*M* = .10), North America (*M* = .09), Africa-Middle East (*M* = .05), and finally Australia/New Zealand (*M* = -.13).

Opportunities and limitations. Handal, MacNish, and Petocz (2013a) reported the quantitative findings of a mixed methods study. Handal et al. (2013a), in the quantitative portion of the study, "sought to evaluate the impact of academics' perceptions about possibilities and constraints in the adoption of [mobile devices]" (p. 350). The study was conducted at an Australian university with nine academic schools spanning three states and serving over 11,000 students (Handal et al., 2013a).

In this study, Handal et al. (2013a) developed and validated a zone of free movement (ZFM) scale to quantify the magnitude and direction of academics' perceptions. Handal et al. (2013a) outlined ZFM as the enclosed environment in which the individual interacts for teaching and learning purposes. A designed scale of 32 ZFM items, which included 16 mobile learning possibilities and 16 mobile learning constraints, were subdivided into seven pedagogical and nine operational categories. The dependent variable was teachers' stage of adoption (p. 353).

Handal et al. (2013a) stated, "research on embracing information and communication technologies (ICT) in education should focus on the interaction between an academic's knowledge and beliefs and the possibilities and constraints surrounding his [or] her professional environment" (p. 351). For the Handal et al. (2103a) study, mobile devices were defined as "portable handheld devices providing computing, information storage, and retrieval functionalities as well as multimedia and communication capabilities" (p. 352). Handal et al. (2013a) specifically listed smartphones or tablets as mobile devices in the study.

Using descriptive statistics, Handal et al. (2013a) pursued to investigate "at the instructional, curricular, and organizational factors impacting on the adoption of mobile learning in a higher education institution" (Handal et al., 2013a, p. 359). The final response rate was 17% (N = 177). Despite the low response rate, the internal reliability coefficient resulted in a moderately high alpha (α=.707). The gender ratio was nearly balanced with 43% female and 57% male. Similarly balanced was the employment status with 48% part-time and 52% full-time. Handal et al. (2013a) used a 3-point Likert scale: agree, undecided, and disagree and the item stemmed from the study was: "In my opinion, mobile devices present the following capabilities and constraints in teaching and

learning…" (p. 353). The operational constraints results reported by Handal et al. (2013a) were:

> Sometimes the connectivity is poor in some areas (*M* = 2.87; *SD* = .373), not all students or lecturers have mobile devices or are not in the habit of using them (*M* = 2.68; *SD* = .627), have restrictions on screen size and resolution (*M* = 2.52; *SD* = .674), internet connection outside the University and home network can be expensive – lack of wifi in many locations (*M* = 2.46; *SD* = .767), in a fast moving market mobile products can be out of date very quickly (*M* = 2.32; *SD* = .747), do not offer the same interface richness/immersiveness compared to a laptop/desktop (*M* = 2.18; *SD* = .768), apps do not work across main mobile platforms (*M* = 2.11; *SD* = .655), data storage capacity is limited (*M* = 2.07; *SD* = .786), and lack of a mouse and a keyboard makes usability difficult (*M* = 1.83; *SD* = .842). (p. 354)

The pedagogical constraints results reported by Handal et al. (2013b) were:

> There are not many formal opportunities to learn about mobile learning (*M* = 2.58; *SD* = .659), special curriculum tasks to support the use of mobile devices are required (*M* = 2.46; *SD* = .713), lack of time to integrate mobile learning into my courses (*M* = 2.46; *SD* = .744), students do not adequately know how to use them for their learning (*M* = 2.32; *SD* = .727), students will be distracted in class (*M* = 2.31; *SD* = .781), concerned that students will cheat using mobile devices (*M* = 2.06; *SD* = .867), and reduce lecturer student personal contact (*M* = 1.92; *SD* = .835). (p. 354)

The operational possibilities results reported by Handal et al. (2013b) were:

> Allow easy physical carrying of digital curriculum-related files (e.g., PDF, Word,

> PowerPoint, course notes) (*M* = 2.82; *SD* = .480), allow students and staff working at own time and location that suit them (*M* = 2.81; *SD* = .484), improve access to online teaching resources (e.g., internet browsing, podcasting, online Library catalogue, Blackboard, virtual galleries) (*M* = 2.79; *SD* = .527), let students write and save their own personal study notes (*M* = 2.68; *SD* = .619), assist lecturers and students in organizing their course tasks (e.g., calendars, diaries, timetables, reminders) (*M* = 2.67; *SD* = .576), empower lecturers and students in producing multimedia presentation through taking their own pictures or recording audio and video footage (*M* = 2.62;*SD* = .611), keep students constantly connected to the course content and developments (*M* = 2.56; *SD* = .672), enable students to record lecture presentations or any other course learning experience (*M* = 2.50; *SD* = .704), and facilitate educational management of marks, attendance and students records (*M* = 2.37; *SD* = .714). (p. 355)

The pedagogical possibilities results reported by Handal et al. (2013a) were:

> Facilitates independence in learning anywhere and at anytime (*M* = 2.72; *SD* = .570), offer greater possibilities for distance remote learning and individualized instruction (*M* = 2.68; *SD* = .549), facilitate collaboration and interaction among students (*M* = 2.61; *SD* = .646), educational apps empower students to explore new concepts, simulate real-life situations, collect data or practice content (*M* = 2.58; *SD* = .631), permit real-time learning interactions in class (e.g., resource sharing, surveys, questions) (*M* = 2.56; *SD* = .671), enhance student-lecturer communication beyond class time (e.g., email, SMS, file sharing, quizzes, feedback, updates, discussion forums, social networking) (*M* = 2.46; *SD* = .767), and increase communication with colleagues (*M* = 2.31; *SD* = .779). (p. 355)

Theoretical Framework

The articles meeting the criteria for inclusion in the theoretical framework section of the literature review used UTAUT as the framework or the main topic of the article. Being a multidimensional scale, UTAUT incorporates eight elements used in the field of information technology to assess user acceptance attitudes about technologies in workplaces (Wang et al., 2009). For instructors, the educational institution is the workplace. Wang et al. (2009) states, UTAUT "provides a powerful empirical tool with which to examine attitudes toward and use of m-learning to determine important correlates of use" (p.170). In agreement with Wang et al. (2009), Irby and Strong (2105) state UTAUT "may provide researchers potential constructs to understand mobile learning acceptance among . . . instructors" (p. 14).

As mobile learning research has been developing for 20 years (Parsons, 2014), a varied range of theories, concepts, designs, experiments, and evaluations have developed during that time. Behavioral theories, flow experience, social constructivism, constructionism, situated cognition, distributed cognition, experiential learning, with activity theory being the most popular, have been used in mobile learning research. The UTAUT model was chosen for this research study because it offers comprehensiveness and a proven ability to adapt to a variety of studies and to demonstrate meaningful results (Aldhaban, 2012; Lee & Rho, 2013; Marchewka & Kostiwa, 2007; Saravani & Haddow, 2011; Yun, Han, & Lee, 2011).

The UTAUT model includes demographics, social influence, and facilitating conditions, which are external variables that may influence educators' perceptions (Yun et al., 2011). Specifically, "the UTAUT model attempts to explain how individual differences influence technology use" (Marchewka & Kostiwa, 2007, p. 95). Researchers

across a range of studies have tested the UTAUT model with the aim of contributing towards the validity and practical applicability, or otherwise, of the constructs and variables.

Venkatesh, Morris, Davis, and Davis (2003) developed the UTAUT model bringing together eight models prominently used in current IT research, which resulted in an integration of the elements, proposing a unified model called the Unified Theory of Acceptance and Use of Technology (UTAUT) (see Appendix A). The eight models or theories which make up the UTAUT includes Fishbein and Ajzen (1975) Theory of Reasoned Action (TRA), Davis (1998) Technology Acceptance Model (TAM), Davis, Bagozzi, and Warshaw (1992) Motivational Model (MM), Ajzen (1991) Theory of Planned Behaviour (TPB), Taylor and Todd (1995) Combined TAM and TPB (C-TAM_TPB), Thompson, Higgins, and Howell (1991) Model of PC Utilization (MPCU), Rogers (2003) Innovation Diffusion Theory (IDT), and Bandura (1986) Social Cognitive Theory (SCT) (Abdulwahab & Dahalin, 2010; Lee & Rho, 2013; Wang et al., 2009).

Venkatesh et al. (2003) stated there appeared to be significant direct determinants of intention or usage in one or more of the individual models" (p. 446). Further, Venkatesh et al. (2003) theorized "that four constructs will play a significant role as direct determinants of user acceptance and usage behavior" (p. 446-447). Direct determinants of UTAUT which appear to be significant are performance expectancy, effort expectancy, social influence, and facilitating conditions.

The four direct determinants that play a significant construct role, and being influenced by key moderators such as age, gender, experience, and voluntariness of use informs the sensitivity to human and social factors in accepting and using technology in the workplace (Venkatesh et al., 2003). Figure 1 presents the UTAUT model (Venkatesh

et al., 2003). Venkatesh et al. (2003) theorized, and van Biljon and Kotzé (2007) agreed, attitude toward behavior, self-efficacy, affect toward use, intrinsic motivation, and anxiety were not direct determinants of intention. In the sections below each model which comprises UTAUT is described followed by a brief detail of the direct determinants which resulted from the research and study conducted by Venkatesh et al. (2003).

The TRA is elicited from social psychology and "is one of the most fundamental and influential theories of human behavior" used to predict wide ranges of behaviors (Venkatesh et al., 2003, p. 428). Two core constructs in TRA are attitude toward behavior and subjective norm (Venkatesh et al., 2003). Attitude toward behavior is "an individual's positive or negative feelings about performing the target behavior" and 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, pp. 216, 302).

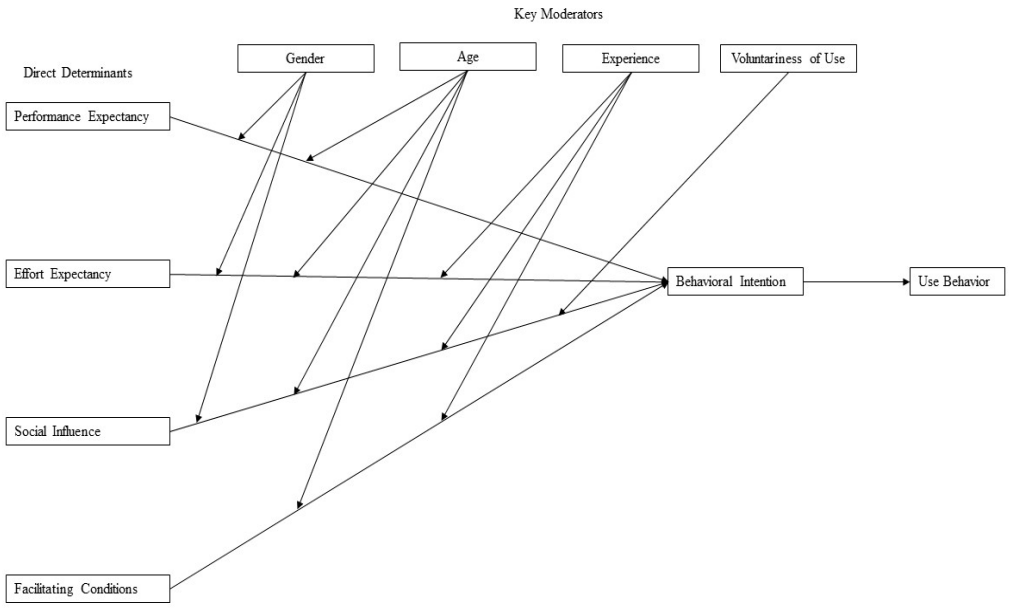

*Figure 1***.** The unified theory of acceptance and use of technology (UTAUT). Adapted from Venkatesh et al. (2003).

Key moderators shown to effect TRA are experience and voluntariness (Venkatesh et al., 2003). Core construct subjective norm becomes a root construct of the direct determinant social influence in UTAUT while attitude towards behavior is not significant on behavioral intention due to spurious relationships between attitude and intention in UTAUT (Venkatesh et al., 2003).

TAM is "designed to predict information technology acceptance and usage on the job and excludes the attitude construct to better explain the intention of the technology use" (Venkatesh et al., 2003, p. 428). There are three core constructs in TAM, subjective norm, perceived usefulness, and perceived ease of use (Venkatesh et al., 2003). Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (Venkatesh et al., 2003, p. 320). The subjective norm core construct is secured from TRA and states "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; Venkatesh et al., 2003).

Key moderators shown to effect TAM are experience, voluntariness, and gender (Venkatesh et al., 2003). Core construct subjective norm becomes a root construct of the direct determinant social influence in UTAUT (Venkatesh et al., 2003). Additionally, core construct perceived usefulness becomes a root construct of direct determinant performance expectancy while core constructs perceived ease of use becomes a root construct of the direct determinant effort expectancy in UTAUT (Venkatesh et al., 2003).

The MM is supported by a significant body of psychology which uses motivation theory to explain behavior by having adapted it for specific contexts (Venkatesh et al.,

2003). Davis, Bagozzi, and Warshaw (1992) used motivational theory to understand new technology adoption and use within information systems domain. There are two core constructs in MM, extrinsic motivation and intrinsic motivation (Venkatesh et al., 2003). Davis et al. (1992) explain extrinsic motivation as an activity "is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions" (p. 1112). Davis et al. (1992) explain intrinsic motivation as an activity which "for no apparent reinforcement other than the process of performing the activity per se, users will want to perform the activity" (p. 1112).

No key moderators were shown to effect MM (Venkatesh et al., 2003). Core constructs extrinsic motivation becomes a root construct of the direct determinant performance expectancy in UTAUT (Venkatesh et al., 2003). Core constructs intrinsic motivation is not significant on behavioral intention in UTAUT (Venkatesh et al., 2003).

According to Venkatesh et al. (2003), "TPB extended TRA by adding the construct of perceived behavioral control" (p. 429), thereby theorizing an additional determinant of intention and behavior. "TPB has been successfully applied to the understanding of individual acceptance and usage of many different technologies in terms of predicting intention" (Venkatesh et al., 2003, p. 429).

There are three core constructs in TPB, attitude toward behavior, subjective norm, and perceived behavioral control (Venkatesh et al., 2003). Attitude toward behavior and the subjective norm core constructs adapted from TRA with attitude toward behavior stated as "an individual's positive or negative feelings about performing the target behavior," and subjective norm stated as "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, pp. 216, 302). Perceived behavioral control is “the perceived ease or difficulty of performing the behavior” (Ajzen, 1991, p. 188).

Key moderators shown to effect TPB are experience, voluntariness, gender, and age (Venkatesh et al., 2003). Core construct subjective norm becomes a root construct of the direct determinant social influence while attitude towards behavior is not significant due to spurious relationships between attitude and intention on behavioral intention in UTAUT (Venkatesh et al., 2003). Core construct perceived behavioral control becomes a root construct in direct determinant facilitating conditions in UTAUT (Venkatesh et al., 2003).

As the name suggests, this model is a marriage between the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). There are four core constructs in C-TAM-TPB, which adapted from another model, attitude toward behavior, subjective norm, and perceived behavioral control are adapted from TRA and TPB (Venkatesh et al., 2003).

Attitude toward behavior is “an individual’s positive or negative feelings about performing the target behavior,” and subjective norm stated as “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, pp. 216, 302). Perceived behavioral control is “the perceived ease or difficulty of performing the behavior” (Ajzen, 1991, p. 188). Core construct perceived usefulness adapted from TAM. Perceived usefulness is defined by Davis (1989) as “the degree to which a person believes that using a particular system would enhance his or her job performance (p. 320).”

Key moderators shown to effect C-TAM-TPB is experience (Venkatesh et al., 2003). Core construct subjective norm becomes a root construct of the direct determinant

social influence while core construct perceived behavioral control becomes a root construct in direct determinant facilitating conditions in UTAUT (Venkatesh et al., 2003). Additionally, the core construct perceived usefulness becomes a root construct of direct determinant performance expectancy in UTAUT (Venkatesh et al., 2003). Core construct attitude towards behavior is not significant on behavioral intention due to spurious relationships between attitude and intention on behavioral intention in UTAUT (Venkatesh et al., 2003).

According to Venkatesh et al. (2003), MPCU is largely derived from Triandis' (1977) theory of human behavior and presents a perspective that competes with TRA and TRB. Thompson et al. (1991) refined and adapted Trandis' model for IS contexts and used the model for predicting PC utilization. The refinement and adaptation by Thompson et al. (1991), allows MPCU to be "particularly suited to predict individual acceptance and use of a range of informational technologies" (Venkatesh et al., 2003, p. 430).

There are six core constructs in MPCU, job-fit, complexity, long-term consequences, affect towards use, social factors, and facilitating conditions (Venkatesh et al., 2003). Thompson et al. (1991) state job-fit to be "the extent to which an individual believes that using [technology] can enhance the performance of his or her job" (p. 129). Regarding complexity, Rogers and Shoemaker (1971) define complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 154). Long-term consequences are "outcomes that have a pay-off in the future" (Thompson et al., 1991, p. 129). Trandis (1979) states affect towards use as "feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act" (p. 211). Trandis (1979) defines social factors to be an "individual's

internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (p. 210). Trandis (1979) further states facilitating conditions, as a core construct of MPCU, to be "objective factors in the environment that several judges or observers can agree to make an act easy to do" (p. 129). For example, buying online is facilitated when there are no shipping charges associated with the placed order.

Key moderators shown to effect MPCU is experience (Venkatesh et al., 2003). Core construct job-fit becomes a root construct of the direct determinant performance expectancy, while core construct complexity becomes a root construct of effort expectancy, in UTAUT (Venkatesh et al., 2003). Additionally, core construct social factors becomes a root construct of the direct determinant social influence while core construct facilitating conditions becomes a root construct of the direct determinant facilitating conditions in UTAUT (Venkatesh et al., 2003). Core constructs long-term consequences and affect towards use are not significant on behavioral intention (Venkatesh et al., 2003).

Rogers (1995) states diffusion of innovations is grounded in sociology and consists of four main elements. The four main elements are "the innovation, communication channels, time, and the social system" (p. 11) and have been in use for more than 40 years to study a variety of innovations (Tornatzky & Klein, 1982). Refining a set of constructs, Moore and Benbasat (1991) adapted the characteristics of innovations presented by Rogers and found support for the predictive validity of these innovation characteristics to study individual technology acceptance.

There are seven core constructs in IDT, relative advantage, ease of use, image, visibility, compatibility, results in demonstrability, and voluntariness of use (Venkatesh

et al., 2003). Moore and Benbasat (1991) define relative advantage as “the degree to which an innovation is perceived as being better than its precursor” (p. 195) and ease of use as “the degree to which an innovation is perceived as being difficult to use” (p. 195).

Image is defined as “the degree to which use of an innovation is perceived to enhance one’s image or status in one’s social system” (Moore & Benbasat, 2001, p. 195). Venkatesh et al. (2003) define visibility as “the degree to which one can see others using the system in the organization” (p. 431). Compatibility is defined as “the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters” (Moore & Benbasat, 2001, p. 195). Finally, Moore and Benbasat (1991) define results demonstrability as “the tangibility of the results of using the innovation, including their observability and communicability” (p. 203) and voluntariness of use as “the degree to which use of the innovation is perceived as being voluntary, or of free will” (p. 195).

Key moderators shown to effect IDT are experience and voluntariness (Venkatesh et al., 2003). Core construct relative advantage becomes a root construct of the direct determinant performance expectancy while core construct becomes a root construct of the direct determinant effort expectancy in UTAUT (Venkatesh et al., 2003). Additionally, core construct image becomes a root construct for the direct determinant social influence while core construct compatibility becomes a root construct for the direct determinant facilitating conditions in UTAUT (Venkatesh et al., 2003). Core constructs visibility, results demonstrability and voluntariness of use are not significant on behavioral intention (Venkatesh et al., 2003).

Bandura introduced social cognitive theory in 1986. It is one of the most potent theories regarding human behavior (Venkatesh et al., 2003). Social cognitive theory,

based on the concept of reciprocal determinism, is where personal factors, biological events, and environmental influences produce exchanges which result in triadic reciprocality (Bandura, 1986). Rooted in human agency, SCT explores the individual's control over personal feelings, thoughts, and actions; “what people think, believe, and feel affects how they behave” (Bandura, 1986, p. 25). In 1995, Compeau and Higgins applied and extended SCT to the context of computer utilization. The Compeau and Higgins model allowed the application of “the underlying model to be extended to acceptance and use of information technology in general” (Venkatesh et al., 2003, p.432). There are five core constructs in SCT, performance outcome expectations, personal outcome expectations, self-efficacy, affect, and anxiety (Venkatesh et al., 2003).

Compeau and Higgins (1995) define performance outcome expectations as “the expected [performance, as in job-related] consequences of behavior and are an important precursor to usage behavior” (p. 196). Compeau and Higgins (1995) similarly define personal outcome expectations as “the expected [personal, as in individual esteem and sense of accomplishment] consequences of behavior and are [also] an important precursor to usage behavior” (p. 196). Venkatesh et al. (2003) defines self-efficacy as the “judgment of one’s ability to use a technology to accomplish a particular job or task” (p. 432), effect as “an individual’s liking for a particular behavior” (p. 432), and anxiety as “evoking anxious or emotional reactions when it comes to performing a behavior” (p. 432).

No key moderators were shown to effect SCT (Venkatesh et al., 2003). Core constructs performance outcome expectations, and personal outcome expectations become root constructs of the direct determinant performance expectancy in UTAUT (Venkatesh et al., 2003). Core constructs self-efficacy, affect, and anxiety is not

significant on behavioral intention in UTAUT (Venkatesh et al., 2003). According to Venkatesh et al. (2003), “previous research has shown self-efficacy and anxiety to be conceptually and empirically distinct from effort expectancy and therefore have been modeled as indirect determinants of intention fully mediated by perceived ease of use” (p. 455).

Performance expectancy within a mobile learning context suggests using mobile learning will enable users to accomplish mobile learning activities more quickly and will increase job performance (Venkatesh, Morris, Davis, & Davis, 2003; Wang et al., 2009). Venkatesh et al. (2003) states, the constructs perceived usefulness, from TAM and C-TAM-TPB, job-fit, from MPCU, extrinsic motivation, from MM, outcome expectations, from SCT, and relative advantage, from IDT in UTAUT influence the direct determinant performance expectancy. Performance expectancy is defined as an individual’s belief using technology will enable benefits in job performance (Venkatesh et al., 2003). Moreover, “they have demonstrated that performance expectancy is the strongest predictor of behavioral intention to use IT,” with key moderators gender and age having the potential to impact performance expectancy on behavioral intention (Venkatesh et al., 2003).

Venkatesh et al. (2003) states, the constructs perceived ease of use, from TAM, complexity, from MPCU, and ease of use, from IDT influence the direct determinant effort expectancy. Effort expectancy is defined as the degree of ease connected with the technology (Venkatesh et al., 2003). However, the construct perceived ease of use, from TAM, may become non-significant over sustained usage (Marchewka & Kostiwa, 2007). As with performance expectancy, the key moderator's gender and age, as well as the key moderator experience, have the potential to impact effort expectancy on behavioral

intention (Venkatesh et al., 2003).

Venkatesh et al. (2003) states, the constructs of subjective norm, from TRA, TAM, TPB, and C-TAM-TPB, social factors, from MPCU, and image, from IDT influence the direct determinant social influence. Social influence is defined as the extent which a person perceives others believe the technology should be used and expect others should also use the technology (Venkatesh et al., 2003). Additionally, key moderators gender, age, experience, and voluntariness of use have the potential to impact social influence on behavioral intention (Venkatesh et al., 2003).

Venkatesh et al. (2003) states, the constructs perceived behavioral control, from TPB and C-TAM-TPB, facilitating conditions, from MPCU, and compatibility, from IDT influence the direct determinant facilitating conditions. Facilitating conditions, as a direct determinant, being defined as the extent to which an individual believes organizational and technical infrastructure exists to sustain the use of the system (Venkstesh et al., 2003). The key moderators with potential to impact facilitating conditions are age and experience (Venkatesh et al., 2003).

In conclusion, UTAUT relates intended use of technology from the impact the key moderators have on the direct determinants (Saravani & Haddow, 2011; Venkatesh et al., 2003). Inversely, Park (2011) and Keskin and Metcalf (2011) contend there is no frame which explicitly guides research methods or data analysis tools available in mobile learning, stating mobile learning has immature technical limitations and pedagogical considerations. Never-the-less, UTAUT has been used to explain 70% of the variance in the intention to use a system, compared to 40% with other models (Lee & Rho, 2013; Yun et al., 2011). Abdulwahab and Dahalin (2010) concur further stating, UTAUT “to a large extent does better than that of any of the original eight models or theories and their

extensions" (p. 268).

Research Questions

This research study stems from the recommendation of a previous research study conducted by Ortiz-Rivera in 2013. From this point on, when the reference to the Ortiz-Rivera study is not for citation, it will be referred to as the original study. One of the original study's recommendations for further research stated," further research should be conducted in higher education learning environments to determine if similar or equal perceptions are found among instructors teaching adult students" (Ortiz-Rivera, 2013, p. 60). Therefore, the research data collected for the current study came from higher education instructors by replicating the research questions, data instrument, and design of the original study.

Using replicated research questions and research method, discussed in Chapter 3, this research study ascertained how higher education faculty perceive mobile learning integration, mobile device usage, and how the perceptions held by the faculty influences practices used in instruction. The participants used in the original study were K-12 faculty. This study used faculty participants in higher education. The research questions replicated in this study were:

1. How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in school? (Ortiz-Rivera, 2013).

2. How do teacher perceptions of the use of m-learning influence the development of classroom instruction strategies? (Ortiz-Rivera, 2013).

3. How do teachers perceive the use of m-learning tools for professional learning? (Ortiz-Rivera, 2013).

4. What perceptions do the teachers have about the influences of m-learning over

the restrictions of time when acquiring knowledge anytime, anywhere? (Ortiz-Rivera, 2013).

5. How do the teachers perceive the use of m-learning tools to facilitate teacher-student communication? (Ortiz-Rivera, 2013).

Summary

This chapter presented the literature review and the theoretical framework that served as the rationale for this study. The articles of the literature review represent a collection of the experiences, opportunities, acceptance, effectiveness, limitations, and concerns of the implementation of mobile learning in teaching and learning in higher education. A reoccurring theme within the literature is that no stable definition of mobile learning currently exists, nor can it be expected to if technology continues to evolve (Crompton & Burke, 2015; Keskin & Kuzu, 2015; Traxler, 2010).

Also, while education provides a learning experience for the student, the education environment is the workplace of the instructor, including some of the same concerns found in any other workplace environment. This study was grounded in the UTAUT theory that incorporates eight elements directed at technologies in the workplace. Given that the educational environment is the instructor's workplace, the UTAUT model was chosen as the theoretical framework for this study as the four direct determinants of the UTAUT model, informs the sensitivity to human and social factors in accepting and using technology in the workplace (Venkatesh et al., 2003).

The UTAUT has been used to explain 70% of the variance in the intention to use a system (Yun et al., 2011; Lee & Rho, 2013). Because the possible use of technology can indicate an intention to use technology (Taylor & Todd, 1995), UTAUT theory may shed light on the attitudes higher education instructors toward using mobile learning

(Wang et al., 2009).

As a reminder, the following definitions from the literature apply to this study.

Mobile Learning or m-learning. The term refers to using mobile technology that allows access to learning materials anywhere and at any time that results in learners having control over the location and time learning takes place (Lan & Sie, 2010; Pisey, Ramteke, & Burghate, 2012).

Mobile Learning Devices. The term refers to mobile phones, iPod, iPad, smartphones, palmtops, handheld computers (PDAs), tablet PCs, laptop computers, personal media players (Kadirie, 2009; Kukulksa-Hulme, 2005).

Mobile Wireless Technologies. The term refers to "any wireless technology that uses a radio frequency spectrum in any band to facilitate transmission of text data, voice, video, or multimedia services to mobile devices with freedom of time and location limitation" (Al-Fahad, 2009, p. 2).

The instrument used for this study was the Mobile Learning Perception Survey (MLPS). The framework support of this study was the Unified Theory of Acceptance and Use of Technology (UTAUT). The MLPS, developed by Uzunboylu and Ozdamli (2011), addresses influences of mobile technologies over the approaches to teaching and learning, use of m-learning technologies to develop class instruction, use of m-learning for professional learning, influences of m-learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and m-learning to facilitate teacher-student communication. Additionally, the UTAUT framework "provides a powerful empirical tool with which to examine attitudes towards and use of mobile learning" (Wang, Wu, & Wang, 2009, p. 170). Key moderators of the UTAUT are gender, age, experience, and voluntariness of use (Venkatesh et al., 2003). Direct determinants of the

UTAUT are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

Chapter 3: Methodology

Chapter 2 presented a review of current literature regarding instructors' perceptions in higher education about mobile learning and serves as the foundation for this study. The purpose of this study was to investigate instructor perceptions about mobile learning among instructors in higher education in the areas of influences of mobile technologies over the approaches of teaching and learning, use of mobile learning technologies to develop class instruction, use of mobile learning for professional learning, influences of mobile learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and mobile learning to facilitate teacher-student communications. An additional objective of this study was to add a more current literature source to the existing literature addressing instructor perceptions about mobile learning in higher education.

This chapter presents the research methodology. An overview of this chapter is presented first, which describes the details, in broad meaning, of this study. Discussion of the participant population and selection of participants for this study follows an overview of the current chapter. The instrument chosen for this study was the Mobile Learning Perception Scale (MLPS), developed by Uzunboylu and Ozdamli (2011). Additionally, presented is a discussion on the development of the MLPS followed by how Roche (2013) modified the MLPS to mirror commonly known terms used in the United States. After the discussion of the instrument, presented is the procedure for carrying out this study. Moreover, finally, the limitations of this study are presented and discussed.

Overview

This study, conducted as a recommendation by the original study, used a different participant group. The original study used participants in K-12 education. The target

group for this study was higher education instructors. The participants were higher education instructors available through seven online communities.

The research design for this study was a cross-sectional study as was the original study, noting that the cross-sectional survey design is the most popular survey design in education (Creswell, 2015). According to Levin (2006) and Creswell (2015), the use of cross-sectional study design is appropriate when the study is descriptive in the form of a survey which measures current opinions or practices. Cross-sectional studies collect data at one point in time during the study and can help to remove assumptions (Levin, 2006).

Cross-sectional studies "are conducted to estimate the prevalence of an outcome of interest for a given population" (Levin, 2006, p. 24). This study was specifically interested in higher education instructor's perceptions about mobile learning. As with the original study, this study investigated instructors' perceptions about mobile learning to (a) affect the methods of teaching and learning, (b) affect limitations of time and space when attaining knowledge anytime, anywhere, (c) create class instruction using mobile technologies, (d) use m-learning for professional development, and (e) support communications with students.

Uzunboylu and Ozdamli (2011) designed and developed the MLPS to explore instructors perceptions' of the implementation of mobile learning in instructional environments and how the potential benefits of mobile learning instructional approaches and mobile technologies, when integrated into instructional programs, are perceived (Ortiz-Rivera, 2013). Since the development of the MLPS took place in Turkey, Roche (2013) modified and validated the MLPS, through a pilot study, to update terms, meanings, and descriptions common to mobile learning in the United States in order to achieve a better understanding of instructor perceptions about mobile learning.

Participants

According to Levin (2006), the "response rate from the selected participants determines how well results can be generalized to the population as a whole" (p. 24). According to Creswell (2015), because it is not always possible to use probability sampling in educational research, the researcher must select individuals that are available or convenient. This study used nonprobability convenience sampling. The participants represent some characteristic the researcher seeks to study (Creswell, 2015).

Using nonprobability convenience sampling, only higher education instructors who willingly volunteered participated in this study as the target population for this study was instructors in higher education. Further, the volunteering participants remained anonymous. Additionally, to prevent creating an overall scale from missing data, which is not the same as a participant recording their individual perceptions and is not generally recommended (Green & Salkind, 2014), a sixth option of Đon't Know, as was with the Roche (2013) study, was included in the Likert Scale and discussed further in the instrument section of this chapter.

A sample of 128 higher education instructors from online communities reaching geographical areas all over the world participated in this study. For each of the online communities, permission was obtained from the administrator of the communities to solicit voluntary participation from the community members. Elimination of any participants who did not meet the criteria of being a higher education instructor transpired. Two participants were excluded from participation because demographic information indicated employment as high school instructors. Therefore, a finalized total of participants for this study was $N = 126$.

Instrument

This section begins with a history of the development of the MLPS, the survey instrument for this study. The MLPS is a Likert scale instrument for gathering perceived reactions of higher education instructors about mobile learning. According to Grimus and Ebner (2015), a Likert scale "is preferred for gathering perceived reactions in research" (p. 24). Additionally, this section explains the why and how of updating the MLPS by Roche (2013).

The MLPS, developed by Uzunboylu and Ozdamli (2011), is a 26-item Likert scale measure first used in Cyprus in a study comprised of 1529 secondary teachers within 32 different schools. The MLPS was developed due to a complete absence of a data instrument to assess teachers' perceptions of mobile learning (Uzunboylu & Ozdamli, 2011). Even so, the MLPS, developed for use in Northern Cyprus with secondary teachers in that region, still provides the "most promising survey instrument in measuring teachers' perceptions and readiness to implement m-learning strategies successfully" (Roche, 2013, p. 26). Several survey statements, as well as an additional option to the Likert scale, were modified in the MLPS. The modifications, realized through a pilot study conducted by Allyn J. Roche (2013) and adopted for this study, updated terms, meanings, and descriptions common to mobile learning in the United States (see Appendix B for detailed modifications to the MLPS).

Uzunboylu and Ozdamli (2011) created and developed the MLPS over four stages. Stage 1 developed 31 original survey items by examining written correspondence from 20 teachers on feelings, opinions, and attitudes about mobile learning along with a literature review of the topic. Stage 2 made necessary changes to the survey items, including the elimination of four of the original survey items, due to an examination of the language, content, and appearance of language, communications, and instructional

technology experts. In Stage 3, Uzunboylu and Ozdamli (2011) tested the validity and reliability of the survey instrument in a pretrial group of 150 teachers, using a 5-point Likert scale with the following categories: *(1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree*. Collection of data at this stage showed the average of the scale to be 2.70 to 3.93, standard deviation 0.99 to 1.26, and correlation between 0.35 to 0.86. Uzunboylu and Ozdamli (2011) removed a final survey item because it had a correlation value less than .030. Finally, in stage four, the final version of the survey instrument was distributed to all teachers involved in the study.

This study was to examine mobile learning through a cross-sectional survey, collecting data at one point in time during the study, thereby investigating current perceptions of higher education instructors about mobile learning. Seven demographic survey statements that collected data anonymously regarding educational attainment, gender, age group, main teaching subject area, length of service teaching, type of teaching environment, and overall skills using educational technologies joined the 26-item modified MLPS survey instrument. The addition of the *Other* options allowed participants to better self-report data concerning academic degree/level, gender, teaching subject matter, and teaching environment as presented in Figure 2.

As piloted by Roche (2013), a sixth option of *Don't Know* was added to the Likert scale because "there may be some participants that are not familiar with m-learning practices" (p. 36). For the Roche (2013) study, using the Don't Know option increased the participant survey by 15. Therefore, the sixth option allows for an increase in the *N*. Other pilot study changes produced replacing the word *application* and *branch*, used in the MLPS, with the words *techniques* and *content* respectively (Roche, 2013). Replacing *application*s with *techniques* minimizes confusion with mobile apps (Roche, 2013). In

the U.S., *content* is a more common term than *branch* for describing specific subject matter that an instructor may teach (Roche, 2013). The mnemonic *MMS* (multimedia messaging service) replaced *text, video, or picture* (Roche, 2013). Survey Item 8, being negatively worded, required recoding to remain consistent with the other survey items.

Validity. Simonson (1979) stated for an instrument to be valid "the instrument must be appropriate for what needs to be measured; a valid test measures the construct for which it is designed" (p. 36). The results of the Kaiser-Meyer-Olkin (KMO) (0.968) and Bartlett's Test of Sphericity (BTS) ($X^2 = 10163.312$; $P < 0.001$) sums the MLPS under three components. According to Zeller and Carmines (1980), "factor analysis has been used to clarify the intercorrelations among variables . . . such as questionnaire responses at a given point in time" (p. 46). "The factor analysis is appropriate for the variables as the correlation between variables was different than 1" (Uzunboylu & Ozdamli, 2011, p. 548). According to Uzunboylu and Ozdamli (2011), "three factors were found in teachers' perception of mobile learning scale" (p. 548). After the Varimax rotation, "total variance of the three factors of the MLPS was estimated as 66.95% which is above the acceptable percentage of 60% in social sciences" (Uzunboylu & Ozdamli, 2011, p. 548). The estimated factor load for the MLPS, after Varimax rotation, was between 0.440 and 0.795 (Uzunboylu & Ozdamli, 2011).

"Obtained from the factors and appropriateness to theoretical structure" (Uzunboylu & Ozdamli, 2011, pp. 548-549) the MLPS divides into three sub-dimensions. Sub-Dimension 1, Aim-Mobile Technologies Fit (A-MTF) that has eight items, describes the Sub-appropriateness of mobile learning. Sub-Dimension 2, Appropriateness of Branch (AB) that has nine items, contains appropriateness statements of mobile learning to teacher's content area. Sub-Dimension 3, Forms of M-Learning Applications and

Tools Adequacy of Communications (FMA/TSAC) that has nine items, contains statements regarding the applications of mobile learning for communication and sufficiency merits in education (see Appendix D - adapted from Roche, 2013).

	Section 1 - Demographics				
A	What is the highest academic degree/level you have completed?				
	□ Associate's Degree	□ Bachelor's Degree	□ Master's Degree	□ Professional Degree (Grad Cert, Ed.S.)	□ Other
B	Your gender?				
	□ Female	□ Male	□ Other	□ No Answer	
C	Please indicate your age by selecting one of the following:				
	□ < 25	□ 26-35	□ 36-45	□ 46-55	□ 56-65	□ > 65
D	What group best describes your teaching subject matter?				
	□ American Sign Language/Interpreter		□ Architecture		
	□ Automotive		□ Behavioral Sciences		
	□ Business		□ Computer Sciences		
	□ Construction		□ Culinary		
	□ Drafting		□ Early Childhood Education		
	□ English		□ Engineering		
	□ Fine Arts		□ Funeral Service Education		
	□ Golf/Turf Management		□ Health		
	□ History		□ Horticulture		
	□ Hospitality		□ Humanities		
	□ HVAC		□ Literature		
	□ Maintenance		□ Mathematics		
	□ Natural Sciences		□ Nursing		
	□ Office Administration		□ Paralegal		
	□ Physical Education		□ Physical Therapy		
	□ Social Sciences		□ Welding		
	□ Other				
E	How many years in-service teaching?				
	□ 3 or fewer years	□ 4 to 9 years	□ 10 to 19 years	□ 20 or more years	
F	Which of the following describes your teaching environment?				
	□ Community College	□ University	□ Other		
G	Rate your overall skills in using educational technologies:				
	□ Below Basic	□ Basic	□ Proficient	□ Advanced	

Figure 2. Added demographic survey statement items.

Reliability. According to Zeller and Carmines (1980), "reliability concerns the degree of repeatability and consistency of empirical measurements and the focus of attention in reliability assessment is on random error" (p. 48). Cronbach's alpha is a measure of internal consistency and is by far the most popular (Zeller & Carmines, 1980). The Cronbach coefficient of reliability for the entire MLPS survey instrument is $\alpha = 0.97$, half-split reliability of the survey instrument is 0.932. Further, the three factors or sub-dimensions, also report reliability coefficients. Sub-Dimension 1, Aim-Mobile Technologies Fit (A-MTF) reports Cronbach coefficient of reliability is $\alpha = 0.894$, half-split reliability is .8881 (Uzunboylu & Ozdamli, 2011). Sub-Dimension 2, Appropriateness of Branch (AB) reports Cronbach coefficient of reliability is $\alpha = 0.940$, half-split reliability is 0.915 (Uzunboylu & Ozdamli, 2011). Sub-Dimension 3, Forms of M-Learning Applications and Tools Adequacy of Communications (FMA/TSAC) reports Cronbach coefficient of reliability is $\alpha = 0.944$, half-split reliability is 0.942 (Uzunboylu & Ozdamli, 2011) (see Appendix D - adapted from Roche, 2013).

Procedures

Design. This study was a recommended study by the original study. The instrument used was the MLPS created by Uzunboylu and Ozdamli (2003) and modified by Roche (2013) and was accessed by participants through an online survey available through seven online communities. The choice of online surveying allowed for flexibility of gaining participants and additionally allowed participants to complete the survey anytime, anywhere, the same opportunity that mobile learning affords learners (Kadirire, 2009).

This study aimed to investigate higher education instructors' perceptions about mobile learning. The independent variable was instructors' perceptions. Mobile learning

was the dependent variable (Ortiz-Rivera, 2013). Per Creswell (2015), attitudes, beliefs, opinions, or practices can be studied using a cross-sectional study. Hence, this study was a quantitative survey using a cross-sectional survey design collecting data at one point in time during the study with nonprobability convenience sampling.

A web-based survey using the MLPS instrument having 33 items collected the data for the research. The first section of the survey contained seven demographic questions, A through G, asking for participants' highest academic degree completed, gender, age, teaching subject, years in-service teaching, type of teaching environment, and self-rating of using educational technologies. Section 2 contained six questions, 1 through 6, investigating the influences of mobile technologies over the approaches of teaching and learning. Section 3 contained five questions, 7 through 11, which investigate the use of mobile learning technologies to develop class instruction. The survey investigates the use of mobile learning technologies to develop class instruction with five questions, 12 through 16, in Section 4. Using four questions, 17 through 20, in Section 5, the survey investigates the influences of mobile learning over the restrictions of time and space when acquiring knowledge "anytime, anywhere." Finally, Section 6 contained six questions, 21 through 26, investigating mobile learning to facilitate teacher-student communication. A Likert scale ranging from 5 to 0 was used to answer each question in Sections 2-6. A sixth option of Don't Know was added to the Likert scale because "there may be some participants that are not familiar with m-learning practices" (Roche, 2013, p. 36).

Survey Q8 through Q33 were coded as follows: *(0) don't know (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree*. Question 8 of the MLPS instrument being negatively worded, was recoded as follows: *(5) strongly*

disagree, (4) disagree, (3) neutral, (2) agree, and (1) strongly agree (0) don't know. Additionally, applicable definitions to the study were made available to the participants within the survey in each section for ease of accessibility to participants.

The survey instrument was distributed using Survey Hero. Survey Hero was chosen as the tool for the development and dissemination of the survey because it allows data exports into SPSS (Statistical Package for the Social Sciences), the software chosen to perform the statistical analysis of the data collected for this study. Additionally, Survey Hero makes available several delivery methods for surveys to reach participants such as the web, mobile, chat, email, or social media, to name a few. However, more importantly, Survey Hero has in place detailed terms of use policy which protects the data collected by the survey, assures the survey developed will not harm the participants, and no identifiable information collected within the survey website (Survey Hero, 2017).

After the development of the online survey on Survey Hero, a post was made to the online communities containing a link to the online survey. Respondents to the survey link were introduced to who was doing the research, why their participation was requested, why the research was being done, the participants required actions, reasons for the research, if there were any dangers involved with participation, what to do if after agreeing to participate how to end participation, if any costs were associated with being a participate, how data are kept confidential, and if participants had questions, who could be connected for answers regarding the research and their participation. The period for the survey to be available within the online communities was seven weeks with the ideal participation of 100 or more individuals. Completion of the MLPS survey through the Survey Hero website took no more than 15 minutes per participant.

Data analysis. Choices the participants made to the survey questions provided the

quantitative data for analysis. A matrix matching the MLPS statements to the research questions is available and demographic survey statements are marked A through G (see Appendix E).

Data collected from Survey Q8 through Q13 answered Research Question 1: "How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in the school?" (Ortiz-Rivera, 2013). Data collected from Survey Q14 through Q18 answered Research Question 2: "How do teacher perceptions of the use of m-learning influence the development of classroom instruction strategies?" (Ortiz-Rivera, 2013). Data collected from Survey Q19 through Q23 answered Research Question 3: "How do teachers perceive the use of m-learning tools for professional learning?" (Ortiz-Rivera, 2013). Data collected from Survey Q24 through Q27 answered Research Question 4: "What perceptions do the teachers have about the influences of m-learning over the restrictions of time when acquiring knowledge 'anytime, anywhere'?" (Ortiz-Rivera, 2013). Finally, data collected for survey questions answered Research Question 5: "How do the teachers perceive the use of m-learning tools to facilitate teacher-student communication?" (Ortiz-Rivera, 2013). All data were entered in SPSS and then validated through the data tab of the menu. The output of this request indicated the data were valid for the predefined rules of SPSS.

According to Kang (2013), "missing data occurs in almost all research" (p. 402) and "are the rule rather than the exception" (Dong & Peng, 2013, p. 1). Collecting the data for this study revealed missing data. Datasets which contain errors, such as not meeting the required participant descriptions, or missing data for some variables but not for others, can cause the results of data analysis to be faulty. Because the analyzed data are descriptive, imputation for missing data is not necessary; data were reported as is

(Allison 2008; Allison 2009; Kang, 2013).

Additionally, there were two participant surveys indicating the participants not to be higher education instructors, but to be high school teachers. Choosing listwise deletion for discarding the two high school teacher surveys was appropriate because the two surveys did not represent a substantial portion of data to the study at an acceptable loss of 1.5625% (Allison 2008; Allison, 2009; Kang, 2013). After exercising listwise deletion, the initial data collection of participant surveys was reduced from $N = 128$ to $N = 126$ with one question Q31 unobserved, finalizing with an acceptable 96.51% useable data (Allison, 2008).

Summary

Chapter 3 presented the research methodology of this study. This study used nonprobability convenience sampling with a quantitative survey exercising a cross-sectional design. The final participant population was $N = 126$ higher education instructors from online communities. The instrument chosen for this study was the Mobile Learning Perception Scale (MLPS), developed by Uzunboylu and Ozdamli (2011), and modified by Roche (2013). Chapter 4 presents the results of the data collected for this study.

Chapter 4: Results

Offered in this chapter are the tables that describe the demographics of the participant group and the perceptions of the participant group regarding mobile learning at the higher education level of learning. Since this study was a replication of the original study, but with a different participant population, the data analysis performed in this study was the same as performed in the original study. The analysis of the data for this study was done descriptively, as was the original study. Descriptive analysis was used to describe essential features of the data that show, or summarize, the data in a meaningful way such that patterns might emerge from the data.

The purpose of this study was to investigate instructor perceptions about mobile learning among instructors in higher education in the areas of influences of mobile technologies over the approaches of teaching and learning, use of mobile learning technologies to develop class instruction, use of mobile learning for professional learning, influences of mobile learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and mobile learning to facilitate teacher-student communications. An additional objective of this study was to add a more current literature source to the existing literature addressing instructor perceptions about mobile learning in higher education.

The data collected through this study was quantitative and from a nonprobability sample (final: $N = 126$) using a cross-sectional design. Gaining all IRB and required permissions, data collection materialized over a period of seven weeks from participants active in relevant online communities. The research questions replicated in this study were:

1. How is the approach to teaching and learning influenced by the adoption of

wireless mobile technologies in school? (Ortiz-Rivera, 2013).

2. How do teacher perceptions of the use of m-learning influence the development of classroom instruction strategies? (Ortiz-Rivera, 2013).

3. How do teachers perceive the use of m-learning tools for professional learning? (Ortiz-Rivera, 2013).

4. What perceptions do the teachers have about the influences of m-learning over the restrictions of time when acquiring knowledge anytime, anywhere? (Ortiz-Rivera, 2013).

5. How do the teachers perceive the use of m-learning tools to facilitate teacher-student communication? (Ortiz-Rivera, 2013).

Data collected and analyzed for this study replicate the tests performed in the original study and are presented together in the tables. Data analysis began with Participant Demographic Information, followed by data analysis for the five research questions replicated from the original study.

Participant Demographic Information

The MLPS had seven demographic questions, A through G, dedicated to collecting participant gender, instructors' highest academic degree/level completed, age group, teaching environment, teaching subject matter, in-service teaching years, and self-assessed educational technology skills. Participant demographic descriptives appear in the tables below.

Gender descriptives. Item B (Your Gender?) collected data for females (n = 66; 52.4%), males (n = 58; 46.0%), no answer (n = 1; 0.8%), and for other (n = 0; 0.0%). Also presented are the data results from the original study in Table 1.

Highest academic degree/level completed descriptives. Regarding Item A

(What is the highest academic degree/level you have completed?), data collected reported for Associate Degree (*n* = 8; 6.3%); Bachelor's Degree (*n* = 21; 16.7%), Ed.D; (*n* = 11; 8.7%); High School Diploma (*n* = 1; 0.8%); Master's Degree (*n* = 34; 27.0%); Other (*n* = 1; 0.8%); Ph.D. (*n* = 29; 23.0%); and for Professional Degree (Graduate Certificate, Ed.S.) (*n* = 21; 16.7%). Presented in Table 2 are the data results from the original study.

Table 1

Frequency of Participant Instructor by Gender

Variable	CS[a]	OS[b]
Gender	*n* (%)	*n* (%)
Female	66 (52.4)	112 (72.7)
Male	58 (46.0)	42 (27.3)
No Answer	1 (0.8)	[c]
Other	0 (0.0)	[c]

[a]Current study. [b]Original study. [c]Not surveyed.

Table 2

Frequency of Highest Academic Degree/Level Completed

Variable	CS[a]	OS[b]
Highest academic degree/level completed	*n* (%)	*n* (%)
Associate's Degree	8 (6.3)	[c]
Bachelor's Degree	21 (16.7)	85 (53.8)
Ed.D.	11 (8.7)	[c]
High School Diploma	1 (0.8)	[c]
Master's Degree	34 (27.0)	56 (35.4)
Other	1 (0.8)	[c]
Ph.D.	29 (23.0)	3 (1.9)
Professional Degree (Graduate Certificate, Ed.S.)	21 (16.7)	14 (8.9)

[a]Current study. [b]Original study. [c]Not surveyed.

Age descriptives. Data collected for Item C (Please indicate your age by selecting one of the following:), reported for age < 25 (*n* = 3; 2.4%); age 26 to 35 (*n* = 13; 10.3%);

age 36 to 45 (*n* = 31; 24.6%); age 46 to 55 (*n* = 41; 32.5%); age 56 to 65 (*n* = 31; 24.6%); and for age > 65 (*n* = 7; 5.6%). Also presented are the data results from the original study as shown in Table 3.

Table 3

Frequency of Age Groups

Variable	CS[a]	OS[b]
Age group	*n* (%)	*n* (%)
< 25	3 (2.4)	1 (0.6)
26 to 35	13 (10.3)	49 (30.8)
36 to 45	31 (24.6)	57 (35.8)
46 to 55	41 (32.5)	35 (22.0)
56 to 65	31 (24.6)	14 (8.8)
> 65	7 (5.6)	3 (1.9)

[a]Current study. [b]Original study.

Teaching environments descriptives. Item D (Which of the following describes your teaching environment?) collected data for Adult Education Center (*n* = 2; 1.6%), Community College (n = 30; 23.8%), NonUniversity 4-Year College (*n* = 1; 0.8%), Other (*n* = 5; 4.0%), Technical College (*n* = 1; 0.8%), University (*n* = 85; 67.5%), and for workplace training (*n* = 2; 1.6%).

Teaching subject matter descriptives. Regarding Item D (What group best describes your teaching subject matter?), data collected reported for Adult Education (*n* = 2; 1.6%), American Sign Language/Interpreter (*n* = 1; 0.8%), Automotive (*n* = 1; 0.8%), Behavioral Sciences (*n* = 6; 4.8%), Business (*n* = 11; 8.7%), Communication Studies (*n* = 1; 0.8%), Computer Sciences (*n* = 10; 7.9%), Construction (*n* = 3; 2.4%), Cultural Education (*n* = 1; 0.8%), Curriculum Studies (*n* = 1; 0.8%), Early Childhood Education (*n* = 2; 1.6%), Education (*n* = 4; 3.2%), Engineering (*n* = 5; 4.0%), English (*n* = 7; 5.6%),

English Second Language (n = 1; 0.8%), Fine Arts (*n* = 1; 0.8%), Health (*n* = 3; 2.4%), Higher Education (*n* = 1; 0.8%), Hospitality (*n* = 1; 0.8%), Humanities (*n* = 3; 2.4%), HVAC (*n* = 2; 1.6%), Instructional/Educational Technology (*n* = 20; 15.9%), Library Science (*n* = 1; 0.8%), Maintenance (*n* = 6; 4.8%), Mathematics (*n* = 2; 1.6%), Medical Assisting (*n* = 1; 0.8%), Natural Sciences (*n* = 6; 4.8%), Other (*n* = 3; 2.4%), Real Estate (*n* = 2; 1.6%), Robotics (*n* = 1; 0.8%), Social Sciences (*n* = 13; 10.3%), Surgical Technology (*n* = 1; 0.8%), Welding (*n* = 2; 1.6%), and for Workplace Learning (*n* = 1; 0.8%). Also presented are the data results from the original study as shown in Table 4.

Table 4

Frequency of Teaching Environments

Variable	CS[a]	OS[b]
Teaching environment	*n* (%)	*n* (%)
Adult Education Center	2 (1.6)	[c]
Community College	30 (23.8)	[c]
Non-University 4-Year College	1 (0.8)	[c]
Other	5 (4.0)	[c]
Technical College	1 (0.8)	[c]
University	85 (67.5)	[c]
Workplace Training	2 (1.6)	[c]
Elementary School	[c]	62 (39.5)
Middle School	[c]	85 (54.1)
High School	[c]	10 (6.4)

[a]Current study. [b]Original study. [c]Not surveyed.

Years in-service teaching descriptives. Data collected for Item E (How many years in-service teaching?), reported for three or fewer years (*n* = 18; 14.3%), for four to nine years (*n* = 33; 26.2%), for 10 to 19 years (*n* = 42; 33.3%), and for 20 or more years (*n* = 31; 24.5%). Also presented are the data results from the original study in Table 5.

Table 5

Frequency of Teaching Subject

Teaching subject matter	CS[a] *n* (%)	OS[b] *n* (%)
Adult Education	2 (1.6)	[c]
American Sign Language/Interpreter	1 (0.8)	[c]
Automotive	1 (0.8)	[c]
Behavioral Sciences	6 (4.8)	[c]
Business	11 (8.7)	[c]
Communication Studies	1 (0.8)	[c]
Computer Sciences	10 (7.9)	[c]
Construction	3 (2.4)	[c]
Cultural Education	1 (0.8)	[c]
Curriculum Studies	1 (0.8)	[c]
Early Childhood Education	2 (1.6)	[c]
Education / General Education[b]	4 (3.2)	34 (21.5)
Engineering	5 (4.0)	[c]
English	7 (5.6)	[c]
English Second Language	1 (0.8)	[c]
Fine Arts	1 (0.8)	[c]
Health	3 (2.4)	[c]
Higher Education	1 (0.8)	[c]
Hospitality	1 (0.8)	[c]
Humanities	3 (2.4)	[c]
HVAC	2 (1.6)	[c]
Instructional/Educational Technology	20 (15.9)	[c]
Library Science	1 (0.8)	[c]
Maintenance	6 (4.8)	[c]
Mathematics	2 (1.6)	21 (13.3)
Medical Assisting	1 (0.8)	[c]
Natural Sciences / Science[b]	6 (4.8)	14 (8.9)
Other	3 (2.4)	[c]
Real Estate	2 (1.6)	[c]
Robotics	1 (0.8)	[c]
Social Sciences	13 (10.3)	[c]
Surgical Technology	1 (0.8)	[c]
Welding	2 (1.6)	[c]
Workplace Learning	1 (0.8)	[c]
Elective Course	[c]	16 (10.1)
Other Academic Subject Areas (English, Language Arts, Social Studies, Reading, ESOL, ESE)	[c]	59 (37.3)
Vocational/Career and Technical Education Course	[c]	14 (8.9)

[a]Current study. [b]Original study. [c]Not surveyed.

Overall educational technology skills by gender descriptives. An analysis was performed to investigate the participants' overall skills in the use of educational technologies by gender. Data analysis reported for advanced educational technology skills for gender of female (*n* = 28; 57.1%), male (*n* = 21; 42.9%), for no answer (*n* = 0; 0.0%), and for other (*n* = 0; 0.0%). Data analysis reported for basic educational technology skills for gender of female (*n* = 4; 28.6%), male (*n* = 9; 64.3%), for no answer (*n* = 1; 7.1%), and for other (*n* = 0; 0.0%). Data analysis reported for below basic educational technology skills for gender of female (*n* = 0; 0.0%), male (*n* = 1; 100.0%), or no answer (*n* = 0; 0.0%), and for other (*n* = 0; 0.0%). Data analysis reported for proficient educational technology skills for gender of female (*n* = 34; 55.7%), male (*n* = 27; 44.3%), for no answer (*n* = 0; 0.0%), and for other (*n* = 0; 0.0%). Also presented are the data results from the original study as shown in Table 6.

Table 6

Frequency of In-Service Years Teaching

Variable	CS[a]	OS[b]
Years in-service teaching	*n* (%)	*n* (%)
3 or fewer years	18 (14.3)	13 (8.1)
4 to 9 years	33 (26.2)	52 (32.5)
10 to 19 years	42 (33.3)	66 (41.3)
20 or more years	31 (24.6)	29 (18.1)

[a]Current study. [b]Original study.

Results for Research Question 1

"How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in school?" (Ortiz-Rivera, 2013). Quantitative data collected for Survey Q8R through Q13 (see Appendix C for survey questions), in section

two of the survey, focused on the influence of mobile technologies over the approaches of teaching and learning. Also presented are the data results from the original study. Mean calculated for comparison of data between the studies as presented in Table 7.

Table 7

Frequency of Overall Educational Technology Skills by Gender

Overall skills by gender	Study	Female	Male	No Answer	Other
		n (%)	*n* (%)	*n* (%)	*n* (%)
Advanced	CS[a]	28 (22.4)	21 (16.8)	0 (0.0)	0 (0.0)
	OS[b]	34 (22.2)	20 (13.0)	[c]	[c]
Basic	CS[a]	4 (3.2)	9 (7.2)	1 (0.8)	0 (0.0)
	OS[b]	77 (50.3)	21 (13.7)	[c]	[c]
Below Basic	CS[a]	0 (0.0)	1 (0.8)	0 (0.0)	0 (0.0)
	OS[b]	0 (0.0)	1 (0.6)	[c]	[c]
Proficient	CS[a]	34 (27.2)	27 (21.6)	0 (0.0)	0 (0.0)
	OS[b]	[c]	[c]	[c]	[c]

[a]Current study. [b]Original study. [c]Not surveyed.

Because Survey Q8 of the MLPS instrument is worded negatively worded, the data for this question were recoded in SPSS and are identified by the addition of R in its identifier. Descriptive results for Q8R, mobile learning techniques do not generate effective learning-teaching environments, inform that participants: strongly agree (*n* = 0; 0.0%), agree (*n* = 12; 9.5%), neutral (*n* = 3; 2.4%), disagree (*n* = 50; 39.7%), strongly disagree (*n* = 46; 36.5%), and for don't know (*n* = 3; 2.4%). Descriptive results for Q9, the teaching-learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with mobile learning technologies, inform that participants: strongly agree (*n* = 14; 11.1%), agree (*n* = 50; 40.5%), neutral (*n* = 44; 34.9%), disagree (*n* = 12; 9.5%), strongly disagree (*n* = 4; 3.2%), and for don't

know (*n* = 1; 0.8%). Descriptive results for Q10, mobile learning technologies provide effective methods for exact transmission of knowledge in learning activities, inform that participants: strongly agree (*n* = 13; 10.3%), agree (*n* = 70; 55.6%), neutral (*n* = 28; 22.2%), disagree (*n* = 2; 7.1%), strongly disagree (*n* = 3; 2.4%), and for don't know (*n* = 3; 2.4%).

Descriptive results for Q11, mobile learning technologies can be used as a supplement in all classes on all subjects, inform that participants: strongly agree (*n* = 39; 31.0%), agree (*n* = 53; 42.1%), neutral (*n* = 12; 9.5%), disagree (*n* = 10; 7.9%), strongly disagree (*n* = 7; 5.6%), and for don't know (*n* = 4; 3.2%). Descriptive results for Q12, utilization of mobile learning technologies increases students' motivation, inform that participants: strongly agree (*n* = 19; 15.1%), agree (*n* = 60; 47.6%), neutral (*n* = 33; 26.2%), disagree (*n* = 9; 7.1%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 5; 4.0%). Descriptive results for Q13, mobile learning techniques are a good method for the necessary interaction in my class, inform that participants: strongly agree (*n* = 16; 12.7%), agree (*n* = 63; 50.0%), neutral (*n* = 25; 19.8%), disagree (*n* = 13; 10.3%), strongly disagree (*n* = 5; 4.0%), and for don't know (*n* = 2; 1.6%).

Results for Research Question 2

"How do teacher perceptions of the use of mobile learning influence the development of classroom instruction strategies?" (Ortiz-Rivera, 2013). Quantitative data collected for Survey Q14 through Q18 (see Appendix C for survey questions), in Section 3 of the survey, focused on the use of mobile learning to develop class instruction. Also presented are the data results from the original study. Mean calculated for comparison of data between the studies is presented in Table 8 as well as comparisons between the current study and the original study concerning mobile learning and techniques as well as

teacher-learning processes.

Table 8

Overall Results for Research Question 1

Research Question 1: How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in school?							
Web-based survey item	Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Q8R[b]	CS[a]	0 (0.0)	12 (9.5)	15 (11.9)	50 (39.7)	46 (36.5)	3 (2.4)
	OS[c]	1 (0.7)	6 (3.9)	21 (13.8)	68 (44.7)	56 (36.8)	[d]
Q9[e]	CS[a]	14 (11.1)	51 (40.5)	44 (34.9)	12 (9.5)	4 (3.2)	1 (0.8)
	OS[c]	14 (9.2)	67 (44.1)	49 (32.2)	20 (13.2)	2 (1.3)	[d]
Q10[f]	CS[a]	13 (10.3)	70 (55.6)	28 (22.2)	2 (7.1)	3 (2.4)	3 (2.4)
	OS[c]	46 (30.5)	87 (57.6)	17 (11.3)	0 (0.0)	1 (0.7)	[d]
Q11[g]	CS[a]	39 (31.0)	53 (42.1)	12 (9.5)	10 (7.9)	7 (5.6)	4 (3.2)
	OS[c]	61 (40.1)	69 (45.4)	15 (9.9)	6 (3.9)	1 (0.7)	[d]
Q12[h]	CS[a]	19 (15.1)	60 (47.6)	33 (26.2)	9 (7.1)	0 (0.0)	5 (4.0)
	OS[c]	65 (43.3)	67 (44.7)	15 (10.0)	1 (0.7)	1 (1.3)	[d]
Q13[i]	CS[a]	16 (12.7)	63 (50.0)	25 (19.8)	13 (10.3)	5 (4.0)	2 (1.6)
	OS[c]	43 (28.3)	75 (49.3)	28 (18.4)	5 (3.3)	1 (0.7)	[d]

[a]Current study. [b]Mobile learning techniques do not generate effective learning-teaching environments. [c]Original study. [d]Not surveyed. [e]The teaching-learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with mobile learning techniques. [f]Mobile learning technologies provide effective methods for exact transmission of knowledge in learning activities. [g]Mobile learning technologies can be used as a supplement in all classes on all subjects. [h]Utilization of mobile learning technologies increases students' motivation. [i]Mobile learning techniques are a good method for the necessary interaction in my class.

Descriptive results for Q14, mobile learning techniques can be used to supplement or in place of the traditional education, inform that participants: strongly agree (*n* = 29; 23.0%), agree (*n* = 63; 50.0%), neutral (*n* = 18; 14.3%), disagree (*n* = 16; 12.7%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 0; 0.0%). Descriptive results for Q15, course materials could be sent to students via text, video or picture messages, inform that participants: strongly agree (*n* = 45; 35.7%), agree (*n* = 70; 55.6%), neutral (*n*

= 5; 4.0%), disagree (*n* = 6; 4.8%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 0; 0.0%). Descriptive results for Q16, mobile learning methods enhance the quality of lessons, inform that participants: strongly agree (*n* = 20; 15.9%), agree (*n* = 60; 47.6%), neutral (*n* = 33; 26.2%), disagree (*n* = 8; 6.3%), strongly disagree (*n* = 2; 1.6%), and for don't know (*n* = 3; 2.4%).

Descriptive results for Q17, most learning activities can be realized by means of mobile learning techniques and strategies, inform that participants: strongly agree (*n* = 24; 19.0%), agree (*n* = 55; 43.7%), neutral (*n* = 26; 20.6%), disagree (*n* = 16; 12.7%), strongly disagree (*n* = 4; 3.2%), and for don't know (*n* = 1; 0.8%). Descriptive results for Q18, I would like to supplement my classes in the future with mobile learning methods, inform that participants: strongly agree (*n* = 35; 27.8%), agree (*n* = 60; 47.6%), neutral (*n* = 23; 18.3%), disagree (*n* = 6; 4.8%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 1; 0.8%).

Results for Research Question 3

"How do teachers perceive the use of mobile learning for professional development?" (Ortiz-Rivera, 2013). Quantitative data collected for survey questions Q19 through Q23 (see Appendix C for survey questions), in section four of the survey, focused on the use of mobile learning for professional development. Mean calculated for comparison of data between the studies are presented in Table 9.

Descriptive results for Q19, mobile learning techniques are convenient to share my specialized knowledge/information with my colleagues, inform that participants: strongly agree (*n* = 31; 24.6%), agree (*n* = 65; 51.6%), neutral (*n* = 19; 15.1%), disagree (*n* = 9; 7.1%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 0; 0.0%). Descriptive results for Q20, mobile learning techniques facilitate teaching the subjects in

my content/grade level, inform that participants: strongly agree (*n* = 21; 16.7%), agree (*n* = 72; 57.1%), neutral (*n* = 21; 16.7%), disagree (*n* = 9; 7.1%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 2; 1.6%).

Table 9

Overall Results for Research Question 2

Research Question 2: How do teacher perceptions of the use of mobile learning influence the development of classroom instruction strategies?							
Web-based survey item	Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Q14[b]	CS[a]	29 (23.0)	63 (50.0)	18 (14.3)	16 (12.7)	0 (0.0)	0 (0.0)
	OS[c]	38 (25.3)	89 (59.3)	16 (10.7)	6 (4.0)	1 (0.7)	[d]
Q15[e]	CS[a]	45 (35.7)	70 (55.6)	5 (4.0)	6 (4.8)	0 (0.0)	0 (0.0)
	OS[c]	47 (31.3)	69 (46.0)	25 (16.7)	9 (6.00	0 (0.0)	[d]
Q16[f]	CS[a]	20 (15.9)	60 (47.6)	33 (26.2)	8 (6.3)	2 (1.6)	3 (2.4)
	OS[c]	27 (17.9)	69 (45.7)	43 (28.5)	11 (7.3)	1 (0.7)	[d]
Q17[g]	CS[a]	24 (19.0)	55 (43.7)	26 (20.6)	16 (12.7)	4 (3.2)	1 (0.8)
	OS[c]	42 (27.8)	84 (55.6)	24 (15.9)	1 (0.7)	0 (0.0)	[d]
Q18[h]	CS[a]	35 (27.8)	60 (47.6)	23 (18.3)	6 (4.8)	1 (0.8)	1 (0.8)
	OS[c]	60 (39.5)	69 (45.4)	19 (12.5)	3 (2.0)	1 (0.7)	[d]

[a]Current study. [b]Mobile learning techniques can be used to supplement or in place of the traditional education. [c]Original study. [d]Not surveyed. [e]Course materials could be sent to students via text, video, or picture messages. [f]Mobile learning methods enhance the quality of lessons. [g]Most learning activities can be realized by means of mobile learning techniques and strategies. [h]I would like to supplement my classes in the future with mobile learning methods.

Descriptive results for Q21, mobile learning techniques provide a convenient environment to hold discussions on my specialized content/classroom, inform that participants: strongly agree (*n* = 24; 19.0%), agree (*n* = 66; 52.4%), neutral (*n* = 16; 12.7%), disagree (*n* = 16; 12.7%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 2; 1.6%). Descriptive results for Q22, mobile learning techniques provide an effective method in learning my specialized content/classroom, inform that participants: strongly agree (*n* = 21; 16.7%), agree (*n* = 60; 47.6%), neutral (*n* = 30; 23.8%), disagree (*n* = 11;

8.7%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 2; 1.6%). Descriptive results for Q23, mobile learning techniques are reliable for personal use of learning, inform that participants: strongly agree (*n* = 32; 25.4%), agree (*n* = 67; 53.2%), neutral (*n* = 18; 14.3%), disagree (*n* = 3; 2.4%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 2; 1.6%) as shown in Table 10.

Table 10

Overall Results for Research Question 3

Research Question 3: How do teachers perceive the use of mobile learning for professional development?							
Web-based survey item	Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Q19[b]	CS[a]	31 (24.6)	65 (51.6)	19 (15.1)	9 (7.1)	1 (0.8)	0 (0.0)
	OS[c]	28 (18.7)	93 (62.0)	28 (18.7)	1 (0.7)	0 (0.0)	[d]
Q20[e]	CS[a]	21 (16.7)	72 (57.1)	21 (16.7)	9 (7.1)	0 (0.0)	2 (1.6)
	OS[c]	29 (19.2)	83 (55.0)	38 (25.2)	1 (0.7)	0 (0.0)	[d]
Q21[f]	CS[a]	24 (19.0)	66 (52.4)	16 (12.7)	16 (12.7)	1 (0.8)	2 (1.6)
	OS[c]	29 (19.3)	88 (58.7)	30 (20.0)	3 (2.0)	0 (0.0)	[d]
Q22[g]	CS[a]	21 (16.7)	60 (47.6)	30 (23.8)	11 (8.7)	0 (0.0)	2 (1.6)
	OS[c]	31 (20.5)	88 (58.3)	31 (20.5)	1 (0.7)	0 (0.0)	[d]
Q23[h]	CS[a]	32 (25.4)	67 (53.2)	18 (14.3)	3 (2.4)	1 (0.8)	2 (1.6)
	OS[c]	[i]	[i]	[i]	[i]	[i]	[d]

[a]Current study. [b]Mobile learning techniques are convenient to share my specialized knowledge/information with my colleagues. [c]Original study. [d]Not surveyed. [e]Mobile learning techniques facilitate teaching the subjects in my content/grade level. [f]Mobile learning techniques provide a convenient environment to hold discussions on my specialized content/classroom. [g]Mobile learning techniques provide an effective method in learning my specialized content/classroom. [h]Mobile learning techniques are reliable for personal use of learning. [i]Unobserved.

Results for Research Question 4

"What perceptions do the teachers have about the influence of mobile learning over the restrictions of time when acquiring knowledge 'anytime, anywhere'?" (Ortiz-Rivera, 2013). Quantitative data collected for survey questions Q24 through Q27 (see

Appendix C for survey questions), in Section 5 of the survey, focused on the influences of mobile learning over the restrictions of time and space when acquiring knowledge "anytime, anywhere. Also presented in Table 11 are the data results from the original study. Mean calculated for comparison of data between the studies.

Table 11

Overall Results for Research Question 4

Research Questions 4: What perceptions do the teachers have about the influence of mobile learning over the restrictions of time when acquiring knowledge 'anytime, anywhere'?							
Web-based survey item	Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Q24[b]	CS[a]	34 (27.0)	68 (54.0)	16 (12.7)	6 (4.8)	1 (0.8)	0 (0.0)
	OS[c]	60 (41.4)	51 (35.2)	25 (19.3)	5 (3.4)	1 (0.7)	[d]
Q25[e]	CS[a]	34 (27.0)	67 (53.2)	12 (9.5)	8 (6.3)	2 (1.6)	1 (0.8)
	OS[c]	72 (49.7)	54 (37.2)	14 (9.7)	5 (3.4)	0 (0.0)	[d]
Q26[f]	CS[a]	47 (37.3)	71 (56.3)	4 (3.2)	2 (1.6)	1 (0.8)	0 (0.0)
	OS[c]	74 (50.7)	61 (41.8)	11 (7.5)	0 (0.0)	0 (0.0)	[d]
Q27[g]	CS[a]	27 (21.4)	57 (45.2)	20 (15.9)	16 (12.7)	3 (2.4)	2 (1.6)
	OS[c]	68 (46.6)	51 (34.9)	23 (15.8)	4 (2.7)	0 (0.0)	[d]

[a]Current study. [b]Mobile learning tools remove the limitation of time and space from traditional resources. [c]Original study. [d]Not surveyed. [e]Programs such as Messenger and Skype which are used through mobile learning tools provide an opportunity for discussions on subjects without the limitations of time and space. [f]Learners can access instructional websites with mobile technologies. [g]An effective learning environment could be produced by sending lecture notes via mobile learning tools such as e-mail.

Descriptive results for Q24, mobile learning tools remove the limitation of time and space from traditional resources, inform that participants: strongly agree (*n* = 34; 27.0%), agree (*n* = 68; 54.0%), neutral (*n* = 16; 12.7%), disagree (*n* = 6; 4.8%), strongly disagree (*n* = 1; 0.8%) and for don't know (*n* = 0; 0.0%). Descriptive results for Q25, programs such as Messenger and Skype which are used through mobile learning tools provide opportunity for discussions on subjects without the limitations of time and space, inform that participants: strongly agree (*n* = 34; 27.0%), agree (*n* = 67; 53.2%), neutral (*n*

= 12; 9.5%), disagree (*n* = 8; 6.3%), strongly disagree (*n* = 2; 1.6%), and for don't know (*n* = 0; 0.0%). Descriptive results for Q26, learners can access instructional websites with mobile technologies, inform that participants: strongly agree (*n* = 47; 37.3%), agree (*n* = 71; 56.3%), neutral (*n* = 4; 3.27%), disagree (*n* = 2; 1.6%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 0; 0.0%). Descriptive results for Q27, an effective learning environment could be produced by sending lecture notes via mobile learning tools such as e-mail, inform that participants: strongly agree (*n* = 27; 21.4%), agree (*n* = 57; 45.2%), neutral (*n* = 20; 15.9%), disagree (*n* = 16; 12.7%), strongly disagree (*n* = 3; 2.4%), and for don't know (*n* = 2; 1.6%).

Results for Research Question 5

"How do the teachers perceive the use of mobile learning tools to facilitate teacher-student communication?" (Ortiz-Rivera, 2013). Quantitative data collected for survey questions Q27 through Q33 (see Appendix C for survey questions), in section six of the survey, focused on mobile learning to facilitate teacher-student communication. Also presented are the data results from the original study. Mean calculated for comparison of data between the studies are presented in Table 12.

Descriptive results for Q28, I can use mobile learning techniques as a good discussion tool with my students in the learning activities, inform that participants: strongly agree (*n* = 29; 23.0%), agree (*n* = 68; 54.0%), neutral (*n* = 17; 13.5%), disagree (*n* = 10; 7.9%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 1; 0.8%). Descriptive results for Q29, teacher-student communication is facilitated by means of mobile learning tools, inform that participants: strongly agree (*n* = 33; 26.2%), agree (*n* = 64; 50.8%), neutral (*n* = 18; 14.3%), disagree (*n* = 7; 5.6%), strongly disagree (*n* = 2; 1.6%), and for don't know (*n* = 2; 1.6%). Descriptive results for Q30, I can have prompt

access to needed materials that are related to my content/grade level by means of mobile technologies, inform that participants: strongly agree (*n* = 40; 31.7%), agree (*n* = 71; 56.3%), neutral (*n* = 9; 7.1%), disagree (*n* = 4; 3.2%), strongly disagree (*n* = 0; 0.0%), and for don't know (*n* = 2; 1.6%).

Table 12

Overall Results for Research Question 5

Research Question 5: How do the teachers perceive the use of mobile learning tools to facilitate teacher-student communication?							
Web-based survey item	Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Q28[b]	CS[a]	29 (23.0)	68 (54.0)	17 (13.5)	10 (7.9)	1 (0.8)	1 (0.8)
	OS[c]	39 (26.4)	87 (58.8)	17 (11.5)	4 (2.7)	1 (0.7)	[d]
Q29[e]	CS[a]	33 (26.2)	64 (50.8)	18 (14.3)	7 (5.6)	2 (1.6)	2 (1.6)
	OS[b]	42 (29.0)	80 (55.2)	19 (13.1)	4 (2.8)	0 (0.0)	[d]
Q30[f]	CS[a]	40 (31.7)	71 (56.3)	9 (7.1)	4 (3.2)	0 (0.0)	2 (1.6)
	OS[b]	53 (35.8)	75 (50.7)	18 (12.2)	2 (1.4)	0 (0.0)	[d]
Q31[g]	CS[a]	[h]	[h]	[h]	[h]	[h]	[h]
	OS[b]	57 (38.5)	69 (46.6)	21 (14.2)	1 (0.7)	0 (0.0)	[d]
Q32[i]	CS[a]	41 (32.5)	67 (53.2)	12 (9.5)	2 (1.6)	1 (0.8)	3 (2.4)
	OS[b]	53 (36.6)	67 (46.2)	22 (15.2)	3 (2.1)	0 (0.0)	[d]
Q33[j]	CS[a]	19 (15.1)	42 (33.3)	40 (31.7)	21 (16.7)	1 (0.8)	3 (2.4)
	OS[b]	32 (21.8)	59 (40.1)	41 (27.9)	14 (9.5)	1 (0.7)	[d]

[a]Current study. [b]I can use mobile learning techniques as a good discussion tool with my students in the learning activities. [c]Original study. [d]Not Surveyed. [e]Teacher-student communication is facilitated by means of mobile learning tools. [f]I can have prompt access to needed materials that are related to my content/grade level by means of mobile technologies. [g]Communication is possible in chat programs by means of mobile technologies. [h]Unobserved. [i]Student-student communication is facilitated by means of mobile learning tools. [j]Students can have more effective communication with mobile technologies than traditional methods.

Descriptive results for Q31, communication is possible in chat programs by means of mobile technologies was unobserved for this study. Descriptive results for Q32, student-student communication is facilitated by means of mobile learning tools, inform that participants: strongly agree (*n* = 41; 32.5%), agree (*n* = 67; 53.2%), neutral (*n* = 12;

9.5%), disagree (*n* = 2; 1.6%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 3; 2.4%). Descriptive results for Q33, students can have more effective communication with mobile technologies than traditional methods, inform that participants: strongly agree (*n* = 19; 15.1%), agree (*n* = 42; 33.3%), neutral (*n* = 40; 31.7%), disagree (*n* = 21; 16.7%), strongly disagree (*n* = 1; 0.8%), and for don't know (*n* = 3; 2.4%).

Summary

Presented in this chapter were tables describing the demographics of the participant group and perceptions by those participants towards mobile learning at the higher education level of learning. Because this study was a replication of the original study, but with a different participant population, the data analysis performed in the original study was replicated in this study. In this chapter, detailed explanations and descriptive analysis of the data collected by the survey for investigating perceptions of higher education instructors with mobile technology influences on teaching and learning, developing class instruction, professional learning, acquiring knowledge without restrictions of time and space, and on teacher-student communications was given. Chapter 5 presents a detailed summary of findings. However, as can be seen by the tables, there is a consensus of agreement between the participants of the original study and this study on perceptions of mobile learning.

Chapter 5: Discussion

Higher education instructors' perceptions about mobile learning were investigated in this cross-sectional study using nonprobability convenience sampling. Data were collected using the MLPS through an online survey site. The purpose of this study was to investigate instructor perceptions about mobile learning among instructors in higher education in the areas of influences of mobile technologies over the approaches of teaching and learning, use of mobile learning technologies to develop class instruction, use of mobile learning for professional learning, influences of mobile learning over the restrictions of time and space when acquiring knowledge anytime, anywhere, and mobile learning to facilitate teacher-student communications. An additional objective of this study was to add a more current literature source to the existing literature addressing instructor perceptions about mobile learning in higher education.

Chapter 4 exhibited higher education instructors' perception about mobile learning. In total, the participant number was $N = 126$ with each answering a 33-item survey. Chapter 5 offers a summary, implications, interpretations of the findings, and recommendations for future research. Additionally, within the sections applicable to this study, comparisons between the current and original studies are presented, because the current study replicated the original study.

Summary, Implications, and Interpretations of Findings

Neither the current study nor the original study made any hypothesis regarding participant demographics and outcomes of the collected data. Chapter 5 presents descriptive summaries of the different variables of the study. The median participant representation based on data collected for the current study has a master's degree, is in the 46 to 55 year age group teaching at a university, has 10-19 in-service years teaching

with proficient educational technology skills if female and basic educational technology skills if male. The median participant representation based on data provided by the original study has a bachelor's degree, is in the 36 to 45 year age group teaching middle school, has 10-19 in-service years teaching with basic educational technology skills if female or male.

Gender. The gender replicated analysis determined the current study had 28 fewer participants than the original study. Female participants represented 52.4% in the current study and 72.7% in the original study. Male participants represented 46.0% in the current study and 27.3% in the original study. No answer, for gender, represented 0.8% in the current study, whereas the original study did not offer this option on gender. The participants in the original study were K-12 instructors. The participants in the current study were higher education instructors. For the current study nor the original study, no hypothesis was made predicting perceptions of mobile learning based on gender, or any other demographic data collected.

Highest degree/level completed. Regarding highest degree/level completed, the most completed degree for the current study is a doctoral degree (31.7%), with a master's degree close behind (27.0%). Whereas for the original study a bachelor's degree (53.8%) is the highest degree/level completed with a master's coming in second (35.4%), and only 1.9% reporting a doctoral degree. Typically, at a minimum, to teach in K12 a bachelor's degree is required and the data in the original study reflects this. Moreover, while, for the original study there were $n = 3$ participants with a doctoral degree, the current study number of doctoral degree participants ($n = 40$) dramatically overshadows the original study number. For higher education, there are many factors, internal and external, which can lead to an academic choosing the highest degree/level to complete for continuing

employment in education.

Age groups. Regarding age groups of the participants in the current and original studies, while the mean of the age group variable for both studies was similar (3.83 and 3.13 respectively), the median and modes were a category apart. For the current study, the median (4.00) and mode (4) for age groups represented 46 to 55 years, whereas for the original study, the median (3.00) and mode (3) represented 36 to 45 years. Overall, most of the participants in the original study were younger than those in the current study.

Teaching environments. The highest reported category for teaching environment in the current study was at the university level (67.5%), whereas middle school (54.1%) was the highest reported level in the original study. The next highest reported teaching environments for the current study were community college (23.8%) and elementary school (39.5%) for the original study. For the current study, five other categories (adult education center, nonuniversity 4-year college, other, technical college, and workplace training) made up 8.8%, and for the original study, the remaining 6.4% represented a high school teaching environment. In K-12, the usual teaching environments are elementary, middle school, and high school, which reflects the data of the original study. However, at the higher education level, there are more options available to learners and instructors than just a university or community college, which reflects the data of the current study.

Teaching subject matter. The overall difference in teaching subject matter between the current study and the original study is, for the current study there were 34 different teaching subject matters compared to only six for the original study. The highest reported teaching subject matter for the current study was Instructional/Educational Technology (15.9%; $n = 20$). Instructional/Educational Technology could have reported the highest data due to the type of online communities involved. However, the second

highest reported data for the current study regarding teaching subject matter were social sciences (10.3%; *n* = 13). Whereas, for the original study, other academic subject areas (English, language arts, social studies, reading, ESOL, and ESE) represented the highest reported teaching subject matter at 37.3% (*n* = 59), with general education (21.5%; *n* = 34) reporting the next highest for the original study. No further analysis was performed to investigate if or how teaching subject matter influenced participants survey choices.

In-service years teaching. Regarding in-service years teaching of the participants in the current and original studies, the mean (2.69), median (3.00), and modes (3) were identical. For the current study and the original study, the median and mode represented 10 to 19 years in-service teaching. No further analysis was performed to investigate if or how in-service years influenced participant survey choices.

Overall educational technology skills by gender. While no hypothesis was made about outcomes by gender, an analysis was performed for educational technology skills by gender as a replication of the original study. For the current and original study, females self-reporting advanced educational technology skills were nearly even; current study 22.4% and original study 22.2%. However, the participant number for the current study was lower than the original study; current study (*n* = 28) and original study (*n* = 34).

For the current study, 16.8% of males self-reported advanced educational technology skills versus 13.0% in the original study. However, the participant number was nearly the same; current study (*n* = 21) and original study (*n* = 20). There were no proficient educational technology skills for the original study. In looking at the current study, 27.2% of females versus 21.6% of males self-reported proficient educational technology skills; females (*n* = 34) and males (*n* = 27).

Regarding the self-reporting of below basic educational technology skills, the findings indicated 0.8% of males in the current study versus 0.6% in the original study; males current study (n = 1) versus original study (n = 1). For the advanced, proficient, and below basic overall educational technology skills, the current and original study were, for the most part, equal. One participant (0.8%) in the current study self-reported basic educational technology skills for no answer on gender.

However, for the basic educational technology skills, the current study had noticeably fewer female participants than the original study; females in the current study was 3.2% (n = 4), and females in the original study was 50.3% (n = 77). Additionally, a lower number of male participants in the current study self-reported basic educational technology skills than the original study; males current study was 7.2% (n = 9) and males original study was 13.7% (n = 21). For the original study, it is not known the level of school these participants taught. The level of teaching could explain the high percentage of participants in the basic category for the original study. The original study involved 62 elementary school teachers (39.5%), 85 middle school teachers (54.1%), and 10 high school teachers (6.4%) (Ortiz-Rivera, 2013).

When discussing skill level of the use of technology, especially when administering a survey in which the participant self-reports, different ideas as to what constitutes advanced, basic, below basic, and proficient skills are possible to happen. Because there was no definition indicating what competent actions indicate a specific skill level, the participants self-reported as to what they believed their educational technology skill level to be. It is somewhat possible participants under or over self-reported their educational technology skills level.

Overall comparison of current and original studies. Before the presentation of

the individual research questions, information regarding the overall mean, median, and mode are offered. Because each survey question beyond demographic survey questions has an individual mean, median, and mode, those scores will be used to provide the overall study comparisons as well as the individual survey question comparisons for summation of the findings as presented in Table 13. Overall, measures of central tendency show that while the mean for the current study is lower than for original study (M = 3.81 and M = 4.09 respectively), the median (4.00) and modes (4) are the same and represent an overall agreement from the participants of each study with the questions presented on the MLPS. As for the recoded question (Q8R), and it being negatively worded, for both studies there is an agreement to disagree with the statement mobile learning techniques do not generate effective learning-teaching environments; current study (M = 1.96, median = 2.00, mode = 2), original study (M = 1.87, median = 2.00, mode = 2).

Table 13

Comparison of Studies Overall Measures of Central Tendency

Study	Mean	Median	Mode
CS[a] (higher education instructors)	3.81	4.00	4
OS[b] (K12 teachers)	4.09	4.00	4

[a]Current study. [b]Original study.

Research Question 1. "How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in the school?" (Ortiz-Rivera, 2013). Data collected from survey questions Q8 through Q13 answered Research Question 1. See Table 14 for overall measures of central tendency for Research Question 1 for the current and original study.

According to Venkatesh et al. (2003), the direct determinant performance

expectancy, of UTAUT, suggests users will gain an advantage if the technology is implemented, and is an active predictor of behavioral intention to use technology. For Research Question 1, current study participants agree mobile learning techniques are a helpful application of learning in higher education. Comparing the current study and the original study, a nearly equal majority of the participants (39.7% and 44.7% respectively) disagree and strongly disagree (36.5% and 36.8% respectively) that mobile learning techniques do not generate effective learning-teaching environments (Q8R) and agree that mobile learning techniques should be used in the teaching-learning process (40.5% and 44.1% respectively). However, many participants reported neutral on using mobile learning techniques for the teaching-learning process (34.9% and 32.2% respectively).

Table 14

Research Question 1 Measures of Central Tendency

Study (Q8:Q13)	Mean	Median	Mode
CS[a] (higher education instructors)	3.57	4.00	4
OS[b] (K12 teachers)	4.03	4.00	4

[a]Current study. [b]Original study.

Additionally, current study and original study participants agree that mobile learning techniques can provide accurate transmission of knowledge in learning activities (55.6% and 57.6% respectively). Moreover, while a large percentage of current and original study participants agree mobile learning techniques can be used to complement in all classes and all subjects (42.1% and 45.4% respectively), many participants strongly agreed with the survey question (31.0% and 40.1% respectively).

The current study and original study participants agree mobile learning techniques increase students' motivation (47.6% and 44.7% respectively), with some participants remaining neutral (current study, 26.2%) and others strongly agreeing with the survey

question (original study, 43.3%). Current and original study participants agree mobile learning methods are necessary for interaction in class (50.0% and 49.9% respectively).

The implication of the findings for Research Question 1 for the current study is as Peters (2007) stated, mobile devices provide an advantage as a "great motivational tool" (p. 11) for students. Also, because students already have mobile devices at their disposal, teachers feel it useful if used for learning (Dobbins & Denton, 2017). Additionally, teachers agree advantages are gained through breaking down course elements into small packages based on mobile technology so that students can access learning activities wherever they are thereby enabling situated learning, group learning, and group interaction (Peters, 2007) thereby complimenting the traditional portions of the classes.

Research Question 2. "How do teacher perceptions of the use of mobile learning influence the development of classroom instruction strategies?" (Ortiz-Rivera, 2013). Data collected from survey questions Q14 through Q18 answered research question two. See Table 15 for overall measures of central tendency for Research Question 2 for the current and original study.

Table 15

Research Question 2 Measures of Central Tendency

Study (Q14:Q18)	Mean	Median	Mode
CS[a] (higher education instructors)	3.84	4.00	4
OS[b] (K12 teachers)	4.03	4.00	4

[a]Current study. [b]Original study.

The direct determinant effort expectancy, of UTAUT, suggests users acknowledge ease connected with the technology, although it may become nonsignificant over sustained technology usage (Venkatesh et al., 2013). For Research Question 2, current study participants further agree mobile learning techniques apply to developing

classroom instruction strategies in higher education. Comparing the current study and original study, a majority of the participants agree that mobile learning techniques can be used to supplement or substitute traditional education (50.0% and 59.3% respectively), to send students course materials through text, video, or picture messages (55.6% and 46.0% respectively), enhance the quality of lessons (47.6% and 45.7% respectively), and can be used for most learning activities (43.7% and 55.6% respectively). While current and original participants agree in supplementing classes with mobile learning methods (47.6% and 45.4% respectively), 27.8% of current study participants and 39.5% of original study participants strongly agree in wanting to supplement classes with mobile learning methods.

The implications of the findings for Research Question 2 for the current study is as Hur, Shen, Kale, and Cullen (2015) reported, teachers find the integration of mobile devices into teaching to be beneficial towards multiple methods to engage in course materials. However, for the implementation of mobile learning to be effective, “it is essential to (re)design teaching and learning activities to optimize mobile learning environments and exploit the unique affordances mobile learning provides” (Brown & Mbati, 2015, p. 118). Any time something established is in need of a design overhaul, expending some level of effort is expected. For an inexperienced instructor, the effort expended may be too immense for any advantage to be seen in the finished product by that instructor. Therefore, for the institution, this may mean affording the instructors professional development and continuing support to aid in helping the instructors (re)design teaching and learning activities. Additionally, institutions should realize extra time is needed to integrate mobile learning techniques into the curriculum and the added workload pressure that follows in initiating changes to be successful with the integration

(Handal et al., 2013b).

Research Question 3. "How do teachers perceive the use of mobile learning tools for professional learning?" (Ortiz-Rivera, 2013). Data collected from Survey Q19 through Q23 answered Research Question 3. See Table 16 for overall measures of central tendency for Research Question 3 for the current and original study.

Table 16

Research Question 3 Measures of Central Tendency

Study (Q19:Q23)	Mean	Median	Mode
CS[a] (higher education instructors)	3.82	4.00	4
OS[b] (K12 teachers)	3.97	4.00	4

[a]Current study. [b]Original study.

According to Venkatesh et al. (2003), the direct determinant facilitating conditions of UTAUT is the belief by the individual that organizational support and technical infrastructure exists in sustaining the use of a system. For Research Question 3, current study participants agreed professional development, through the use of mobile learning tools, is possible in higher education. Moreover, the participants find the use of mobile learning techniques for participating in professional development reliable. Comparing the current study and the original study, the majority of the participants agree that mobile learning techniques used with professional development activities are a convenient way to share specialized knowledge and information with colleagues (51.6% and 62.0% respectively), facilitate teaching content in applicable subjects and grade level (57.1% and 55.0% respectively), provides convenient environments for discussions on applicable specialized content and classrooms (52.4% and 58.7% respectively), provide useful methods in learning applicable specialized content and classrooms (47.6% and 58.3% respectively), and are reliable for personal use of learning (53.2% and N/A

respectively).

Keskin and Kuzu (2015) reported that academics found the use of a mobile learning system to be beneficial in providing independence of time and space when used for professional development purposes. However, Handal et al. (2103b) found “evidence that there are few formal opportunities provided to academics to learn about mobile learning: (p. 362). Additionally, Power et al. (2016) stated new instructional technologies and pedagogical strategies are adopted based on a teacher’s ability and confidence in using the strategy. Likewise, Hur et al. (2015) stated, “Teachers are more likely to adopt mobile devices when they perceive their educational benefits and feel confident in their use of technology in the classroom” (p. 11). The implications of these findings for Research Question 3 for the current study suggest, by the institution providing professional development to instructors through mobile learning techniques an instructor’s ability in using mobile learning techniques could increase thereby building confidence in using the techniques in the classroom. Using mobile learning techniques through professional development gives a first-hand example of how instructors can use those techniques in the classroom either for complementing or in place of traditional education.

Research Question 4. “What perceptions do the teachers have about the influences of mobile learning over the restriction of time when acquiring knowledge ‘anytime, anywhere’?” (Ortiz-Rivera, 2013). Data collected from Survey Q24 through Q27 answered Research Question 4. See Table 17 for overall measures of central tendency for Research Question 4 for the current and original study.

The performance expectancy direct determinant of UTAUT suggests users will gain an advantage if the technology is implemented and is a robust predictor of

behavioral intention to use technology (Venkatesh et al., 2003). For Research Question 4, current study participants agree mobile learning tools allow interaction with instructors and learning materials anytime and anywhere in higher education. Comparing the current study with the original study, many of the participants agree that mobile learning tools remove limitations of time and space from traditional resources (54.0% and 41.4% respectively).

Table 17

Research Question 4 Measures of Central Tendency

Study (Q24:Q27)	Mean	Median	Mode
CS[a] (higher education instructors)	3.99	4.00	4
OS[b] (K12 teachers)	4.29	4.00	5

[a]Current study. [b]Original study.

Further, while current study participants (53.2%) agreed using programs such as messenger and Skype provided opportunities for discussions without the limitations of time and space, original study participants (49.7%) strongly agreed with the survey statement. For the survey question mobile learning tools allow learners to access instructional websites, 56.3% of current study participants agreed (37.3% strongly agreed), while 50.7% of original study participants strongly agreed (41.8% agreed). Additionally, 45.2% of current study participants agreed with mobile learning tools creating productive learning environments by sending lecture notes through e-mail, 46.6% of original study participants strongly agreed.

Handal et al. (2013b) stated, “Mobile learning tools are effective to promote autonomous learning and generate more course engagement due to their anywhere, anytime capabilities promoting collaboration beyond the physical campus” (p. 363). While Handal et al. (2013b) stated, in using mobile learning tools for more interactivity

with students, “perhaps [instructors] feel threatened that students demand a quick turnaround to emails” (p. 362) outside of office hours when students are likely to have questions regarding coursework. Lauricella and Kay (2013) stated, mobile devices “allow [students] to get in touch with [instructors] right away” (p. 13) for answers to questions that may come from working through course materials outside the classroom. Further stating, “students used text messaging with instructors to communicate quickly about a particular issue and to receive administrative reminders” (Lauricella & Kay, 2013, p. 14) regarding course activities. The implication of the findings for Research Question 4 for the current study is that while instructors welcome learning anytime, anywhere, they may also feel that they are truly not working and may suppose compensation is in due order. One solution, as offered by Peters (2007), is flexibility in the instructor’s course load, or schedule and, alternatively, as “mobile learning allows for higher quotas” (p. 14) for courses which are strictly distance learning, perhaps instructor’s pay could be restructured.

Research Question 5. “How do the teachers perceive the use of mobile learning tools to facilitate teacher-student communication?” (Ortiz-Rivera, 2013). Data collected from Survey Q28 through Q33 answered Research Question 5. See Table 18 for overall measures of central tendency for Research Question 5 for the current and original study.

Table 18

Research Question 5 Measures of Central Tendency

Study (Q28:Q33)	Mean	Median	Mode
CS[a] (higher education instructors)	3.87	4.00	4
OS[b] (K12 teachers)	4.15	4.00	4

[a]Current study. [b]Original study.

According to Venkatesh et al. (2003), the direct determinant social influence of

UTAUT is the belief a person perceives others believe the technology should be used and expects others should also use the technology. For Research Question 5, current study participants agree mobile learning techniques should be used to facilitate interaction between student and instructor in higher education. Comparing the current study with the original study, the majority of the participants agree that mobile learning techniques are an excellent tool to hold discussion with students in learning activities (54.0% and 58.8% respectively), facilitate teacher-student communications (50.8% and 55.2% respectively), provide prompt access to needed materials (56.3% and 50.7% respectively), and makes possible communication by way of chat programs (N/A and 46.6% respectively).

Johnson et al. (2011) stated, “Mobile devices afford students the flexibility to work outside the classroom while encouraging student collaboration” (p. 15). However, the participants of the current study and the original study only moderately believe mobile learning techniques provide students a more effective communication method than traditional methods of communication (33.3% and 40.1% respectively).

The implication of the findings for Research Question 5 for the current study is acknowledging awareness of the reliance students have on mobile technology and using that reliance in such a way as to engage students in taking greater responsibility for their learning by incorporating mobile learning techniques into the classroom and curriculum. It is evident, daily, the extent to which students engage with technology. In 2007, Peters stated, “The digital age has created a new relationship between teachers and learners and younger learners are comfortable with the thought of using mobile [devices] for learning” (p. 5). Further stating, students are already using laptops and ready to access learning objects through SMS.

Moreover, resourceful teachers are already incorporating SMS and text for

communicating with students (Peters, 2007). Gikas (2011) added, “Mobile devices allow instructors to incorporate strategies that are effective for interaction” (p. 90) between teacher and student. A sense of connectivity and interactivity (Cochrane & Bateman, 2010) can develop through actions such as “recording video, using text messages to communicate with classmates and the instructor, taking pictures, as well as accessing course content (Gikas, 2011, p. 90). Additionally, as suggested by Gikas (2011), find applicable ways through course design with mobile learning techniques to engage with students for discussions of course content.

Limitations of the Study

Inherent to this study is that this is the first applied dissertation research performed by the researcher. For example, Survey Q31 was unobserved for this study; it was overlooked. However, given the participants’ responses to the remaining survey questions, the unobserved survey question only represented 3.03% to the current study. This is an acceptable percentage of missing data, according to Allison (2008), Allison (2009), and Kang (2013).

Another limitation of this research is that the participants were genuinely anonymous and from online communities. In other words, demographic data were at the mercy of the participant. There was no way for the researcher to know, without a doubt, the data collected for the demographic portion of the survey were 100% accurate.

Further, another inherent limitation of this study was the cross-sectional design. According to Levin (2006), “Nonresponse is a common problem in wide-scale surveys” (p. 24). Additionally, this study utilized a Likert-type scale through a questionnaire. According to Cohen, Manion, and Morrison (2007), this prompts the participant to choose the option that appears consistent with society’s opinion or an ideal acceptance

rather than allowing the participant to express his or her own opinion. Moreover, Likert-type scales may not echo the subjectivity of an individual's belief and, therefore, do not offer the participant the possibility of expressing explanations for a choice to a survey question.

It was possible, with the lack of technology literacy and if professional opportunities have been made available by the educational institution, to address these limitations in the past. Further, lack of technology literacy would limit the imagination of the participant in how mobile learning technologies can influence the learning environment. An additional limitation worth mentioning is, given that instructors do more than merely facilitate a group of students, instructor obligations to the workplace and families, that this survey may seem frivolous and therefore not significant enough in which to participate because participation is strictly voluntary and anonymous. As an anonymous survey, the data collected are at the mercy of the truthfulness of the participants. Further, by presenting this survey in online communities, there is no obligation of truth by any participant while performing the required actions of the study. The researcher can only take the collected data at face value because there is no way to verify the participants.

Another limitation inherent of this study is the MLPS instrument. The MLPS, developed in 2011, appears outdated in terms compared to the terms used presently in education regarding mobile learning. According to Creswell (2015), "with knowledge expanding in educational research, instruments over 5 years old might be outdated" (p. 157). Also, even though participants were provided with specific definitions to apply to their participation in the survey, it is not definite if the participants only referred to those definitions provided. Because there is no single accepted definition of mobile learning in

education, the participants could apply their preconceived knowledge-based exclusively on their understanding of applicable terms.

Further, a source is not needed to validate a statement regarding the rapid growth of technology. The swiftness at which technology advances can be affirmed by merely taking a look around inside any technology store or browsing through technology websites. Laptops and tablets are available in many sizes and with varying processor speeds. The iPad is now available in three sizes: mini, standard, and pro. Additionally, cell phones have morphed into smartphones that are available in a vast and assorted, if not impossible to fully list, selection of features and capabilities. Given that there is no one single device that can be considered only applicable to mobile learning, the participants could apply their preconceived knowledge base exclusively on their understanding of and preferences of mobile devices.

Recommendations for Further Research

After reviewing the literature, collecting and analyzing the data, and the implication of the findings, several recommendations became apparent for further research. First recommendation: a mixed methods research design should be applied along with the MLPS to evaluate further quantitative data collected by the instrument. In the current study, Don’t Know was selected a total of 45 times by participants. The researcher questioned why the participants responded with not knowing. Many assumptions could be listed here as to why. However, a mixed methods study might reveal why.

Second recommendation: a mixed methods study focused on the teaching subject matter. Of importance is how or if teaching subject matter drives the responses of the participants. Of interest in the current study are the responses from 18 participants that

represented Career and Technical Education (CTE) based on the teaching subject matter selected; the researcher of the current study, having spent over 20 years in the CTE field, feels confident in making this statement. Many of the responses from these participants were Neutral, Disagree, and Strongly Disagree. Qualitative information through a mixed methods study could give an insight into particular circumstances that may plague CTE fields when considering mobile learning techniques.

Third recommendation: according to Venkatesh et al. (2003), there are four key moderators (gender, age, experience, voluntariness of use) that act upon the four direct determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions) of the UTAUT. Replication of the current research with particular emphasis on the four key moderators is endorsed. Of interest would be how these key moderators influence the responses of the participants to gain a deeper understanding of these variables as applied to mobile learning techniques.

Summary

The purpose of this quantitative cross-sectional study was to investigate instructor perceptions in higher education about mobile learning. Five areas were of particular interest: influences of mobile learning technologies over the approaches of teaching and learning, developing class instruction, participating in professional learning, on the restrictions of time and space when acquiring knowledge anytime, anywhere, and facilitating teacher-student communications. Further, an additional objective was to add a more current literature source to the existing literature concerning instructor perceptions about mobile learning in higher education.

The current study is a replication of the original study conducted in 2013. The overall result of the original study revealed the group of K-12 participants agreed with the

survey statements (Q8 recoded) presented to them through the MLPS survey. Five years later, in 2018, the overall result of the current study revealed the participant group of higher education instructors also agreed with the survey statements (again, Q8 recoded).

Specifically, both the current and original study participant groups agree the adoption of mobile learning techniques influences the approaches to teaching and learning and the development of classroom instruction strategies. Additionally, both the current and the original study participant groups agree mobile learning techniques are useful for professional learning by the instructors. Further, both the current and the original study participant groups agree the restriction of time when acquiring knowledge anytime, anywhere and facilitating teacher-student communications are also influenced by the adoption of mobile learning techniques. Finally, both the current and the original study participant groups disagree mobile learning techniques do not engender effectual learning-teaching environments.

Conclusion

According to Traxler (2007), different stakeholders, and other factors in the process of conceptualizing mobile education remain unclear because it is still emerging. Further, mobile learning, “however innovative, technically feasible, and pedagogically sound, may have no chance of sustained, wide-scale institutional deployment in higher education in the foreseeable future, at a distance or on-site” (Traxler, 2007, p. 9). Then, in 2010, Traxler stated mobile learning is still fairly young, despite research and attempts of trying to define mobile learning for nearly two decades. Given the ongoing debates as to what mobile learning is and how to best define it, legitimization through terminology remains unclear still. The last two decades of technological advancements have caused changes in teaching and learning dynamics (Henderson & Chapman, 2012; Wakefield &

Smith, 2012). As Kaki and Yunus (2015) reiterated, "[educational technology] is always changing because both education and technology are evolving and . . . can be seen clearly through the brief history of changes in educational technology that has led to mobile learning" (p. 11).

The popularity and support of mobile devices within student populations give cause to call on researchers to begin further investigations of how mobile learning can best aid the teaching and learning environment. Therefore, it is "foolish for educational institutions to ignore [students and mobile devices] in the learning environment" (Lauricella & Kay, 2013, p. 2). However, adoption of technology should not solely rest in what type of technology is being considered. "Technology should support individual choices about access to materials and expertise, amount and type of educational content, and methods of teaching" (Johnson et al., 2012, p. 9). Social, cultural, and organizational factors also impact considerations in addition to the perceptions of the instructors within the various disciplines of educational institutions.

As seen from the literature, a wide range of theories, concepts, designs, experiments, and evaluations have reported inconclusive results about higher education instructor perceptions of mobile learning. As Handal et al. (2013b) suggested, there are several factors "that are not allowing academics to effectively adopt mobile learning devices in their instruction" (p. 363) with professional development being heavily requested by academics to eliminate the negative factors. Even so, "mobile technologies are widely employed in distance learning in higher education to provide students with an opportunity to learn regardless of time and place" (Ahrens & Zaščerinska, 2015).

"Many features motivate learners and educators to use mobile [learning techniques], especially due to the mobility and accessibility of the devices which promote

autonomous learning" (Zaki & Yunus, 2015, p. 16). Therefore, "there is a need to prepare and support [instructors] to meet the pedagogical and technological development requirements of their target audience most effectively and efficiently" (Dabbagh & Fake, 2017, p. 393).

"Technology will never replace great teachers, but technology in the hands of great teachers is transformational." – George Couros

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Appendix A

Unified Theory of Acceptance and Use of Technology

Unified Theory of Acceptance and Use of Technology

Unified Theory of Acceptance and Use of Technology Model						
Direct Determinant	Gender	Age	Experience	Voluntariness of Use	Applicable Models	Constructs from Models
	Key Moderators					
Performance Expectancy	X	X			TAM[a]	Perceived Usefulness
					C-TAM-TPB[b]	
					MPCU[c]	Job-fit
					MM[d]	Extrinsic Motivation
					SCT[e]	Outcome Expectations
					IDT[f]	Relative Advantage
Effort Expectancy	X	X	X		TAM[a]	Perceived Usefulness
					MPCU[c]	Complexity
					IDT[f]	Ease of Use
Social Influence	X	X	X	X	TRA[g]	Subjective Norm
					TAM[a]	
					TPB[h]	
					C-TAM-TPB[b]	
					MPCU[c]	Social Factors
					IDT[f]	Image
Facilitating Conditions		X	X		TPB[h]	Perceived Behavioral Control
					C-TAM-TPB[b]	
					MPCU[c]	Facilitating Conditions
					IDT[f]	Compatibility

[a]Technology Acceptance Model (TAM). [b]Combined TAM and TPB (C-TAM-TPB). [c]Model of PC Utilization (MPCU). [d]Motivational Model (MM). [e]Social Cognitive Theory (SCT). [f]Innovation Diffusion Theory (IDT). [g]Theory of Reasoned Action TRA). [h]Theory of Planned Behavior (TPB).

Appendix B

Comparison of Original and Modified Survey Statements in the MLPS

Comparison of Original and Modified Survey Statements in the MLPS

Comparison of Original and Modified Survey Statements in the MLPS		
Item	Original Survey Statement	Modified Survey Statement (Roche, 2013)
Q8	M-learning applications do not generate effective learning-teaching environments	M-learning techniques do not generate effective learning-teaching environments
Q9	Teaching-Learning process should be performed with any M-learning technologies	The Teaching-Learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with M-learning technologies.
Q10	M-learning technologies is an effective method in exact transmission of knowledge in learning activities	M-learning technologies provide effective methods for exact transmission of knowledge in learning activities
Q11	(NM) M-learning technologies can be used as a supplement in all classes on all subjects	
Q12	(NM) Utilization of M-learning technologies increases students' motivation	
Q13	M-learning applications is a good method for the interaction, which is necessary in my class	M-learning techniques are a good method for the necessary interaction in my class
Q14	M-learning applications can be used to supplement or in place of the traditional education	M-learning techniques can be used to supplement or in place of the traditional education
Q15	Course materials could be sent to students via MMS messages	Course materials could be sent to students via text, video or picture messages
Q16	M-learning methods increase the quality of lessons	M-learning methods enhance the quality of lessons
Q17	Learning activities can be realized by means of M-learning applications in e-learning	Most learning activities can be realized by means of M-learning techniques and strategies
Q18	(NM) I would like to supplement my classes in the future with M-learning methods	
Q19	M-learning applications are convenient to share my specialized knowledge with my colleagues	M-learning techniques are convenient to share my specialized knowledge/information with my colleagues
Q20	M-learning applications facilitate teaching the subjects in my branch	M-learning techniques facilitate teaching the subjects in my content/grade level
Q21	M-learning applications provides a convenient environment to do discussions on my specialized subject	M-learning techniques provide a convenient environment to hold discussions on my specialized

		content/classroom
Q22	M-learning applications provide an effective method in learning my specialized subject	M-learning techniques provide an effective method in learning my specialized content/classroom
Q23	M-learning techniques are reliable for personal use	M-learning techniques are reliable for personal use of learning
Q24	M-learning tools remove the limitation of time and space	M-learning tools remove the limitation of time and space from traditional resources
Q25	(NM) Programs such as Messenger and Skype which are used through M-learning tools provide opportunity for discussions on subjects without the limitations of time and space	
Q26	(NM) Learners can access instructional websites with mobile technologies	
Q27	(NM) An effective learning environment could be produced by sending lecture notes via M-learning tools such as e-mail	
Q28	I can use M-learning applications as a good discussion tool with my students in the learning activities	I can use M-learning techniques as a good discussion tool with my students in the learning activities
Q29	(NM) Teacher-student communication is facilitated by means of M-learning tools	
Q30	I can have a prompt access to materials that I need which is related to my branch by means of mobile technologies	I can have prompt access to needed materials that are related to my content/grade level by means of mobile technologies
Q31	(NM) Communication is possible in chat programs by means of mobile technologies	
Q32	(NM) Student-student communication is facilitated by means of M-learning tools	
Q33	(NM) Students can have more effective communication with mobile technologies than traditional methods	

Note: (NM) – no modifications

Appendix C

Mobile Learning Perception Scale With Modifications and Demographics

Mobile Learning Perception Scale With Modifications and Demographics

Item Number	**Mobile Learning Perception Scale**				
	Section One – Demographics (7 items)				
A	What is the highest academic degree/level you have completed?				
	□ Associate Degree	□ Bachelor's Degree	□ Master's Degree	□ Professional Degree (Graduate Certificate, Ed.S.)	□ Other
B	Your gender?				
	□ Female	□ Male	□ Other	□ No Answer	
C	Please indicate your age by selecting one of the following:				
	□ < 25	□ 26 to 35	□ 36 to 45	□ 46 to 55	□ 56 to 65	□ > 65
D	What group best describes your teaching subject matter?				
	□ American Sign Language/Interpreter		□ Architecture		
	□ Automotive		□ Behavioral Sciences		
	□ Business		□ Computer Sciences		
	□ Construction		□ Culinary		
	□ Drafting		□ Early Childhood Education		
	□ English		□ Engineering		
	□ Fine Arts		□ Funeral Service Education		
	□ Golf/Turf Management		□ Health		
	□ History		□ Horticulture		
	□ Hospitality		□ Humanities		
	□ HVAC		□ Literature		
	□ Maintenance		□ Mathematics		
	□ Natural Sciences		□ Nursing		
	□ Office Administration		□ Paralegal		
	□ Physical Education		□ Physical Therapy		
	□ Social Sciences		□ Welding		
	□ Other				
E	How many years in-service teaching?				
	□ 3 or fewer years	□ 4 to 9 years	□ 10 to 19 years	□ 20 or more years	
F	Which of the following describes your teaching environment?				
	□ Community College	□ University	□ Other		
G	Rate your overall skills in using educational technologies:				
	□ Below Basic	□ Basic	□ Proficient	□ Advanced	
	Mobile Learning or m-learning – using mobile technology which allows access to learning materials anywhere and at any time which results in				

	learners having control over the location and time learning takes place (Lan & Sie, 2010; Pisey, Ramteke, & Burghate, 2012). **Mobile Learning Devices** – mobile phones, iPod, iPad, smartphones, palmtops, handheld computers (PDA's), tablet PC's, laptop computers, personal media players (Kadirie, 2009; Kukulksa-Hulme, 2005). **Mobile Wireless Technologies** – "any wireless technology that uses a radio frequency spectrum in any band to facilitate transmission of text data, voice, video, or multimedia services to mobile devices with freedom of time and location limitation" (Al-Fahad, 2009, p. 2).
	Section Two – Influences of Mobile Technologies Over the Approaches of Teaching and Learning (6 items)
RQ1	"How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in the school?" (Ortiz-Rivera, 2013)
Q8	Mobile learning techniques do not generate effective learning-teaching environments.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
Q9	The teaching-learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with mobile learning technologies.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
Q10	Mobile learning technologies provide effective methods for exact transmission of knowledge in learning activities.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
Q11	Mobile learning technologies can be used as a supplement in all classes on all subjects.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
Q12	Utilization of mobile learning technologies increases students' motivation.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
Q13	Mobile learning techniques are a good method for the necessary interaction in my class.
	□ Strongly Agree | □ Agree | □ Neutral | □ Disagree | □ Strongly Disagree | □ Don't Know
	Section Three – Use of Mobile Learning Technologies to Develop Class Instruction (5 items)
RQ2	"How do teacher perceptions of the use of mobile learning influence the

	development of classroom instruction strategies?" (Ortiz-Rivera, 2013).					
Q14	Mobile learning techniques can be used to supplement or in place of the traditional education.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q15	Course materials could be sent to students via text, video or picture messages.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q16	Mobile learning methods enhance the quality of lessons.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q17	Most learning activities can be realized by means of mobile learning techniques and strategies.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q18	I would like to supplement my classes in the future with mobile learning methods.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
	Section Four – Use of M-Learning for Professional Learning (5 items)					
RQ3	"How do teachers perceive the use of mobile learning tools for professional learning?" (Ortiz-Rivera, 2013).					
Q19	Mobile learning techniques are convenient to share my specialized knowledge/information with my colleagues.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q20	Mobile learning techniques facilitate teaching the subjects in my content/grade level.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q21	Mobile learning techniques provide a convenient environment to hold discussions on my specialized content/classroom.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q22	Mobile learning techniques provide an effective method in learning my specialized content/classroom.					
	□	□ Agree	□ Neutral	□	□	□ Don't

	Strongly Agree			Disagree	Strongly Disagree	Know
Q23	Mobile learning techniques are reliable for personal use of learning.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
	Section Five – Influences of Mobile Learning Over the Restrictions of Time and Space When Acquiring Knowledge "Anytime, Anywhere" (4 items)					
RQ4	"What perceptions do the teachers have about the influences of mobile learning over the restriction of time when acquiring knowledge 'anytime, anywhere'?" (Ortiz-Rivera, 2013).					
Q24	Mobile learning tools remove the limitation of time and space from traditional resources.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q25	Programs such as Messenger and Skype which are used through mobile learning tools provide opportunity for discussions on subjects without the limitations of time and space.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q26	Learners can access instructional websites with mobile technologies.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q27	An effective learning environment could be produced by sending lecture notes via mobile learning tools such as e-mail.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
	Section Six – Mobile Learning to Facilitate Teacher-Student Communication (6 items)					
RQ5	"How do the teachers perceive the use of mobile learning tools to facilitate teacher-student communication?" (Ortiz-Rivera, 2013).					
Q28	I can use mobile learning techniques as a good discussion tool with my students in the learning activities.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q29	Teacher-student communication is facilitated by means of mobile learning tools.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know

Q30	I can have prompt access to needed materials that are related to my content/grade level by means of mobile technologies.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q31	Communication is possible in chat programs by means of mobile technologies.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q32	Student-student communication is facilitated by means of mobile learning tools.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know
Q33	Students can have more effective communication with mobile technologies than traditional methods.					
	□ Strongly Agree	□ Agree	□ Neutral	□ Disagree	□ Strongly Disagree	□ Don't Know

Appendix D

MLPS Three Factors and Corresponding Survey Questions

MLPS Three Factors and Corresponding Survey Questions

MLPS Three Factors and Corresponding Survey Statements	
Factor 1: Aim-Mobile Technologies Fit (A-MTF); α = 0.894; half-split reliability = 0.881	
Q8	M-learning techniques do not generate effective learning-teaching environments
Q10	M-learning technologies provide effective methods for exact transmission of knowledge in learning activities
Q11	M-learning technologies can be used as a supplement in all classes on all subjects
Q12	Utilization of M-learning technologies increases students' motivation
Q16	M-learning methods enhance the quality of lessons
Q24	M-learning tools remove the limitation of time and space from traditional resources
Q25	Programs such as Messenger and Skype which are used through M-learning tools provide opportunity for discussions on subjects without the limitations of time and space
Q27	An effective learning environment could be produced by sending lecture notes via M-learning tools such as e-mail
Factor 2: Appropriateness of Branch (AB); α = 0.940; half-split reliability = 0.915	
Q13	M-learning techniques are a good method for the necessary interaction in my class
Q18	I would like to supplement my classes in the future with M-learning methods
Q19	M-learning techniques are convenient to share my specialized knowledge/information with my colleagues
Q20	M-learning techniques facilitate teaching the subjects in my content/grade level
Q21	M-learning techniques provide a convenient environment to hold discussions on my specialized content/classroom
Q22	M-learning techniques provide an effective method in learning my specialized content/classroom
Q23	M-learning techniques are reliable for personal use of learning
Q28	I can use M-learning techniques as a good discussion tool with my students in the learning activities
Q30	I can have prompt access to needed materials that are related to my content/grade level by means of mobile technologies
Factor 3: Forms of M-learning Application & Tools Sufficient Adequacy of Communication (FMA & TSAC) α = 0.944; half-split reliability = 0.942	
Q9	The Teaching-Learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with M-learning technologies
Q14	M-learning techniques can be used to supplement or in place of the traditional education
Q15	Course materials could be sent to students via text, video or picture messages
Q17	Most learning activities can be realized by means of M-learning techniques and strategies
Q26	Learners can access instructional websites with mobile technologies
Q29	Teacher-student communication is facilitated by means of M-learning tools
Q31	Communication is possible in chat programs by means of mobile technologies
Q32	Student-student communication is facilitated by means of M-learning tools
Q33	Students can have more effective communication with mobile technologies than traditional methods

Appendix E

Instrument/Research Questions Matrix

Instrument/Research Questions Matrix

Instrument/Research Questions Matrix	
Question One	**Survey Statements Q8 to Q13**
How is the approach to teaching and learning influenced by the adoption of wireless mobile technologies in the school? (Ortiz-Rivera, 2013).	M-learning techniques do not generate effective learning-teaching environments
	The Teaching-Learning process (planned interaction that promotes behavioral change that is not a result of coincidence) should be performed with M-learning technologies
	M-learning technologies provide effective methods for exact transmission of knowledge in learning activities
	M-learning technologies can be used as a supplement in all classes on all subjects
	Utilization of M-learning technologies increases students' motivation
	M-learning techniques are a good method for the necessary interaction in my class
Question Two	**Survey Statements Q14 to Q18**
How do teacher perceptions of the use of m-learning influence the development of classroom instruction strategies? (Ortiz-Rivera, 2013).	M-learning techniques can be used to supplement or in place of the traditional education
	Course materials could be sent to students via text, video or picture messages
	M-learning methods enhance the quality of lessons
	Most learning activities can be realized by means of M-learning techniques and strategies
	I would like to supplement my classes in the future with M-learning methods
Question Three	**Survey Statements Q19 to Q23**
How do teachers perceive the use of m-learning tools for professional learning? (Ortiz-Rivera, 2013).	M-learning techniques are convenient to share my specialized knowledge/information with my colleagues
	M-learning techniques facilitate teaching the subjects in my content/grade level
	M-learning techniques provide a convenient environment to hold discussions on my specialized

	content/classroom
	M-learning techniques provide an effective method in learning my specialized content/classroom
	M-learning techniques are reliable for personal use of learning
Question Four	**Survey Statements Q24 to Q27**
What perceptions do the teachers have about the influences of m-learning over the restrictions of time when acquiring knowledge “anytime, anywhere”? (Ortiz-Rivera, 2013).	M-learning tools remove the limitation of time and space from traditional resources
	Programs such as Messenger and Skype which are used through M-learning tools provide opportunity for discussions on subjects without the limitations of time and space
	Learners can access instructional websites with mobile technologies
	An effective learning environment could be produced by sending lecture notes via M-learning tools such as e-mail
Question Five	**Survey Statements Q28 to Q33**
How do the teachers perceive the use of m-learning tools to facilitate teacher-student communication? (Ortiz-Rivera, 2013).	I can use M-learning techniques as a good discussion tool with my students in the learning activities
	Teacher-student communication is facilitated by means of M-learning tools
	I can have prompt access to needed materials that are related to my content/grade level by means of mobile technologies
	Communication is possible in chat programs by means of mobile technologies
	Student-student communication is facilitated by means of M-learning tools
	Students can have more effective communication with mobile technologies than traditional methods