Higher Education Faculty Perceptions and Implementation of Mobile Learning in Graduate Education

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ABSTRACT

Mobile learning (M-Learning) technology has emerged to enhance teaching and learning experiences, especially in higher education. This research aims to investigate graduate faculty perceptions of M-Learning. Also, the study investigates how faculty implement M-Learning in graduate education. There are three main research questions addressed in this dissertation study: (1) what are the graduate faculty perceptions of using M-Learning in graduate learning experiences? (2) Do the graduate faculty perceptions toward M-Learning differ according to demographic (i.e., age, gender, years of teaching experience, and area of expertise)? (3) How are graduate faculty implementing M-Learning in graduate education?

Data were collected using an electronic survey and individual interviews. One-way ANOVA was used to analyze the data from the electronic survey demographic. Inductive thematic analysis was used to analyze the interview data and the open-ended survey questions. The electronic survey results indicate that there are significant differences in the perceptions of M-Learning among graduate faculty based on their (a) age groups and (b) area of expertise. However, there are no significant differences in the perceptions of M-Learning among graduate faculty based on their (a) gender and (b) years of teaching experience. However, based on the electronic survey results, overall faculty are neutral on their perceptions about the use of M-Learning in graduate education. Faculty interviews indicate a wide range of specific views on M-Learning. Some graduate faculty have prior experience with M-Learning, while others have never considered using it in their teaching. The research concludes that graduate faculty

primarily considers M-Learning as hardware or software that can be used to fulfill basic course requirements such as accessing the learning management system (LMS) and the video conferencing software. The results suggest that graduate faculty members are interested in attending M-Learning professional development to better understand how to use M-Learning in graduate education.

Keywords: Mobile Learning; Faculty Perceptions; Graduate Education; Implementation.

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CHAPTER ONE

INTRODUCTION

There has been a notable rise in the use of M-Learning in higher education to enhance teaching and learning by providing anytime and anywhere experiences (Sung et al., 2016; Kuhnel et al., 2018; Jie & Sunze 2022). The concept of M-Learning is the integration of electronic learning (e-learning) with mobile computing devices (Elfeky & Masadeh, 2016). Mobile learning, also referred to as M-Learning, is a pedagogical method that has emerged in response to the transformative impact of improvements in mobile and wireless technologies inside educational environments (Abdalla & Devi, 2023). Hwang et al. (2021) stated that M-Learning has become a trend in education over the past decade. Moreover, a considerable number of studies have focused on the educational techniques of incorporating mobile devices into classroom activities (Jie & Sunze, 2022). M-Learning is an integration of digital learning and portable devices capable of three things: interaction, learning material access, and access to services (Hwang et al., 2021).

History of Mobile Learning

The emergence of mobile devices as educational aids may give the impression of a recent development. However, it is worth noting that the idea of using mobile devices for educational purposes was first introduced by Alan Kay in the 1970s (Crompton, 2013). Kay conceptualized the Dynabook, a portable apparatus designed for educational purposes (Crompton, 2013). The Dynabook would display textual content and visual elements like a traditional book (Crompton, 2013). Today, cell phones have evolved into

smartphones, which resemble a personal computer and have become compact and lightweight (Al-Said, 2015). Smartphones offer additional features such as a calendar, games, and multimedia players. Smartphones enable users to browse the Internet, send and receive emails, and share multimedia content including text, audio, and images (Al-Said, 2015). The advent of smartphones in the mobile phone industry started in the Fall of 2003, marked by the introduction of Nokia's 6600 which was characterized by its compact size and user-friendly interface (Raento et al., 2009). The Nokia 6600 garnered widespread favor among users because it had sample storage and processing capabilities (Raento et al., 2009).

The mobile phone, originally designed for the purpose of voice communication, has rapidly evolved into a versatile device due to advancements in wireless technology (Al-Said, 2015). Today advances in technology have given rise to a range of mobile devices that can be integrated into learning experiences at all levels. An examination of the prevalence of mobile devices in higher education reveals that a considerable proportion of university students' own smartphones (Aresta et al., 2015; Delcker, 2016; Fox, 2019). Morris and Sarapin (2020) found that American students often use computers and tablets throughout their academic pursuits, typically using them in class settings between one and four times each week. Additionally, mobile phones are commonly employed by these students in class with usage occurring between five and ten times per week (Morris & Sarapin, 2020).

Mobile Learning Definitions

The definitions of M-Learning have been discussed extensively in the literature. Ktorido et al. (2007) defined M-Learning as a learning experience in which the network serves as the place of production, circulation, and consumption. Lee et al. (2020) state that M-Learning is "a dynamic learning environment through the use of mobile technologies especially in the field of education" (p. 108). According to Gikas and Grant (2013), M-Learning encompasses a synthesis of three fundamental components: (1) M-Learning encompasses more than the mere delivery of educational content via mobile computing devices, (2) It encompasses both formal and informal modes of learning, and (3) M-Learning is characterized by its ability to adapt to the learner's situation and provide real learning experiences. For this dissertation research, M-Learning is defined as a type of learning across multiple contexts through social and content interactions, without limitations of time and place, using tablets and smartphones (Crompton & Burke, 2018; Hilao & Wichadee, 2017; Dunleavy et al., 2019).

Benefits and Challenges of Mobile Learning

M-Learning's educational benefits have been widely studied in the literature. For example, research has shown that M-Learning can bridge the gap between formal and informal learning, expand learning outside of the traditional classroom, improve teacher and peer engagement, and provide convenient access to learning materials (Viberg & Gronlund, 2013; Vazquez-Cano, 2014; Hoi, 2020). In some instances, M-Learning might have these features: scientific comprehensiveness, visual richness, auditory richness, interactive content, self-assessment, and user support (Bolatli & Kizil, 2022). For

example, the instructor may ask students to create a short video (less than a minute) about a book trailer by using their mobile devices and share it with the class using a mobile application. Students then examine the videos using the mobile application and can vote for their favorite. Also, M-Learning has the possibility to offer students prompt access to information, contextualized learning experiences, and autonomy in the learning process (Demir & Akpinar, 2018). For instance, in many higher education institutions, students can conveniently access pertinent course material and monitor their academic progress by using the mobile application of the LMS. According to Alzaza and Yaakub (2011), M-Learning provides the possibility to pursue education with a high degree of flexibility and at a reduced cost. Students can use their mobile devices, such as tablets, to access asynchronous online courses or group project assignments. Utilizing mobile applications as educational tools can enhance student motivation, knowledge generation, and collaborative learning (Vazquez-Cano, 2014; Abdalla & Devi, 2023). For example, the instructor can use Kahoot, a game-based learning platform, to gamify a learning experience and have students use their mobile devices to quickly respond to the questions presented. Similarly, social media applications accessed through mobile devices provide learners with the potential to engage in collaborative activities and discussions with peers and other educators (Gikas & Grant, 2013).

In addition to the previously identified benefits, there are many challenges with M-Learning. Using mobile devices in the classroom for non-educational purposes may negatively impact students' behaviors. For example, Morris and Sarapin (2020) pointed out that learners who use their cell phones during lectures typically take less notes, retain

less knowledge, and do poorer on exams than those who refrain from doing so. Therefore, instructors may consider using various teaching methods and attempt to engage students in different learning strategies. It is crucial to utilize mobile devices in a manner that enhances the learning experience rather than as a distraction (Bose & Lowenthal, 2016). Moreover, some of M-Learning challenges faced by higher education institutions include a lack of institutional support, a lack of a culture that promotes e-learning, the exclusion of academics from e-learning development programs, the attitude of educators towards technological advances in teaching and learning, and inadequate information and communication technology support (Cant et al., 2021). Hence, the successful integration of M-Learning necessitates the cultivation of effective pedagogical strategies (Romero-Rodriguez et al., 2020) and institutional systemic changes.

Mobile Learning Across Sectors

M-Learning is common across all levels of education through elementary, secondary, post-secondary, and workplace learning.

Mobile Learning in K-12 Education

The use of mobile devices in the United States (U.S.) elementary and high school education has been well documented, with a current deployment of 1.5 million tablets in public school districts (Foti & Mendez, 2014). It is noteworthy that several researchers have examined the positive and negative consequences of using mobile devices in the U.S. K-12 classrooms (Gikas & Grant, 2013). The positive aspects include instant access to information and collaboration. While the negative aspects include devices as a distraction (Gikas & Grant, 2013), as previously mentioned. Awareness of these factors

helps researchers anticipate M-Learning's aims and work rigorously to improve its effectiveness (Hwang et al., 2021).

Some researchers have discussed mobile applications that can be used in K-12 education (Park, 2011; Popov et al., 2020). For example, “NetCalc, is a handheld version of SimCalc, an application designed to help middle school students learn mathematics of change and variation” (Park, 2011, p. 90). Other researchers have shared how they have used M-Learning as an instructional approach with their K-12 students around the world. For instance, Kim (2009) used action research to create a M-Learning initiative for Latin American migratory indigenous children. M-Learning was used to teach migrant children in remote communities the alphabet using an early mobile device prototype. Popov et al. (2020) discussed the effective M-Learning teaching and learning strategies in K-12 education. For example, “the context-aware ubiquitous M-Learning, mobile augmented reality, and simulated and real-world learning through mobile games” have been shown to enhance students' interest in and comprehension of subjects related to STEM (science, technology, engineering, and mathematics) fields (Popov et al., 2020, p. 1151).

Mobile Learning in Higher Education

M-Learning has been widely debated and explored in higher education institutions worldwide. For instance, Seton Hill University and George Fox University are two examples of higher education institutions that have acknowledged the potential benefits of using mobile devices into their educational practices, therefore integrating these devices into their curriculum (Foti & Mendez, 2014). Now, many universities have customized their websites to be mobile-friendly. Ally (2013) stated that the development

of mobile-friendly websites by most university libraries included user interface characteristics that facilitate resource accessibility across many platforms, including desktops, laptops, and mobile devices.

M-Learning facilitates accessibility to learning resources, enhances information delivery, and provides tools for knowledge development (Alshehri & Cumming, 2020). For instance, Alshehri and Cumming (2020) investigated how the use of mobile technology affects knowledge management among students. They found that students found it simpler to access resources without the professor, study at their own pace, and interact in mobile conversations (Alshehri & Cumming, 2020). Also, many higher education institutions implement M-Learning to improve student collaboration. For example, Vazquez-Cano (2014) reported "the Stanford Mobile Inquiry Learning Environment (SMILE) program, developed by Paul Kim, allows students to use their devices to create, collaborate, and evaluate questions regarding educational topics, essentially becoming a research lab in students' pockets" (p. 1506). Also, the integration of technology at Spanish Universities like the University of Granada has been rapidly expanding, with numerous examples of integrating mobile devices and related technologies such as virtual reality and augmented reality (Romero-Rodriguez et al., 2020).

Mobile Learning in the Corporate Sector

Similarly to elementary, secondary, and postsecondary educational environments, the corporate sector is increasingly employing M-Learning. Pimmer and Grohbiel (2008) emphasizes the significance of incorporating M-Learning into the corporate information

infrastructure and highlights the strategic value of mobile solutions. M-Learning promotes creativity and offers novel prospects for commercial ventures (Pimmer & Grohbiel, 2008). M-Learning in the corporate sector encompasses various activities conducted using mobile devices. These activities may include online simulations and less formal situations where workers participate in collaborative endeavors through organizational social networks accessed on their mobile devices (Butler et al., 2021). Furthermore, mobile devices are often used in work-based learning, including activities such as on-the-job training and informal coaching and mentoring (Butler et al., 2021).

Mobile Learning in the Military

The military sector has begun to integrate M-Learning in its training programs and daily operations. Kissinger (2009) stated that in the year 2007-2008, the United States Army Headquarters Continuing Education System collaborated with Florida State College Jacksonville to create college courses that could be delivered using a mobile, offline distance-learning approach. The goal of the year-long agreement was to maintain consistent educational standards and learning opportunities, with a particular focus on accommodating the unique circumstances and difficulties faced by a geographically dispersed and disconnected student (Kissinger, 2009). The use of mobile devices has been shown to enhance the educational experience of military students via the facilitation of genuine, independent, social, and contextual learning, while also providing the advantage of mobility (Hsu & Chao, 2023). In more recent developments, mobile applications have been used to provide a convenient avenue for enhancing health, treating behavioral issues, and to assist military personnel and their families in overcoming

hurdles they encounter (Nolan et al., 2019). For example, Parenting2GO is an M-Learning application that provides support to veterans and military members in navigating co-parenting difficulties, hence facilitating their effective reintegration into the family unit (Nolan et al., 2019).

Statement of the Problem

Using mobile devices has increased in daily life (Viberg & Grönlund, 2013; Aresta et al., 2015; Sung et al., 2016; Kuhnel et al., 2018; Popov et al., 2020). Students in higher education are increasingly using smartphones and tablet computers as they see these devices as crucial for their academic achievements (Aresta et al., 2015). As a result, higher education institutions in developed and developing countries are actively engaged in formulating methods to include M-Learning into the educational process and learning experiences (Vazquez-Cano, 2014; Aresta et al., 2015). Thus far, the use of M-Learning has been investigated in environments, both within and outside the traditional classroom (Pimmer et al., 2016). Some studies anticipate that M-Learning will have a profound impact on the field by introducing new methods, practices, tools, apps, and resources to effectively achieve the potential of ubiquitous, pervasive, personal, and linked learning (Pimmer et al., 2016). This research aims to address existing gaps in the present body of research and provide a solid groundwork for future investigations in M-Learning. Previous studies have investigated the efficacy of integrating M-Learning on teaching and learning (Sung et al., 2016; El-Sofany & El-Haggar, 2020). Nevertheless, a few studies provide faculty perceptions and implementation of M-Learning within the context of graduate education. Therefore, this study examines the implementation of M-Learning

in graduate education, with particular emphasis on the faculty's perspective and current practices of M-Learning. The findings of this research may provide valuable insights for educators in determining the most effective methods for integrating M-Learning technologies into instructional practices in graduate education.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews current research on M-Learning. First, how researchers conducted systematic reviews and meta-analysis related to M-Learning. Second, this chapter explores the research on the use of M-Learning in higher education in both undergraduate and graduate studies. Third, the chapter discusses the use of M-Learning by faculty in higher education in post-COVID times. Finally, the chapter addresses the strengths and limitations of current studies of M-Learning to identify gaps in the literature. Research questions and the purpose of the study are also addressed in this chapter.

Mobile Learning Systematic Review

Several systematic review studies have been conducted to examine the topic of M-Learning in the last two decades. Pimmer et al. (2016) conducted a review of 36 empirical articles from 2000 to 2013 on mobile and ubiquitous learning in higher education. They found that there is a scarcity of empirical evidence to support the extensive and ubiquitous adoption of M-Learning in higher education settings (Pimmer et al., 2016). Nevertheless, through the utilization of the growing availability of digital mobile media, several educational opportunities can be implemented to enhance and expand upon conventional modes of higher education (Pimmer et al., 2016). A study by Alrasheedi et al. (2015) discussed the effectiveness of M-Learning in higher education. The results identified critical success factors for M-Learning adoption (Alrasheedi et al., 2015). For instance, the user's assessment of the technology and user’s consideration of

whether or not the implementation of this pedagogical framework could enhance their productivity and efficiency (Alrasheedi et al., 2015). Kaliisa and Picard (2017) reviewed articles published between 2010 to 2016 on M-Learning in higher education in the African context to investigate the use, effect, and obstacles of mobile technology-supported learning. The results showed that the use of M-Learning at higher education institutions in Africa facilitates learning and reflective practice (Kaliisa & Picard, 2017). Also, the utilization of M-Learning fosters the development of learning communities within these institutions (Kaliisa & Picard, 2017). However, the study also revealed notable obstacles in the implementation of M-Learning in African higher education institutions such as inadequate technological infrastructure, limited availability of contemporary mobile devices, and insufficient pedagogical expertise among instructors regarding M-Learning (Kaliisa & Picard, 2017).

Crompton and Burke (2018) also presented a summary of studies on M-Learning for higher education settings from 2010 to 2016. Most of the research that they surveyed focused on the influence of M-Learning on student accomplishment (Crompton & Burke, 2018). According to the results, 74% of the studies surveyed included undergraduates, and 54% of the studies were planned for a formal educational environment (Crompton & Burke, 2018). Furthermore, the study encouraged higher education teachers to explore incorporating M-Learning into their academic approach (Crompton & Burke, 2018). Qureshi et al. (2020) reviewed literature on the domain of M-Learning from 2009 to 2018 and concluded that the M-Learning environment has a major impact for both students and instructors, as it facilitates collaborative work and provides user-oriented features and

contextual support. Moreover, they concluded that mobile tutoring, which is collaborative learning, is an efficacious learning method, since students may use mobile phone apps for educational purposes (Qureshi et al., 2020). A study by Criollo-C et al. (2021) reviewed M-Learning articles for education with the objective of illuminating benefits and issues of M-Learning. The results showed that M-Learning enables the incorporation of many learning models such as Universal Design for Learning (UDL), hence promoting student participation in the active development of their own educational experiences (Criollo-C et al., 2021). Also, the increasing use of mobile technology has led to a growing number of projects aimed at integrating M-Learning in the educational framework (Criollo-C et al., 2021). Thus, the use of mobile devices facilitates distance learning socialization and encourages instructor-student and student-student collaboration and communication (Crompton & Burke, 2018; Criollo-C et al., 2021). In contrast, the challenges associated with the implementation of M-Learning pertain to the design of activities for M-Learning, the substance of mobile applications, educators, technology, students, the learning process, and academic establishments (Criollo-C et al., 2021).

Mobile Learning Meta-Analyses

Several meta-analysis studies have been conducted on the effectiveness of M-Learning in education. Wu et al. (2012) examined the findings of studies evaluating the critical success factors of M-Learning. They found that most M-Learning studies include surveys and examinations, with emphasis on evaluating efficacy and designing M-Learning systems (Wu et al., 2012). Also, the findings showed that mobile phones are the predominant devices used for M-Learning (Wu et al., 2012). In their study, Alrasheedi

and Capretz (2013) discussed several elements that contribute to the success of M-Learning which include learners identifying the ability to collaborate and the flexibility to learn at any time and from any location.

Chee et al. (2017) examined trends of M-Learning from 2010 to 2015. The findings showed that the primary emphasis in most research pertaining to M-Learning is evaluating its efficacy, with attention given to conducting reviews of M-Learning literature (Chee et al., 2017). Also, many studies conducted on M-Learning have shown positive outcomes (Chee et al., 2017). A study of Sung et al. (2017) examined the effects of mobile computer supported collaborative learning (mCSCL). The findings showed that the use of mCSCL has been shown to have positive effects on students' academic performance, their attitudes towards learning, and their interactions with peers.

Mobile Learning Use in Higher Education

As technology utilization increases in higher education, mobile technology studies have focused on M-Learning (Jie & Sunze, 2021). M-Learning can potentially become one of the most successful methods of distributing higher-education resources in the future (Abu-Al-Aish et al., 2013; Simsek, 2024). M-Learning is not only digital, but it also has mobile qualities (Hwang et al., 2021). M-Learning is, therefore, preferable to digital learning since it is not limited by temporal limitations (Hwang et al., 2021). M-Learning involves a basic connection between the learner and the device(s) used for learning purposes (Wright & Parchoma, 2011).

The global acceptance of M-Learning is increasing due to the pervasive adoption of mobile devices, particularly smartphones, which power this phenomenon (Tsinakos,

2013). Most of the M-Learning applications are school-based initiatives, with backing from local governments, provinces, the corporate sector, and industry (Tsinakos, 2013). According to Jie and Sunze (2022), as higher education transitions to mobile technology, “educators' emotions, such as belief, values, personal connections, and educational environments, lack dynamic connections with relevant parties, such as stakeholders, environments, and institutional support" (p. 2). Also, there are some barriers to the adoption of M-Learning, including a lack of knowledge and desire, technological limits with appropriate mobile devices, and Internet connection concerns (Abu-Al-Aish et al., 2013). However, today with fast Internet speeds in many higher education institutions, students are eager to utilize their mobile devices for educational purposes. Also, many students possess an elevated level of proficiency in utilizing mobile devices.

The growing usage of mobile devices, which is often accompanied by student mobility across varied contexts and settings, has generated excitement about the possibilities of M learning, but too little attention has been given to the critical role of instructors (Kukulska-Hulme et al., 2015). Instructors who are comfortable using computers for instruction may be less comfortable using mobile technology for their instruction (So, 2016). Some studies indicate that educators and individuals entrusted with educational duties are frequently influenced to believe that a single device can revolutionize learning environments, demonstrating the same tendencies observed with earlier technological adoptions (Daughtery & Berge, 2017).

Educators are expanding their usage of mobile devices for learning, believing that the devices help them interact with students while also providing stimulation, allowing

access to Internet resources, online education, and content production (Herro et al., 2013). To ensure efficient implementation of M-Learning in higher education, it is necessary to focus on developing a model that can serve as a roadmap for identifying the challenges associated with the implementation of this technology in university education, as well as incorporating all of the essential components of successful M-Learning use (Abu-Al-Aish et al., 2013).

Mobile Learning in Undergraduate Education

Several studies have examined the application of M-Learning in undergraduate education. Hilao and Wichadee (2017) compared the perceptions of male and female students regarding the use of mobile phones as an instrument for language learning, specifically in relation to their English language proficiency and overall learning performance. They found that gender has no effect on students' attitudes and use of mobile phones for study (Hilao & Wichadee, 2017). They also indicated that it is essential for educators to create learning assignments that align with the functional capacities of students' mobile phones (Hilao & Wichadee, 2017).

A study by Briz-Ponce et al. (2017) investigated the various motivations and factors that may affect students' attitudes of M-Learning technologies. Social influence was identified as a crucial factor in the development of M-Learning users' attitudes and intentions to engage with technology (Briz-Ponce et al., 2017). Specifically, a considerable proportion of participants 57% showed a positive attitude towards using mobile technology for educational purposes and a considerable percentage 40.5%

expressed their readiness to suggest the use of mobile technology for learning (Briz-Ponce et al., 2017).

Al-Adwan et al. (2018) discussed several factors that impact the adoption of M-Learning by students. These factors are the perceived benefits compared to traditional learning methods, the level of complexity associated with M-Learning, the influence of social elements, the perceived satisfaction derived from M-Learning, and the ability to effectively control one's own learning process (Al-Adwan et al., 2018). According to Willemse et al. (2019), the potential of mobile devices to enhance learning by enabling real-time communication of activities and student reactions is notable. The use of social space such as WhatsApp enhanced peer support and group cohesiveness, hence fostering an environment conducive to learning (Willemse et al., 2019).

El-Sofany and El-Haggar (2020) investigated students' perspectives regarding the acceptance of mobile techniques. Their study's aim was to determine the usefulness of mobile services for academic and social objectives, with the goal of enhancing teaching methodologies and learning outcomes within higher education institutions. The results showed that students have a positive perception of the integration of mobile technology into the classroom, which improves their ability to concentrate, grants them flexible access to mobile services containing learning materials, and enhances their proficiency in utilizing mobile technology for e-learning (El-Sofany & El-Haggar, 2020).

Mobile Learning in Graduate Education

Several studies have been conducted to investigate applications of M-Learning in graduate education. According to past studies of M-Learning in graduate education, there

is no evidence of significant statistical variation in the average perception ratings for M-Learning activities among postgraduate students when considering their gender (Thiyagu, 2012; Korucu & Bicer, 2018). Also, there is no evidence of significant statistical variation in the average scores of perceptions towards M-Learning activities among postgraduate students, when considering their level of educational attainment (Thiyagu, 2012). Short et al. (2014) indicated that using smartphones in graduate medical education brings a significant transformation in medical communication, learning, and decision support. The utilization of smartphone technology for mobile teaching presents a learning approach that is accessible at any time and location, demonstrating considerable promise for enhancing effectiveness and learner contentment (Short et al., 2014).

Kim et al. (2013) found that mobile technologies can provide innovative educational opportunities in graduate education. These experiences give graduate students more opportunity to actively participate in educational activities outside the classroom, hence enhancing their learning experiences within their respective communities of practice (Kim et al., 2013). The use of mobile devices in graduate education for the purpose of logging and tracking study time across various settings has the potential to enhance skills in time management (Tabuenca et al., 2015). Being notified of notifications including learning statistics and general recommendations on self-regulation has a potential impact on the development of time management skills (Tabuenca et al., 2015).

M-Learning is most beneficial when used as an additional tool to Information and Communication Technology (ICT), online learning, and conventional learning

approaches because it has the potential to significantly enhance the educational experience (Fouzdar & Behera, 2017). The effectiveness of the teaching-learning scenario may be enhanced if graduate students have a good attitude towards M-Learning (Fouzdar & Behera, 2017). Graduate students' views towards M-Learning remain consistent across age groups, education level, and daily Internet use; however, these views can differ depending on the ownership status of mobile devices (Korucu & Bicer, 2018).

Mobile Learning Use by Faculty in Higher Education

Several studies have been conducted to investigate the use of M-Learning by faculty in higher education. A study by Bose and Lowenthal (2016) found that many educators reported an enhancement in their digital literacy skills after incorporating mobile devices into their instructional practices. Also, some instructors indicated that they permit students to use their mobile devices for the purpose of accessing material during tests, class discussions, lectures, and assignments (Bose & Lowenthal, 2016). Another report by Bose and Lowenthal (2016) stated that one instructor was interested in exploring the potential of using mobile devices to enhance instructor social presence within the context of online courses.

A study by Al-Emran et al. (2016) reported that most educators who participated in the study have positive attitudes towards their academic positions, academic background, and possession of smartphones in relation to M-Learning. Morris and Sarapin (2020) found that most college professors in the survey 77% reported that they implement a policy regarding the usage of mobile phones in the classroom and 23% did

not set ground rules for students' use of personal mobile devices during lectures. Furthermore, a substantial majority (88%) include their mobile-phone regulations within their syllabi (Morris & Sarapin, 2020). Among instructors who have implemented regulations, a majority (54.1%) said that their policy has been successful in reducing unsupervised mobile phone use (Morris & Sarapin, 2020).

Mobile Learning in Post-COVID Times

The M-Learning technology became increasingly significant in the context of the COVID-19 pandemic (Castellanos-Reyes et al., 2022; Omirzak et al., 2021), which has compelled countries around the world to switch to remote learning that involves both fixed and mobile equipment (Dolzhich et al., 2021). The adoption of remote learning by educational institutions has additionally prompted students to utilize their mobile devices for attending classes (Milton & Subramaniam, 2023).

During the COVID-19 pandemic, these mobile devices have become an alternative to face-to-face instruction (Omirzak et al., 2021). Modern mobile devices proved to be a viable option for providing mandated distant learning times for remote participants via lectures, practical sessions, and other forms of training (Omirzak et al., 2021). Students that were proficient in using mobile devices have shown high competence in using technology to engage in digital M-Learning (Lutfi et al., 2022). In the wake of the COVID-19 pandemic, it is essential to explore appropriate strategies for integrating digital device use in the field of education (Lutfi et al., 2022).

Strength and Limitations of the Current Research

Despite the growing interest in M-Learning, a great deal of study is required to establish a solid groundwork for the field, as well as to stay up with technological developments and rising levels of individual autonomy, both of which increase the potential for educational applications (Miglani & Awadhiya, 2017).

A report by Simsek (2024) discussed the technologies that will be used for future education. The study mentioned that using mobile applications and smart devices in the classroom is going to be huge in the future (Simsek, 2024). This means that the proliferation of Internet-enabled mobile devices, the evolution of web content to be more adaptable, and the establishment of networks that can accommodate mobile connectivity soon in higher education (Miglani & Awadhiya, 2017). However, we need studies that support mobile devices as a new teaching tool if M-Learning is going to be a reality (Pollara, 2011).

Much of the existing research focuses on mobile devices for single tasks or projects, rather than investigating the applications of M-Learning that include M-Learning in graduate education. In addition, when compared to modern equipment, the technology used in research even five or ten years ago was primitive. There is a chance to study something that has been neglected in previous studies: the personal and educational use of mobile devices by faculty. Also, the effective use of mobile devices in graduate education.

There is another gap in the existing body of research that has the capacity to impede the incorporation of M-Learning in the classroom. The difficulties encountered

by faculty members such as the" issues of inadequate infrastructure, training, unclear teaching, and assessment" poses a major obstacle to the integration of mobile devices in the classroom (Qazi et al., 2024, p. 6). While it is understandable that instructors have concerns about potential disruptions, it is necessary to study to have a better understanding of how to effectively use mobile devices for education.

Additionally, there were gaps in how instructors viewed M-Learning. Students said that some instructors were hesitant to use technology to its full potential and failed to provide enough support for student engagement with course materials (Miglani & Awadhiya, 2017). On the other hand, Qazi et al. (2024) reported that M-Learning can provide convenience and ease of access to lecture materials. Therefore, more studies are required to examine the perspectives of instructors towards M-Learning, as well as the level of preparedness for widespread usage of mobile devices for education.

Purpose of the Study

Education is undergoing a period of transformation, where the methods of instruction and acquisition of knowledge need to be adjusted to meet the needs and expectations of society (Romero-Rodriguez et al., 2020). The COVID-19 pandemic has led to positive changes in higher education (Milton & Subramaniam, 2023). For instance, higher education instructors are required to incorporate technology in their instruction (Moris & Sarapin, 2020). Although instructors are often enthusiastic and willing to implement innovative teaching strategies, they may encounter challenges as they attempt to enhance their teaching and learning environments with modern technologies. Higher education institutions might need to prioritize the needs of M-Learning to effectively

assist students in online learning (Milheim et al., 2021). For the implementation of the M-Learning in higher education institutions, both students and faculty must recognize the need to use mobile devices for instructional purposes (Pollara, 2011). Furthermore, since many higher education students use mobile devices for educational purposes (Mata et al., 2021), faculty may need to be prepared and receptive to the potential advantages of M-Learning in teaching and learning environments (Pollara, 2011). The purpose of the study is to investigate graduate faculty readiness and perceptions of M-Learning. Also, the study will investigate how faculty implement M-Learning in graduate education.

Research Questions

- RQ1: What are the graduate faculty's perceptions of using M-Learning in graduate learning experiences?
- RQ2: Do the graduate faculty's perceptions toward M-Learning differ according to demographic?
    - RQ2a: Do the graduate faculty's perceptions toward M-Learning differ according to age?
    - RQ2b: Do the graduate faculty's perceptions toward M-Learning differ according to their gender?
    - RQ2c: Do the graduate faculty's perceptions toward M-Learning differ according to their years of teaching experience?
    - RQ2d: Do the graduate faculty's perceptions toward M-Learning differ according to their area of expertise (by college)?
- RQ3: How are graduate faculty implementing M-Learning in graduate education?

CHAPTER THREE

RESEARCH METHODOLOGY

This study uses a mixed-methods design (Creswell, 1999). The acquisition of quantitative data would be facilitated by conducting an electronic survey, while the collection of qualitative data would be accomplished by conducting individual interviews with faculty members. The following sections will be discussed in detail: rationale for methodology, setting and participants, instruments, data collection procedures, participants' demographics, and data analysis.

Rationale for Methodology

This research used a mixed method (sequential explanatory design) (Creswell, 1999). The sequential explanatory design establishes that the study starts with a quantitative approach followed by qualitative data collection to further extend the first stage of the research (Creswell, 1999). As a result, the study provides a deeper understanding of the perceptions of faculty about M-Learning and its implementation in higher education. Mixed methods design was also chosen since it enables expansion and deepening of the research results and thereby adds to the published literature on the usage of M-Learning in higher education.

Setting and Participants

This study was conducted at a higher education institution in eastern United States. The university employs around 1,600 full-time instructional faculty according to their website. Every effort was made to ensure that the faculty represented various areas

of study including agriculture, art and sciences, business, education, health, human sciences, engineering, law, nursing, social work, and veterinary medicine.

Survey Participants

Eight hundred faculty members were invited to participate in the electronic survey via email. The email invitation contained: a brief description of the study and a hyperlink directing them to the web-based survey. At the survey's end, participants were given an option to provide their email address if they wish to be contacted to participate in an individual interview.

Individual Interview Participants

Following a thorough examination of the electronic survey results participants who volunteered by sharing their information in the survey were selected to partake in the individual interview process. These participants received an invitation via email to engage in an individual interview. The interviewees were selected by a purposive typical instances sampling approach, which aims to provide a more comprehensive understanding than the average responder (Pollara, 2011).

Instruments

Both the electronic survey instrument and the interview protocol were previously utilized in a research project. The survey instrument was developed by Miglani & Awadhiya (2017), and the interview protocol was developed by Pollara (2011).

Survey Instrument

The first section of the electronic survey has five demographic inquiries, including: experience teaching at graduate level, gender, age, years of teaching

experience, and the departments in which they are teaching. The faculty teaching experience question aims to determine if there is a relationship between educational experiences and M-Learning experiences. Also, the inclusion of the question about the department in the demographic section aims to facilitate an analysis of potential variations of M-Learning experience among different groups within the institution.

The second section of the electronic survey includes three questions about device readiness. The third section of the electronic survey focuses on usage patterns of mobile phones. The fourth section of the instrument includes questions pertaining to perception regarding M-Learning. The last section of the instrument contains two questions about whether M-Learning is necessary in courses. If so, provide instances of M-Learning technologies (open-ended question). The electronic survey instrument can be found in Appendix B.

Interview Protocol

Semi-structured interviews were conducted using eight open-ended questions using an interview protocol (see Appendix C). The protocol serves as a guiding framework for the interview, allowing participants the flexibility to share more about the subject if they are inclined to do so.

Data Collection Procedures

The collection of quantitative data for this research was conducted using an electronic survey via Qualtrics. The semi-structured interviews were conducted with a specific subset of participants who had provided their permission to be contacted for further interviews.

Survey Data Collection

After the Institutional Review Board (IRB) approval was received (see Appendix A), the researcher generated a list of department chair contacts using the university's official website. The researcher emailed each department chair at the institution. In the email, the department chair received information about the study's aim and a request to forward it to their respective faculty members (see Appendix F). To enhance the number of participants, the researcher created a list of faculty emails and emailed them a link to the electronic survey. Also, communication was directed to the Provost's Office and Digital Learning that facilitated the electronic survey's distribution. A flyer with details about the research project and its intended participants had been produced and was distributed with the email invitations (see Appendix H). The electronic survey took approximately 15-20 minutes to complete.

Individual Interviews Data Collection

As responses to the electronic survey were completed, the researcher checked if any of the respondents had volunteered to also participate in an individual interview. For those participants who volunteered for an individual interview, the researcher organized their contact information and teaching department into a spreadsheet. The researcher selected 20 individuals from the list and invited them via email (see Appendix G). The researcher sent the consent form and interview questions to those who responded to the email and scheduled the interview.

The researcher scheduled 45-minute synchronous interviews via a video conferencing software (i.e., Zoom), based on the interviewees' availability. Prior to the

interview, participants read the consent form that outlines the objectives of the study and the measures in place to safeguard the anonymity of the participants (see Appendix E). Interviews began with a quick explanation of the interview technique, followed by an invitation to record the interview to ensure accuracy and authenticity. The recordings were transcribed using Otter.ai. Following that, the Otter.ai transcriptions were imported into Microsoft Excel for organization. Participants were assigned pseudonyms to guarantee that their information remains confidential.

Participants' Demographics

This section summarizes the individuals who participated in the research, including faculty who completed the electronic survey and those who participated in the individual interviews.

Survey Participants Demographics

The electronic survey was sent to more than 800 faculty with multiple reminders and follow up email invitations. A total of 89 participants completed the electronic survey. At the beginning of the electronic survey, participants were asked if they have taught at graduate level in the last year. A total of 133 participants consented to this question, where n=102 chose "yes" and n=31 chose "no". Those who selected "yes" were permitted to proceed with the electronic survey, while those who selected "no" had to exit the electronic survey because this study focuses only on those who taught at graduate level in the last year. **Figure 3.1** describes the percentages of participants who have taught at graduate level last year.

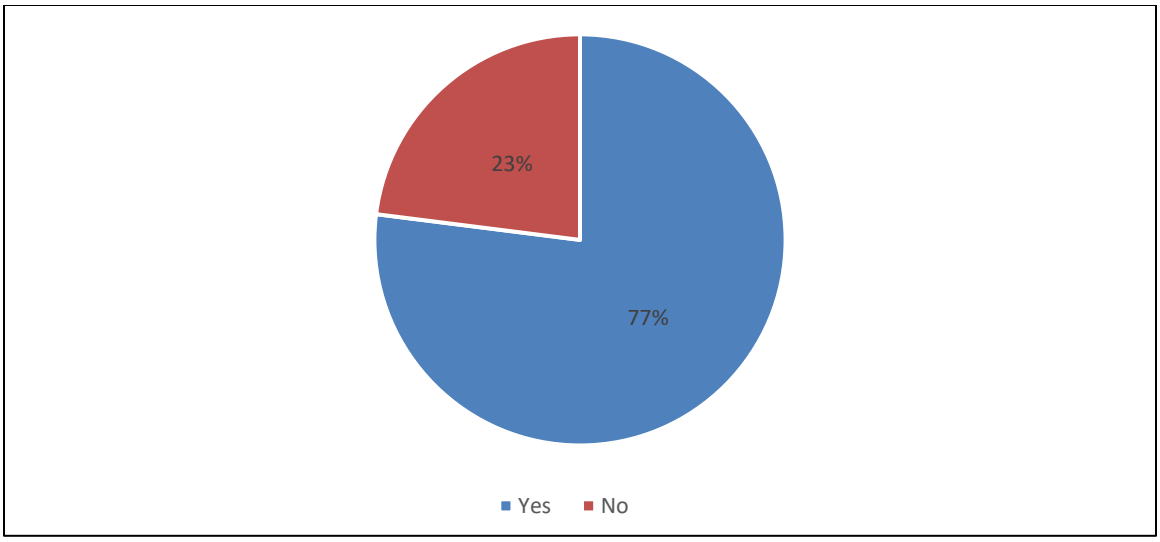

Figure 3.1. *Participants Who Have Taught a Graduate Level Course in the Last Year*

Participants were asked about their gender identity. A total of 95 participants responded to this question. The results of the electronic survey indicate that *n*=51 were male; *n*=42 were female; *n*=1 chose other and *n*=1 preferred not to disclose. **Figure 3.2** describes the percentages of participants' gender.

Participants were also asked about their age group. A total of 95 participants responded to this question. The results of the electronic survey indicate that the highest number participants were in the age group 35 to 44 (*n*=35) followed by age group 45 to 54 (*n*=22) and age group 55 to 64 (*n*=18). **Table 3.1** describes the number of responses and percentages of participants in each age group. OBJ

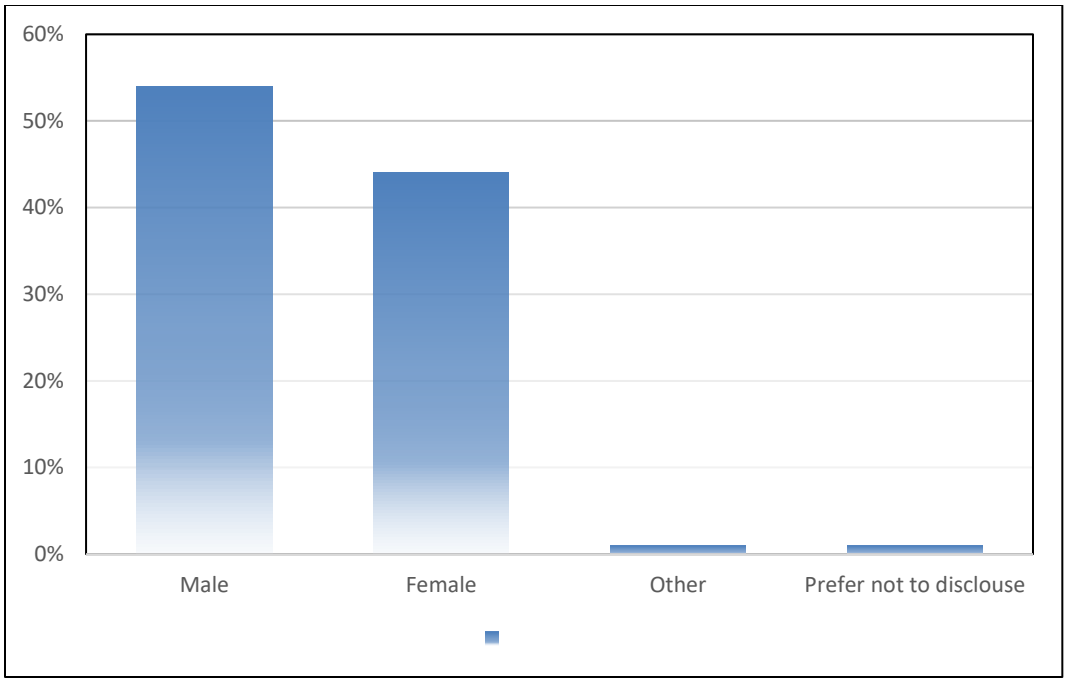

Figure 3.2. *Participants' Gender*

Table 3.1
Participants' Age Group

Age Group	Responses	Percentage
18 - 24 years old	*n*=0	0%
25 - 34 years old	*n*=7	7%
35 - 44 years old	*n*=35	37%
45 - 54 years old	*n*=22	23%
55 - 64 years old	*n*=18	19%
65 years or older	*n*=13	14%

Participants were asked to share their years of teaching experience. A total of 95 participants responded to this question. The results of the electronic survey indicate that the highest number of participants were in the 11 to 15 years of teaching experience category (*n*=22). **Table 3.2** describes the number of responses and percentages of participants in each year of teaching experience category.

Table 3.2
Participants' Years of Teaching Experience

Years of Teaching Experience	Responses	Percentage
5 years or less	*n*=9	9%
5 - 10 years	*n*=15	16%
11 - 15 years	*n*=22	23%
16 - 20 years	*n*=13	14%
21 - 25 years	*n*=18	19%
26 or more	*n*=18	19%

For demographic purposes, participants were asked what their university department is. A total of 95 participants responded to this question. The results of the electronic survey indicate that the highest number of participants were from the Theory and Practice in Teacher Education department (*n*=8) followed by the Social Work department (*n*=6). **Table 3.3** describes the number of responses per university department.

The participants were asked about their experience with different teaching modalities. A total of 95 participants responded to this question. The participants could choose more than one option. The results of the electronic survey indicate that the highest number of participants have taught in-person classes (*n*=92). **Table 3.4** describes the number of responses in each type of teaching modality.

Table 3.3
Participants' Department

Department	Responses
Accounting and Information Management	*n*=1
Agricultural Leadership, Education and Communications	*n*=2
Agriculture and Resources Economics	*n*=4
Anthropology	*n*=1
Business Analytics and Statistics	*n*=2

Table 3.3 Continued

Biochemistry & Cellular and Molecular Biology	*n*=2
Biosystems Engineering and Soil Science	*n*=1
Civil and Environmental Engineering	*n*=3
Earth, Environmental and Planetary Sciences	*n*=3
Ecology and Evolutionary Biology	*n*=3
Economics	*n*=1
Education	*n*=1
Educational Research	*n*=1
Educational Leadership and Policy Studies	*n*=2
Educational Psychology and Counseling	*n*=2
Electrical Engineering and Computer Science	*n*=1
Entomology and Plant Pathology	*n*=3
Engineering	*n*=1
English	*n*=1
Finance	*n*=1
Food Science	*n*=1
Geography and Sustainability	*n*=2
Graduate Executive Education	*n*=1
Haslam College of Business	*n*=1
History	*n*=1
Kinesiology, Recreation, and Sport Studies	*n*=1
Law	*n*=2
Management and Entrepreneurship	*n*=1
Marketing	*n*=1
Materials Science	*n*=1
Mechanical, Aerospace, & Biomedical Engineering	*n*=1
Microbiology	*n*=1
Nuclear Engineering	*n*=2
Nursing	*n*=2
Nutrition	*n*=2
Philosophy	*n*=2
Physics	*n*=1
Political Science	*n*=4
Public Health	*n*=3
Retail, Hospitality, and Tourism Management	*n*=1
School of Natural Resources	*n*=3
Social Work	*n*=6
Supply Chain Management	*n*=4
Theatre	*n*=2
Theory and Practice in Teacher Education	*n*=8
Veterinary Medicine	*n*=2
World Languages and Cultures	*n*=3

Table 3.4
Participants Teaching Modalities Responses

Teaching Modalities	Responses	Percentage
In-person teaching	*n*=92	97%
Online synchronous	*n*=67	71%
Online asynchronous	*n*=44	46%
Hybrid (in-person & synchronous online)	*n*=56	59%
Hybrid (synchronous & asynchronous online)	*n*=30	32%
Other	*n*=4	4%

Individual Interview Participants

At the end of the electronic survey, participants were asked to share their information if they had experience with M-Learning and were interested in participating in an individual interview. Twenty participants shared their information in the electronic survey. The researcher contacted the 20 participants by email, inviting them to partake in an individual interview. Ten individuals responded to the invitation email and agreed to participate in the interview. Interviews were conducted with (*n*=5) males and (*n*=5) females that represented a variety of different departments (Anthropology, Educational Research, Management & Entrepreneurship, Nutrition, Political Science, Public Health, Supply Chain Management, and Theory & Practice in Teacher Education). **Table 3.5** describes the participants' age, years of teaching experience, department, and teaching modalities experience.

Table 3.5
Demographics of Individual Interview Participants

ID	Name	Age Group	Teaching Experience	Department
1	Anna	55 - 64	16-20 yrs.	Anthropology
2	Aaron	45 - 54	11-15 yrs.	Educational Research

Table 3.5 Continued

3	Alice	35 - 44	11-15 yrs.	Public Health
4	Aria	35 - 44	21-25 yrs.	Theory and Practice in Teacher Education
5	Ashton	35 - 44	11-15 yrs.	Political Science
6	Asher	65 or older	16-20 yrs.	Supply Chain Management
7	Arthur	45 - 54	16-20 yrs.	Supply Chain Management
8	Ava	45 - 54	21-25 yrs.	Nutrition
9	Ayden	55 - 64	11-15 yrs.	Management & Entrepreneurship
10	Abby	55 - 64	16-20 yrs.	Supply Chain Management

Data Analysis

The electronic survey quantitative data were analyzed using SPSS. The qualitive data including individual interviews and open-ended electronic survey questions were analyzed using inductive thematic analysis.

Survey Data Analysis

The electronic survey data were transferred from Qualtrics into MS Excel format for formatting and organization. Afterwards, the data were imported and reformatted for analysis using SPSS. To address research question 1, the researcher used a frequency analysis to show the percentages and responses in each statement. To address research question 2, the researcher used one-way analysis of variance (ANOVA) to analyze the dependent variable (M-Learning perceptions) versus the independent variables (age, gender, years of teaching experience and colleges).

The electronic survey also included an open-ended question asking faculty to provide more information on how M-Learning hardware or software is implemented in their courses. The researcher used inductive thematic analysis to identify themes from participants responses (DeJonckheere et al., 2024). An inductive approach enables the

evidence to speak for itself rather than imposing a predetermined framework (DeJonckheere et al., 2024). The researcher conducted a comprehensive examination of the data to identify any potential mistakes that may have arisen during the process of transferring or reformatting of the data.

Individual Interview Data Analysis

To address research question 3, the researcher used individual interviews with faculty. After the interviews were completed, the researcher uploaded the recordings in Otter.ai, read, and cleaned the transcripts by removing words such as "you know." The reviewed transcripts were then transferred into MS Excel. While reading each transcript, the researcher first used coding. The coding process revolves on ensuring that coding techniques are established, rigorous, and consistent to meet the validity and reliability requirements associated with qualitative research (Williams & Moser, 2019).

The researcher started with open coding (Williams & Moser, 2019). It is the first level of coding that is structured by defining broad subject areas for data collection (Williams & Moser, 2019). The process of open coding in thematic analysis is

Table 3.6
Thematic Analysis Coding Process

Open coding	Axial coding	Selective coding
Evaluate	Assess	Student assessment
Access	Course requirement	Access LMS
Stay up to date	Stay up to date	Teaching self-efficacy
Engage	Accessible	Enhance accessibility
Professional	Engage	Enhance engagement
Conflict	Confidence	
Expect	Interest	
Confidence		

Table 3.6 Continued

Interest
Teach
Learn
Provide
Increase

undertaken to identify, evaluate, and present patterns within data that constitute themes (Braun & Clarke, 2006). The researcher sorted through the interviewees' responses and classified comparable words and phrases, or idea indicators, into broad initial categories (Williams & Moser, 2019).

Afterward, the researcher moved to the second level of coding which is axial coding (Williams & Moser, 2019). Williams and Moser (2019) stated "in contrast to open coding, which focuses on identifying emergent themes, axial coding further refines, aligns, and categorizes the themes" (p. 50). Then the researcher moved to the third and last level of coding which is selective coding (Williams & Moser, 2019). It helped the researcher choose and combine categories of ordered data from axial coding in coherent and meaningful statements (Williams & Moser, 2019). **Table 3.6** above describes the process of thematic analysis coding and examples for each level. After the selective coding process of the 10 transcripts, the researcher identified the relationship between codes that led to define the themes. The researcher defines five themes, which will be discussed in Chapter 4.

CHAPTER FOUR

RESULTS

This study was designed to investigate the faculty's perceptions on the utilization of mobile technology in the context of teaching in graduate education. The first six questions of the electronic survey were addressed in Chapter 4 in the participants' demographics section. It is also important to mention that before addressing this dissertation's research questions, the researcher examined device readiness and use patterns of smartphones and tablets of the participants. Therefore, this chapter will start with the results about device readiness and use patterns of smartphone and tables as reported by participants.

Device Readiness

In the seventh question of the electronic survey, participants were asked to share their device readiness. According to the electronic survey, 92 participants consented to this question. The results of the electronic survey indicate that 91 participants have a smartphone, and one participant does not. **Figure 4.1** describes the percentages of participants who own smartphones. Also, 60 participants shared that they own a tablet and 32 stated they do not have a tablet. **Figure 4.2** describes the percentages of participants who own tablets. Lastly, 57 participants have a tablet with Internet capability and 35 participants do not have a tablet with Internet capability. **Figure 4.3** describes the percentages of participants who own tablets with Internet capability.

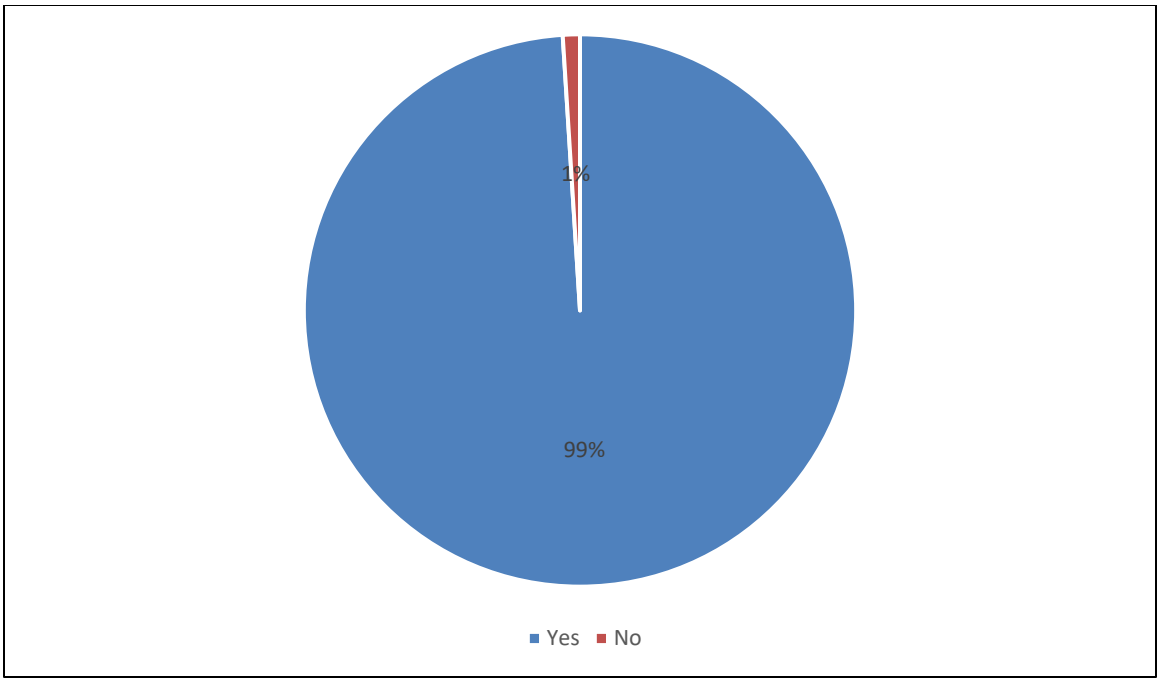

Figure 4.1. Percentages of Participants who Own a Smartphone

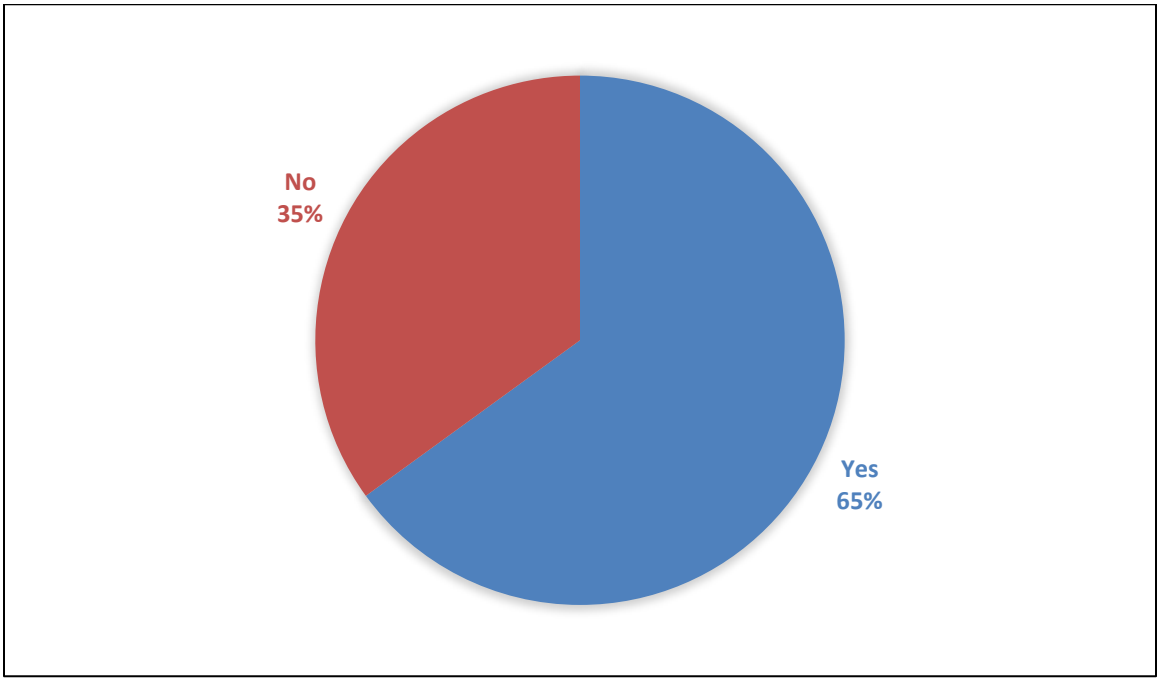

Figure 4.2. Percentages of Participants who Own a Tablet

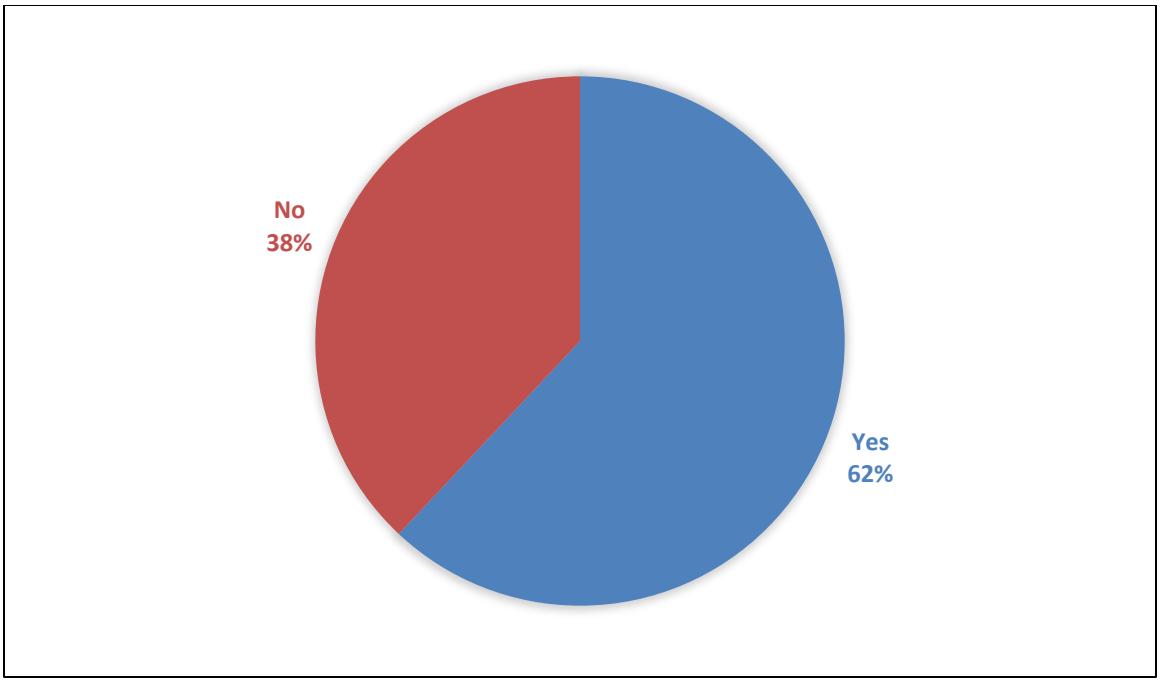

Figure 4.3. Participants who Own Tablet with Internet Capability

Usage Pattern of Smartphone or Tablet

In the eighth question of the electronic survey, participants were asked to assess their usage pattern of smartphones and tablets by reflecting and evaluating 15 statements presented in the electronic survey. Ninety-two participants consented to this question. A scale that includes "Never," "Rarely," "Sometimes," and "Often" was used to measure usage pattern of smartphones and tablets. **Table 4.1** describes the usage pattern of smartphones and tablets, the number of responses per statement, and percentages per statement.

The results indicate that faculty members primarily use their smartphones and tablets for Internet search and checking email (*n*=83), downloading mobile applications (*n*=42), social networking (*n*=36), sharing images, audio, or videos (*n*=47), using an

online calendar or keeping appointments (*n*=70), watching online videos (*n*=35) and using e-commerce services (*n*=45).

Also, the results indicate that faculty members sometimes use their smartphones and tablets for making video calls (*n*=42). Faculty members rarely use their smartphones and tablets as storage devices (*n*=32) or for launching online programs (*n*=34). Furthermore, faculty members never use their smartphones and tablets for downloading and reading e-books (*n*=28), blogging (*n*=69) or to play online interactive games (*n*=59). Lastly, analysis of usage pattern indicates that faculty rarely or never use their smartphones and tablets to download games (*n*=40).

Table 4.1
Graduate Faculty Usage Patterns of Smartphones and Tablets

Statements	**Responses**			
	Never	**Rarely**	**Sometimes**	**Often**
Internet Search	*n*=1 1%	*n*=1 1%	*n*=7 8%	*n*=83 90%
Checking and sending emails	*n*=1 1%	*n*=1 1%	*n*=7 8%	*n*=83 90%
Download mobile applications	*n*=1 1%	*n*=19 21%	*n*=30 33%	*n*=42 46%
Social networking (e.g., Twitter)	*n*=16 17%	*n*=19 21%	*n*=21 23%	*n*=36 39%
Sharing images, audio, or video	*n*=2 2%	*n*=15 16%	*n*=28 30%	*n*=47 51%
Using an online calendar or keeping appointments	*n*=4 4%	*n*=8 9%	*n*=10 11%	*n*=70 76%

Table 4.1 Continued

Downloading and reading e-books	*n*=28 30%	*n*=21 23%	*n*=21 23%	*n*=22 24%
Watching online videos (e.g., YouTube)	*n*=3 3%	*n*=27 29%	*n*=27 29%	*n*=35 38%
Using e-commerce services (e.g., Banking, bill payments, ticket booking, online shopping)	*n*=4 4%	*n*=14 15%	*n*=29 32%	*n*=45 49%
Making video calls (e.g., FaceTime)	*n*=4 4%	*n*=21 23%	*n*=42 46%	*n*=25 27%
Using it as a storage device (e.g., Google Drive, Dropbox	*n*=14 15%	*n*=32 35%	*n*=22 24%	*n*=24 26%
Blogging (e.g., Blogs)	*n*=69 75%	*n*=19 21%	*n*=2 2%	*n*=2 2%
Downloading games	*n*=40 43%	*n*=40 43%	*n*=9 10%	*n*=3 3%
Launching online programs (e.g., Canvas)	*n*=11 12%	*n*=34 37%	*n*=29 32%	*n*=18 20%
Playing online interactive games	*n*=59 64%	*n*=18 20%	*n*=10 11%	*n*=5 5%

RQ1: What are the graduate faculty's perceptions of using M-Learning in graduate learning experiences?

Perceptions

The results indicate that faculty members agreed that M-Learning provides learning opportunities irrespective of place, pace, and time (*n*=43); provides rich learning resources at fingertips (*n*=30); and provides access to Information and Communication Technology (ICT) based educational opportunities to everyone (*n*=40). Faculty members were neutral on whether M-Learning improves communication between learners and

teachers (*n*=27); supports a collaborative learning environment (*n*=29); saves the efforts and time of learners (*n*=36); and replaces e-learning through conventional devices like computers or laptops (*n*=34). Lastly, faculty members disagreed with the claim that M-Learning engages learners to a greater extent (*n*=29) and saves effort and time of teachers (*n*=24). **Table 4.2** describes graduate faculty perceptions of M-Learning, the number of responses per statement, and percentages per statement.

Table 4.2
Graduate Faculty Perceptions of M-Learning

Statements	Responses				
	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
M-Learning provides learning opportunities irrespective of place, pace, and time	*n*=2 2%	*n*=1 1%	*n*=16 18%	*n*=43 48%	*n*=27 30%
M-Learning improves communication between learners and teachers	*n*= 9 10%	*n*=19 21%	*n*=27 30%	*n*=23 26%	*n*=11 12%
M-Learning provides rich learning resources at fingertips	*n*=3 3%	*n*=12 13%	*n*=28 31%	*n*=30 34%	*n*=16 18%
M-Learning provides access to Information and Communication Technology (ICT) based educational opportunities to everyone	*n*=4 4%	*n*=7 8%	*n*=21 24%	*n*=40 45%	*n*=17 19%
M-Learning supports collaborative learning environment	*n*=10 11%	*n*=21 24%	*n*=29 33%	*n*=21 24%	*n*=8 9%
M-Learning saves efforts and time of learners	*n*=7 8%	*n*=18 20%	*n*=36 40%	*n*=20 22%	*n*=8 9%
M-Learning engages learners to a greater extent	*n*=19 21%	*n*=29 33%	*n*=24 27%	*n*=13 15%	*n*=4 4%
M-Learning saves efforts and time of teachers	*n*=24 27%	*n*=22 25%	*n*=23 26%	*n*=15 17%	*n*=5 6%
M-Learning can replace e-learning through conventional devices like computers/ laptops	*n*=19 21%	*n*=22 25%	*n*=34 38%	*n*=12 13%	*n*=2 2%

M-Learning Technology in Courses

In the tenth question of the electronic survey, participants were asked if M-Learning technology (hardware or software) was required in their courses. Eighty-nine participants consented to this question. Participants had the choice to select more than one answer. Sixty-seven participants stated that M-Learning technology was not required in their courses. **Table 4.3** describes participants responses to this specific electronic survey item.

Table 4.3
M-Learning in Graduate Courses

Items	Percentage	Responses
Yes, smartphones	7%	*n*=6
Yes, tablets	1%	*n*=1
Yes, software or applications	21%	*n*=19
No	75%	*n*=67

Open-Ended Survey Question

Participants who stated that M-Learning was used in their courses were also asked to state how it was integrated in their courses. Twenty-two participants responded to this question. The researcher used inductive thematic analysis to answer this question (DeJonckheere1 et al., 2024). The researcher started with 1) familiarizing themselves with the data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes and 6) producing the report (DeJonckheere1 et al., 2024). **Table 4.4** describes the participants' examples of M-Learning technology in their courses.

Table 4.4
M-Learning Integrated in Graduate Courses

Themes	Responses	Participant's Comments
Using software as course requirement	*n*=6	Brenna (Entomology and Plant Pathology): "*I teach a flipped course, and students use software to prepare assignments and test case studies.*" Celine (Theatre): "*I have transitioned to using the ProCreate App for iPads to teach rendering to my students. I have found that it lessens the gap between the self-perceived "good" artists and "lesser" artists and speeds up their process.*"
Using Microsoft Office	*n*=2	Robin (Political Science): "*Must have PowerPoint on their phones*." Patrick (Civil and Environmental Engineering): "*Excel files used to solve some problems.*"
Using LMS	*n*=8	Robin (Political Science): "*Must have Canvas and on their phones.*" Emily (Theory and Practice in Teacher Education): "*Students are required to access the LMS (canvas), and many choose to do so through mobile devices.*"
Using clicker technology	*n*=6	Jack (Business Analytics and Statistics): "*Mainly the PointSolutions "clicker" app*" Timothy (Finance): "*Clicker questions in class*"

Table 4.4 Continued

Using video conferencing tool	***n*=3**	Britany (Civil and Environmental Engineering): "*Students need to attend classes via zoom*" Emily (Theory and Practice in Teacher Education): "*I have many students who participate in Zooms via their mobile device*"

RQ2: Do the graduate faculty's perceptions toward M-Learning differ according to demographic?

The responses from 89 participants who fully completed the electronic survey were used to assess the researcher's research question. To address the perception of M-Learning based on demographics the researcher looked at different independent variables: age category, gender, years of teaching experience, and colleges. The nineth question of the electronic survey addressed perception in M-Learning. Participants shared their level of agreement on specific statements. The results of the electronic survey were converted into numerical values as follows: Strongly Disagree (1 point), Disagree (2 points), Neutral (3 points), Agree (4 points) and Strongly Agree (5 points). The numerical values allowed the analysis of the result by using SPSS (see Appendix I).

SPSS was used for Analysis of Variance (One-way ANOVA), which is a statistical technique used to compare the means of multiple groups (Kim, 2017). One-way ANOVA determines if there are significant differences between the average values of a dependent variable across different levels of an independent variable (Kim, 2017). By using one-way ANOVA, the researcher effectively determined whether there were

significant differences in dependent variables across the various levels of independent variable. This analysis provided valuable insights into the relationship between these variables and contributed to our understanding of research topics.

RQ2a: Do the graduate faculty's perceptions toward mobile learning differ according to age?

There were three age groups. Each age group was categorized as follows: Group 1 (25 - 44 years old) = 42 participants, Group 2 (45 - 64 years old) = 40 participants, and Group 3 (65 years old or more) = 13 participants. The analysis included groups 1 to 3. **Table 4.5** shows the One-way ANOVA results.

Table 4.5
Age Groups One-Way ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.37	2	0.18	7.28	.001
Within Groups	2.35	92	0.03		
Total	2.72	94			

F-statistic (7.28) value suggests the observed differences between the group means are large. Additionally, the analysis indicates that the significance (.001) p-value is lower than .05. There is enough evidence to conclude that there are significant differences in the dependent variable (M-Learning perceptions) across the different levels of the independent variable (the different age groups). Therefore, the analysis supports the claim that the average values of the dependent variable are significantly different among the groups being compared. This means that the graduate faculty perceptions toward M-Learning differ based on their age group categories. A post hoc Tukey test was performed to determine which groups differed significantly.

The post hoc Tukey test revealed that Group 2 (M = 3.15, SD = .23) rated their perceptions significantly higher than Group 1 (M = 3.02, SD = .07), with a mean difference of 0.12 (95% CI [0.04, 0.21], p = .001). Similarly, Group 2 rated their perceptions significantly higher than Group 3 (M = 3.03, SD = .00), with a mean difference of 0.12 (95% CI [0.00, 0.24], p = .04). However, no significant difference was found between Group 3 and Group 1 (p = .99).

RQ2b: Do the graduate faculty's perceptions toward mobile learning differ according to their gender?

There were four gender groups stated in the electronic survey. Each group was categorized as follow: Group 1 (male) = 48 participants, Group 2 (female) = 39 participants, Group 3 (other) = 1 participant, and Group 4 (prefer not to disclose) = 1 participant. The analysis included groups 1 to 4. **Table 4.6** shows the One-way ANOVA results.

Table 4.6.
Gender One-Way ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.30	3	1.10	1.88	.13
Within Groups	49.82	85	0.58		
Total	53.12	88			

F-statistic (1.88) value suggests that the observed differences between the group means are insignificant compared to the variation within the groups. Additionally, the significance (.13) p-value is greater than .05, this means there is not enough evidence to conclude that there are significant differences in the dependent variable (M-Learning perceptions) across the different levels of the independent variable (gender). Therefore,

the analysis suggests that there is no robust evidence to support the claim that the average values of the dependent variable are significantly different among the groups being compared. This means that the graduate faculty perceptions toward M-Learning do not differ according to their gender.

RQ2c: Do the graduate faculty's perceptions toward mobile learning differ according to their years of teaching experience?

There were six categories for year of teaching experience listed in the electronic survey. For the data analysis, each was categorized as follows: Group 1 (5 years or less) = 8 participants, Group 2 (5 - 10 years) = 15 participants, Group 3 (11 - 15 years) = 20 participants, Group 4 (16 - 20 years) = 12 participants, Group 5 (21 – 25 years) = 17 participants, and Group 6 (26 years or more) = 17 participants. The analysis included groups 2 to 6. **Table 4.7** shows the One-way ANOVA results.

Table 4.7
Years of Teaching Experience One-Way ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.89	5	.37	.61	.69
Within Groups	51.22	83	.61		
Total	53.11	88			

F-statistic (.61) value suggests that the observed differences between the group means are insignificant compared to the variation within the groups. 2) Additionally, the significance (.69) p-value is greater than .05, this means there is not enough evidence to conclude that there are significant differences in the dependent variable (M-Learning perceptions) across the different levels of the independent variable (years of teaching experience). Therefore, the analysis suggests that there is no robust evidence to support

the claim that the average values of the dependent variable are significantly different among the groups being compared. This means that the graduate faculty perceptions toward M-Learning do not differ according to their years of teaching experience.

RQ2d: Do the graduate faculty's perceptions toward mobile learning differ according to their area of expertise?

Based on the information shared in the demographic electronic survey, faculty were categorized into nine groups according to their area of expertise. Each group represented a college in the higher education institution where the research was conducted. The nine groups included the following: Group 1 (Agriculture) = 14 participants, Group 2 (Art and Science) = 23 participants, Group 3 (Business) = 12 participants, Group 4 (Education, Health, and Human Sciences) = 19 participants, Group 5 (Engineering) = 9 participants, Group 6 (Law) = 2 participants, Group 7 (Nursing) = 2 participants, Group 8 (Social Work) = 6 participants, and Group 9 (Veterinary Medicine) = 2 participants. The analysis included groups 1 to 9. **Table 4.8** shows the One-way ANOVA results.

Table 4.8
Area of Expertise One-Way AVOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.44	8	1.18	5.21	<.001
Within Groups	18.33	81	0.22		
Total	27.77	89			

F-statistic (5.21) value suggests that the observed differences between the group means are large. Additionally, the analysis of the data indicates that the significance (<.001) p-value is lower than .05. These results indicate enough evidence to conclude that

there are significant differences in the dependent variable (M-Learning perceptions) across the different levels of the independent variable (areas of Expertise). Therefore, the analysis supports the claim that the average values of the dependent variable are significantly different among the groups being compared. This means that the graduate faculty perceptions toward M-Learning differ based in their area of expertise. A post hoc Tukey test was performed to determine which groups differed significantly.

The post hoc Tukey test revealed several significant differences in participants' perceptions. Group 7 (M = 4.11, SD = .00) rated their perceptions significantly higher than Group 1 (M = 2.97, SD = .57), with a mean difference of 1.13 (95% CI [-.01, 2.27], p = .05), Group 2 (M = 2.70, SD = .52), with a mean difference of 1.40 (95% CI [.29, 2.52], p = .004), and Group 5 (M = 2.93, SD = .23), with a mean difference of 1.17 (95% CI [-.00, 2.36], p = .05). Additionally, Group 2 rated their perceptions significantly lower than Group 3 (M = 3.52, SD = .76), with a mean difference of -0.82 (95% CI [-1.36, -0.28], p < .001), and Group 4 (M = 3.30, SD = .21), with a mean difference of -0.60 (95% CI [-1.06, -0.13], p = .003).

There were no significant differences in participants' perceptions between the following groups:

- Group 1 and Group 2 (p = .72), Group 3 (p = .09), Group 4 (p = .58), Group 5 (p = 1.00), Group 6 (p = 1.00), Group 8 (p = .95), and Group 9 (p = 1.00).
- Group 2 and Group 5 (p = .94), Group 6 (p = .98), Group 8 (p = .23), and Group 9 (p = .99).

- Group 3 and Group 4 (p = .93), Group 5 (p = .12), Group 6 (p = .92), Group 7 (p = .79), Group 8 (p = .96), and Group 9 (p = .87).
- Group 4 and Group 5 (p = .60), Group 6 (p = .99), Group 7 (p = .36), Group 8 (p = 1.00), and Group 9 (p = .99).
- Group 5 and Group 6 (p = 1.00), Group 8 (p = .94), and Group 9 (p = 1.00).
- Group 6 and Group 7 (p = .39), Group 8 (p = 1.00), and Group 9 (p = 1.00).
- Group 7 and Group 8 (p = .40) and Group 9 (p = .33).
- Group 8 and Group 9 (p = .99).

RQ3: How are graduate faculty implementing mobile learning in graduate education?

The researcher used individual interviews with faculty to understand how they implement M-Learning in graduate education. At the interview's beginning, interviewees were asked to give permission for the interview recording, and all participants concurred. The average length of the interview was 17:49 minutes. The recordings were obtained using Zoom. At the completion of each Zoom meeting, audio files were automatically produced, and the researcher used Microsoft Excel to transcribe each interview. Despite the electronic survey's assertion that the interview is intended for faculty members who have experience with M-Learning, some interviewees disclosed that they did not have any experience with it (*n*=5). The other interviewees were confident and have experience with M-Learning (*n*=5).

First, the interviewees were asked about their experience with using smartphone or tablet. All of them revealed that they have smartphones, and they used them for basic skills such as searching on the Internet because the screen of smartphones is small.

Interviewees stated that they have tablets (iPads) and use them for teaching and learning opportunities (*n*=5). Also, they were asked if they can provide examples of mobile applications. All of them provided mobile applications like Tableau, an analytic platform. The interviewees were subsequently asked regarding their level of familiarity with the most recent technology in the classroom. The interviewees responded that they maintain a high level of familiarity with the most recent technology in the classroom (*n*=4). Interestingly, interviewees revealed that they implemented M-Learning technology in practical courses (n=5). Afterward, they were asked about how they incorporated M-Learning in their courses. They stated that they used smartphones or tablets in their courses (*n*=5). Nevertheless, all interviewees were unaware of the M-Learning initiatives of other universities. They expressed an interest in participating in M-Learning training offered by their institution (*n*=8), while others were confident in their ability to utilize M-Learning at an advanced level (*n*=2).

The interviews were analyzed using inductive thematic analysis (DeJonckheere1 et al., 2024). Interviews with faculty revealed several themes and views among the participants. The results of the interview indicate that the highest number of participants stated that they use their mobile devices for accessing the LMS (Canvas) (*n*=9). Also, the results found that participants use mobile devices for students' assessment (*n*=2), to enhance students' performance (*n*=2), to promote teaching Self-efficacy (*n*=4) and to increase accessibility for students (*n*=3). **Table 4.9** describes the M-Learning themes, number of responses and examples from the interview.

Table 4.9
Implementation of mobile learning in graduate education

Themes	Responses	Examples
Using mobile devices for students' assessment	*n*=2	Anna (Anthropology): "*I have an iPad that I use when I'm grading… I like that Canvas has a mechanism to be able to just say, count the best 10 towards the grades. So, I don't have to calculate that.*" Ayden (Management and Entrepreneurship): "*I use my tablet many times a day…I'm looking at a technology now that could evaluate a recorded video for just certain key phrases so that I could automate the grading process.*"
Using mobile devices for accessing the LMS	*n*=9	Aaron (Educational Research): "*My experience when I upgraded to tablets, I used it significantly for teaching, especially for using Canvas. And so, a lot of what I designed, we designed some curriculum for students on how to use Canvas*." Abby (Apply Chain Management): "*As a teacher, there's lots of apps on the iPad just for you or you can put on your tablet for education, whether it's canvas, whether it's just notes taking and different project planners*." Ashton (Political Science): "*I have a lot of experience teaching, and I have a very developed curriculum. And I mean, I use, like canvas, and I have my students watch videos sometimes on YouTube, things like that.*"

Table 4.9 Continued

Using mobile devices to enhance students' performance	*n*=2	Aria (Theory and Practice in Teacher Education): "*I've incorporated phones. So, I guess the way that I incorporate mobile phones or smartphones is through doing in class surveys, where people can scan, you know, the QR code and it'll take them to a survey link and or they can text, write their response.*" Asher (Supply Chain Management): "*I've used the Mentimeter platform, and I use it to sort of engage the students in an interactive fashion, to try to create some engagement by posing questions and getting reactions to various videos or presentations and so forth.*"
Using M-Learning to promote teaching Self-efficacy	*n*=4	Aaron (Educational Research): "*I would say to a very high level, I'm always keeping up to date with the latest developments, especially when it comes to anything that I know could impede their learning*." Aria (Teaching and Practice in Teacher Education): "*I do a fairly good job of keeping up to date with technology developments for teaching, not as much as I could, but I'm definitely open to trying things*." Arthur (Supply Chain Management): "*So whenever new technology is available from our vendors that supply our textbooks, usually, fairly frequently, if something new technology becomes available. They allow us to test it.*" Ayden (Management and Entrepreneurship): "*For my classes, I stay pretty up to date. I wouldn't say I'm on the cutting edge, but I have developed online asynchronous courses now for about two years.*"

Table 4.9 Continued

Using mobile devices to increase accessibility for students	*n*=3	Aria (Theory and Practice in Teacher Education): "*I think the other thing that I've really tried to do is to make participation in my courses as accessible as possible. So, I've been using the Owl device to provide opportunities for people to join class by zoom when they have a situation that prevents them from being there during an in-person class.*" Alice (Public Health): "*I tried to make sure that students can access all of the opportunities in a number of ways. And one of those ways is mobile*."

CHAPTER FIVE

DISCUSSION

The purpose of this research was to investigate graduate faculty perceptions toward M-Learning. This research effort also aimed to investigate the graduate faculty implementation of M-Learning in graduate education. Prior research on M-Learning has primarily focused on students' perceptions (Korucu & Bicer, 2018). However, few studies present faculty perceptions and implementation of M-Learning in the context of graduate education (Pollara, 2011). This chapter will discuss implications of the study results, conclusions, future research considerations, and limitations of this dissertation research.

Implications of this Study

The results of the electronic survey and the individual interviews revealed that graduate faculty members have diverse perspectives on the usage of M-Learning. For example, one of the key findings of this investigation is that most graduate faculty members did not perceive M-Learning as an instructional strategy that saves effort or time. In fact, interviews with graduate faculty members revealed that instructors find it challenging to stay up to date with M-Learning technology due to time constraints. The findings indicate that graduate faculty are often overwhelmed by their teaching schedules and do not have time to engage in professional development on how to incorporate M-Learning into the courses they teach. Prior research stated that interactive teaching with technology, as compared to traditional lecturing, often requires more preparation time (Brownell & Tanner, 2012).

Other diverse perspectives related to M-Learning included the (1) need for implementation, (2) method of implementation, and (3) resources available for implementation. In an individual interview with Ashton (political science instructor), he indicates that he does not need technological innovation in his teaching, since he often receives positive teaching evaluations. In an individual interview Ayden (management & entrepreneurship instructor), who fully supported the use and integration of M-Learning, stated that he does not restrict students from using mobile devices in the classroom as graduate students are viewed as more mature. Also, interviews with graduate faculty indicate that to engage in M-Learning, resources should be provided by their institution. For example, several interviewees stated that if faculty intend to incorporate M-Learning in their courses, their university must supply mobile devices. These results align with findings from previous studies which stated that faculty members' perceptions of how M-Learning should be implemented are among the elements impacting its widespread usage (Mohammadi et al., 2020).

Additionally, the results of this investigation provided mixed results. Analysis of the electronic survey revealed that graduate faculty did not perceive M-Learning to enhance communication. Yet, an individual interview with Alice (public health instructor) revealed that she uses her mobile devices daily to interact with students and to facilitate communication as part of her teaching. Prior research supports the benefits of M-Learning technologies for both learner-to-learner and learner-to-instructor communication (Darko-Adjei, 2019; Miglani & Awadhiya, 2017; Oliveira et al., 2021).

There were also mixed results related to the use of M-Learning for collaboration. Analysis of the electronic survey revealed that faculty did not perceive M-Learning to support collaborative learning environment. However, individual interviews with Aria (theory & practice in teacher education instructor) and Alice (public health instructor) revealed that they utilized M-Learning technologies to engage learners in collaborative learning in a mobile-friendly manner. The findings from the individual interviews resonate with prior research by Gikas & Grant (2013) who reported that M-Learning enables learners to interact, discuss information with classmates and instructors, and generate new meaning and comprehension.

The results of this investigation did suggest that graduate faculty perceived M-Learning to provide learning opportunities irrespective of place, pace, and time. Interviewees emphasized that students could attend online synchronous and asynchronous classes from anywhere. For example, during an individual interview Aaron (educational research instructor) stated that the use of video conferencing software (i.e., Zoom) through a mobile application allows students to attend class while traveling. The findings indicate that graduate faculty appreciate that M-Learning benefits students by allowing them to participate in class remotely. Similarly, prior research has emphasized that the rapid expansion of mobile technology in the field of education allows students to have easy access to classes regardless of location or time limitations (Nicolaidou et al., 2023).

The results of this investigation also revealed that faculty did not perceive that M-Learning can replace computers and laptops. For example, an individual interview with

Ayden (management & entrepreneurship instructor) stated that in some instances he preferred to access a computer desktop because the screen is bigger. These findings align with a study reported by Miglani & Awadhiya (2017) who concluded that mobile devices cannot replace conventional technologies (computers & laptops) because mobile devices have limited display capabilities and input interfaces.

The findings of this study revealed differences in graduate faculty perceptions of M-Learning based on their areas of expertise and age groups. However, this contrasts with Al-Hunaiyyan et al. (2017), who found that instructors' perceptions of M-Learning did not vary by age. On the other hand, the results of this dissertation align with Al-Hunaiyyan et al. (2017) in showing no differences in perceptions of M-Learning based on gender. Furthermore, the study indicated no significant differences in faculty perceptions of M-Learning according to years of teaching experience, a finding consistent with Al-Emran et al. (2016), who reported similar results regarding educators' use of M-Learning.

Lastly, the results of the electronic survey and individual interviews helped map how faculty used M-Learning technologies in graduate education. The results of this investigation revealed that M-Learning is often seen as self-directed learning not mandated by the instructor. Given the ease of access to M-Learning technology, faculty perceive it as a default method for students to engage with instructional content. The faculty recognized the use of M-Learning as a basic course requirement in graduate education. For example, in the electronic survey, faculty referred to M-Learning technology as accessing the LMS (e.g., Canvas), using video conferencing tools (e.g., Zoom) and using Microsoft Office (e.g., Excel and PowerPoint). Others perceived M-

Learning technology as using clicker technology (e.g., PointSolutions formerly known as TurningPoint) to engage students during lectures.

Conclusion

The results of this research indicated that graduate faculty have various perceptions of M-Learning. Although faculty are aware of the positive aspects of M-Learning, they were neutral about M-Learning use in graduate education. Based on the results, it is difficult to determine whether M-Learning technology is used in teaching and learning opportunities in graduate education. According to studies on M-Learning, the primary components of M-Learning implementation in graduate education are students, instructors, and institutions (Miglani & Awadhiya, 2017). While several studies have already established students' preparedness and acceptance of M-Learning, this study focuses on perspectives of graduate faculty, who are a vital link in the overall framework of information delivery. This research concludes that graduate faculty consider M-Learning as a component of the learning experience that may be used to fulfill basic course requirements such as accessing LMS and the video conferencing software (i.e., Zoom). The results suggest that graduate faculty members are interested in attending M-Learning professional development to better understand how to use M-Learning in graduate education.

Limitations

This study's potential shortcomings include a small sample size for both the electronic survey and individual interviews. The electronic survey's sample size is insufficient for statistical analysis based on this specific research population. The

researcher contacted over 800 faculty members; however, the response rate was lower than anticipated given the size of the potential pool of participants. Furthermore, the number of individual interviewers was small, with five out of ten participants having experience with M-Learning. Due to the absence of M-Learning experience among certain participants for individual interviews, the researcher was unable to provide more instances of M-Learning in graduate education.

Future Research

This research helped to understand how faculty perceived M-Learning in graduate education. This research was limited to graduate faculty at a specific university in the United States. Future research might involve graduate faculty perceptions of M-Learning from multiple universities in various regions and with different availability of resources. Future research could also explore graduate faculty perceptions of M-Learning in an international context in countries in different geographical regions across the globe. Furthermore, future research could help determine whether there is a distinction in faculty perception in terms of institutional affiliation by country. Tablets and smartphones were the primary focus of this M-Learning investigation. Future research could consider only examining smartphones or tablets. This might help M-Learning researchers to focus on the features of smartphones or tablets.

In terms of the data collection procedure, future research could consider using social media to distribute the survey to reach many potential respondents from different institutions. In future research, it is important to consider analyzing a larger sample especially for statistical measurement (Pollara, 2011). This study employed an electronic

survey for all faculty members, regardless of whether they have M-Learning experience. Future research on M-Learning might consider only faculty members with M-Learning experience. This will allow M-Learning researchers to evaluate large amounts of data more effectively.

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APPENDIX

Appendix A

Institutional Review Board Approval

THE UNIVERSITY OF TENNESSEE KNOXVILLE

May 16, 2024

Enilda Jannet Romero-Hall
UTK - Coll of Education, Hlth, & Human - Theory & Prac-Teacher Ed

Re: UTK IRB-24-08211-XM
Study Title: Higher Education Faculty Perceptions and Implementation of Mobile Learning in Graduate Education

Dear Enilda Jannet Romero-Hall:

The Human Research Protections Program (HRPP) reviewed your application for the above referenced project and determined that your application is eligible for **exempt** review under 45 CFR 46.101. Category 2: Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Your application has been determined to comply with proper consideration for the rights and welfare of human subjects and the regulatory requirements for the protection of human subjects.

Therefore, this letter constitutes full approval of your application (Version 1.1) as submitted, including:

Documents Stamped:

- Interview Informed Consent Form Revised (English) - (Version 2.0)
- Survey Online Informed Consent Form Revised (English) - (Version 1.0
- Qualtrics Survey Software_Revised - (Version 1.0)
- Department Head Email - (Version 1.0)
- Interview Protocol - (Version 1.0)
- Survey - (Version 1.0)

That have been dated and stamped IRB approved. You are approved to enroll a maximum of 1020 participants. Approval of this study will be valid from 05/16/2024.

Any revisions in the approved application, consent forms, instruments, recruitment materials, etc., must be submitted to and approved by the IRB prior to implementation. In addition, you are responsible for reporting any

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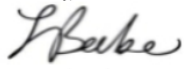
1534 White Avenue Knoxville, TN 37996-1529
865-974-7697 865-974-7400 fax irb.utk.edu

unanticipated serious adverse events or other problems involving risks to subjects or others in the manner required by the local IRB policy.

Approval of this study is valid for three years. If a Study Update Form is not submitted in iMedRIS and approved by the IRB prior to 05/15/2027, the study will be automatically closed by the IRB and no further study activity will be permitted until a Study Update Form is received. Please be sure to also submit a Study Closure Request (Form 7) when all research activity, including data analysis, has been completed.

Sincerely,



Lora Beebe, Ph.D., PMHNP-BC, FAAN
Chair

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Appendix B

Higher Education Faculty Perceptions and Implementation of Mobile Learning in Graduate Education Survey

1. Have you taught at graduate level in the last year?
    - Yes
    - No
- Please click here to access the online consent form for the survey.

  STATEMENT OF CONSENT

  I have read the form, and the research study has been explained to me. I have been given the chance to ask questions, and my questions have been answered. If I have more questions, I have been told who to contact. By Selecting "I Agree" below, I am providing my signature by electronic means and agree to be in this study. I can print or save a copy of this consent information for future reference. If I do not want to be in this study, I can select "I Do Not Agree" to exit the survey.
    - I Agree
    - I Do Not Agree
2. What is your gender identity?
    - Male
    - Female
    - Other
    - Prefer not to disclose
3. What is your age?
    - 18- 24 years old
    - 25- 34 years old
    - 35- 44 years old
    - 45- 54 years old
    - 55-64 years old
    - 65 years or older
4. How many years of teaching experience?
    - 5 years or less
    - 5- 10 years
    - 11- 15 years
    - 16- 20 years
    - 21- 25 years
    - 26 or more
5. In which department do you teach?

   _____

6. In what teaching modalities have you taught? Please check all that apply.
    - In-person teaching
    - Online synchronous
    - Online asynchronous
    - Hybrid (with in-person and synchronous online sessions)
    - Hybrid (with synchronous and asynchronous online sessions)
    - Other
7. Device Readiness:

    - Do you have a smartphone?
        - Yes
        - No
    - Do you have a tablet?
        - Yes
        - No
    - Do you have a tablet with Internet capability?
        - Yes
        - No
8. The following statements will allow you to evaluate and reflect upon your usage Pattern of Smartphone and/or Tablet. For each statement, please select the response that best represents you.

Statement	**Never**	**Rarely**	**Sometimes**	**Often**
Internet Search				
Checking and Sending emails				
Download mobile applications (Apps)				
Social Networking (e.g., Twitter etc.)				
Sharing images/ audio/ video				
Using online calendar/ Keeping appointment				
Downloading and reading e-books				
Watching online videos (e.g., YouTube etc.)				
Using e-commerce services (e.g., Banking, Bill payments, Ticket booking, online shopping etc.)				
Making video calls (e.g., FaceTime etc.)				

Using it as a storage device (e.g., Google Drive, Dropbox etc.)
Blogging (e.g., Blogs etc.)
Downloading games
Launching online programs (e.g., Canvas etc.)
Playing online interactive games

9. The following statements will allow you to evaluate and reflect upon your mobile learning perspective. For each statement, please select the response that best represents you.

Statement	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Mobile learning provides learning opportunities irrespective of place, pace, and time					
Mobile learning improves communication between learners and teachers Mobile learning provides rich learning resources at fingertips					
Mobile learning provides access to Information and Communication Technology (ICT) based educational opportunities to everyone					
Mobile learning supports collaborative learning environment					
Mobile learning saves efforts and time of learners					
Mobile learning engages learners to a greater extent					
Mobile learning saves efforts and time of teachers					
Mobile learning can replace e-learning through conventional devices like computers/ laptops					

10. Are mobile learning technology (hardware and/or software) required in your courses? Please check all that apply.
    - Yes, smartphones
    - Yes, tablets
    - Yes, software or applications
    - No

11. If "yes" to the above question, how is mobile learning technology (hardware and/or software) used in your courses?

_____

Invitation to Participate in an Individual Interview

Thank you for participating in this electronic survey. I am seeking to interview faculty members who teach at graduate level (at least in the last year) and use mobile learning in their teaching practice. Please enter your email address below, if I may contact you for a short interview via zoom:

- Name (First and Last Name):
- Preferred Email Address:

Appendix C

Interview Protocol

Date: _____
Participant's Name: _____
Consent Provided? _____
Consent to Record Provided? _____
ID Number: _____

Please remember that for the purpose of this investigation mobile learning is defined as: a type of learning across multiple contexts through social and content interactions, without limitations of time and place, using tablets and smartphones (Crompton & Burke, 2018; Hilao & Wichadee, 2017; Dunleavy et al., 2019).

1. Describe your experiences with using mobile technology, specifically tablets & smartphones.
2. Have you ever used your mobile tablet or smartphone for your own personal learning? How?
3. To what extent would you say you keep up with the latest developments in technologies for your classes?
4. Are you aware of any mobile applications that may be used in your profession?
5. How have you incorporated mobile learning in the classroom? What mobile device(s) did you use? What applications did you use? What challenges and benefits did you encounter?
6. What type of courses have you taught utilizing mobile technology (i.e., theoretical, practical, research, etc.)?
7. Do you know of any universities that have mobile learning initiatives to encourage the use of mobile devices or applications in teaching and learning? How would you feel if this university started one?
8. Would you attend training provided by your institution on mobile learning? What would you be interested in learning? Please explain your response.

Post-Interview Notes:

_____
_____

Appendix D

Online Consent Form for Survey

Research Study Title: Higher Education Faculty Perceptions and Implementation of Mobile Learning in Graduate Education

Researcher(s): Dr. Enilda Romero-Hall, University of Tennessee, Knoxville and Afnan Alyanbaawi, University of Tennessee, Knoxville

Why am I being asked to be in this research study?

We are asking you to be in this research study because you are a faculty at the University of Tennessee, Knoxville, and have an essential perspective relevant to our research project. The information in this consent form is to help you decide if you want to be in this research study. Please take your time reading this form and contact the researcher(s) to ask questions if there is anything you do not understand.

What is this research study about?

The purpose of the research study is to investigate graduate faculty readiness and perceptions of mobile learning. Also, the study will investigate how faculty implement mobile learning in graduate education.

How long will I be in the research study?

If you agree to be in the study, your participation in the survey will take 15-20 minutes.

What will happen if I say "Yes, I want to be in this research study"?

If you agree to be in this study, we will ask you to complete an electronic survey. At the end of the survey, you will be asked to provide your name and an email to contact you if you have experience with mobile learning. After collecting the survey, we may contact you for an online individual interview. Please be aware that providing your name and email address for the interview is voluntary and not required. You include this information if you want to be contacted for participation in the interview.

What happens if I say "No, I do not want to be in this research study"?

You can say no now or leave the study later. Either way, your decision will not affect your employment at the University of Tennessee Knoxville.

What happens if I say "Yes" but change my mind later?

Even if you decide to be in the study now, you can change your mind and stop at any time.

Are there any possible risks to me?

It is possible that someone could find out you were in this study or see your study information, but we believe this risk is small because of the procedures we use to protect your information.

Are there any benefits to being in this research study?

There are no direct benefits to research participants. Your participation will help us to learn more about mobile learning in higher education. We hope the knowledge gained from this study will benefit you and others in the future.

Who can see or use the information collected for this research study?

We will protect the confidentiality of your information by assigning you a pseudonym. If information from this study is published or presented at scientific meetings, your name and other personal information will not be used.

What will happen to my information after this study is over?

We will not keep your information to use for future research or other purposes. Your name and other information that can directly identify you will be kept secure and stored separately from your research data collected as part of the study. We will not share your research data with other researchers.

Will I be paid for being in this research study?

You will not be paid for being in this study.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers, Dr. Enilda Romero-Hall, eromeroh@utk.edu and Afnan Alyanbaawi, aalyanba@vols.utk.edu, 865-437-6070. For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact: Institutional Review Board, The University of Tennessee, Knoxville, Phone: 865-974-7697, Email: utkirb@utk.edu.

STATEMENT OF CONSENT

I have read this form, and been given the chance to ask questions, and have my questions answered. If I have more questions, I have been told who to contact. By selecting "I Agree" below, I am providing my signature by electronic means and agree to be in this

study. I can print or save a copy of this consent information for future reference. If I do not want to be in this study, I can select “I Do Not Agree” to exit the survey.

Appendix E

Consent Form for Individual Interview

Research Study Title: Higher Education Faculty Perceptions and Implementation of Mobile Learning in Graduate Education

Researcher(s): Dr. Enilda Romero-Hall, University of Tennessee, Knoxville and Afnan Alyanbaawi, University of Tennessee, Knoxville

Why am I being asked to be in this research study?

We are asking you to be in this research study because you are a faculty member at the University of Tennessee, Knoxville, and have an essential perspective relevant to our research project. The information in this consent form will help you decide if you want to participate in this research study. Please take your time reading this form and contact the researcher(s) to ask questions if there is anything you do not understand.

What is this research study about?

The purpose of the research study is to investigate graduate faculty readiness and perceptions of mobile learning. Also, the study will investigate how faculty implement mobile learning in graduate education courses.

How long will I be in the research study?

If you agree to be in the study, your participation in the interview will take 45 minutes.

What will happen if I say "Yes, I want to be in this research study"?

If you agree to be in this study, you will receive an email to schedule a time for an individual interview. It will be online via zoom. The interview will be audio recorded. Otter.ai may use participant transcript information for testing, tuning, optimizing, validating, or otherwise enhancing the analytics, models, or algorithms underlying the service.

What happens if I say "No, I do not want to be in this research study"?

Being in this study is up to you. You can say no now or leave the study later. Either way, your decision will not affect your employment at the University of Tennessee Knoxville.

What happens if I say "Yes" but change my mind later?

Even if you decide to be in the study now, you can change your mind and stop at any time.

Are there any possible risks to me?

It is possible that someone could find out you were in this study or see your study information, but we believe this risk is small because of the procedures we use to protect your information.

Are there any benefits to being in this research study?

There are no direct benefits to research participants. Your participation will help us to learn more about mobile learning in higher education. We hope the knowledge gained from this study will benefit you and others in the future.

Who can see or use the information collected for this research study?

We will protect the confidentiality of your information by assigning you a pseudonym. If information from this study is published or presented at scientific meetings, your name and other personal information will not be used.

What will happen to my information after this study is over?

We will not keep your information to use for future research or other purposes. Your name and other information that can directly identify you will be kept secure and stored separately from your research data collected as part of the study. We will not share your research data with other researchers.

Will I be paid for being in this research study?

You will not be paid for being in this study.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers, Dr. Enilda Romero-Hall, eromeroh@utk.edu and Afnan Alyanbaawi, aalyanba@vols.utk.edu, 865-437-6070. For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact: Institutional Review Board, The University of Tennessee, Knoxville, Phone: 865-974-7697, Email: utkirb@utk.edu

STATEMENT OF CONSENT

I have read this form, and the research study has been explained to me. I have been given the chance to ask questions, and my questions have been answered. If I have more

questions, I have been told who to contact. I agree to participate in the research study and/or I do not agree to participate in the research study.

Appendix F

Survey Email

Dear Prof. (Department Chair Name), or Dear Dr. (Faculty Name):

I hope this email finds you well. I am Afnan Alyanbaawi, a doctoral student in the Learning, Design, and Technology program at the University of Tennessee Knoxville (UTK). I am conducting dissertation research with Dr. Enilda Romero-Hall. The research examines the implementation of mobile learning in graduate education, with particular emphasis on the faculty's perspective and current practices of mobile learning. This study is conducted at [institution of higher education]. The study participants are graduate faculty. This study uses an electronic survey about graduate faculty perceptions of mobile learning. Please find the attached flyer.

I would like to ask you to share this email with faculty members in your department. The survey will take approximately 15-20 minutes to complete. Here is the link: https://utk.co1.qualtrics.com/jfe/form/SV_9FWuB3ke3gnPBOu. If you have any questions, please let me know.

Best Regards,

Afnan Alyanbaawi
University of Tennessee Knoxville

Appendix G

Interview Email

Dear Dr. (Faculty Name),

I hope this email finds you well. I am Afnan Alyanbaawi, a doctoral student in the Learning, Design, and Technology program. I am conducting dissertation research with Dr. Enilda Romero-Hall. The study examines the implementation of mobile learning in graduate education, with particular emphasis on the faculty's perspective and current practices of mobile learning. This study uses individual interviews to collect information about mobile learning. You have provided your information in the survey. Therefore, you have been chosen to participate in this study. The interview will take 45 minutes. It will be online via zoom. The interview will be audio-taped, and you will be given a pseudonym to guarantee that your information remains confidential. Your participation in the study is voluntary.

Your participation will add to the growing academic body of knowledge about the implementation of mobile learning in graduate education. I will send you the interview questions and the consent form for further information. When you are ready, please sign the consent form and let me know when you are available for an individual interview. If you need more information, please let me know.

Best Regards,

Afnan Alyanbaawi
University of Tennessee Knoxville

Appendix H

Survey Flyer

Appendix I

ANOVA Outputs

One-way ANOVA (Age)

Descriptives

Perception

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
1	42	3.02	.07	.01	3.00	3.04	2.99	3.20
2	40	3.15	.23	.03	3.07	3.22	2.90	3.36
3	13	3.03	.00	.00	3.03	3.03	3.03	3.03
Total	95	3.07	.17	.01	3.04	3.11	2.90	3.36

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Perception	Based on Mean	275.63	2	92	<.001
	Based on Median	14.95	2	92	<.001
	Based on Median and with adjusted df	14.95	2	48.47	<.001
	Based on trimmed mean	230.42	2	92	<.001

ANOVA

Perception

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.37	2	.186	7.28	.001
Within Groups	2.35	92	.03		
Total	2.72	94			

ANOVA Effect Sizes[a]

		Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
Perception	Eta-squared	.13	.02	.25
	Epsilon-squared	.11	.00	.24
	Omega-squared Fixed-effect	.11	.00	.23
	Omega-squared Random-effect	.06	.00	.13

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Perception

Tukey HSD

(I) Age group	(J) Age group	Mean Difference (I-J)	Std. Error	Sig.	95% Cc Lower Bo
1	2	-.12*	.03	.00	
	3	-.00	.05	.99	
2	1	.12*	.03	.00	
	3	.12*	.05	.04	
3	1	.00	.05	.99	
	2	-.12*	.05	.04	

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Perception

Tukey HSD[a,b]

Age group	N	Subset for alpha = 0.05 1	2
1	42	3.02	
3	13	3.03	
2	40		3.15
Sig.		.99	1.0

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 23.860.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

One-way ANOVA (Gender)

Descriptives

Perception

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	48	3.18	.77	.11	2.96	3.40	1.00	5.00
2	39	2.99	.75	.12	2.74	3.23	1.22	4.66
3	1	3.44	.	.	.	.	3.44	3.44
4	1	1.55	.	.	.	.	1.55	1.55
Total	89	3.08	.77	.08	2.92	3.24	1.00	5.00

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Perception	Based on Mean	.142	1	85	.708
	Based on Median	.090	1	85	.765
	Based on Median and with adjusted df	.090	1	84.150	.765
	Based on trimmed mean	.140	1	85	.710

ANOVA

Perception

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.305	3	1.102	1.880	.139
Within Groups	49.820	85	.586		
Total	53.126	88			

ANOVA Effect Sizes[a,b]

		Point Estimate	95% Confidence Interval	
			Lower	Upper
Perception	Eta-squared	.062	.000	.155
	Epsilon-squared	.029	-.035	.125
	Omega-squared Fixed-effect	.029	-.035	.124
	Omega-squared Random-effect	.010	-.011	.045

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
b. Negative but less biased estimates are retained, not rounded to zero.

One-way ANOVA (Year of Teaching Experience)

Descriptives

Perception

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	8	3.18	.94	.33	2.39	3.97	1.77	5.00
2	15	2.96	.42	.10	2.72	3.19	2.33	4.11
3	20	3.16	.83	.18	2.77	3.55	1.00	4.22
4	12	3.27	.79	.22	2.77	3.78	2.11	4.88
5	17	3.15	.92	.22	2.67	3.62	1.55	4.66
6	17	2.84	.73	.17	2.47	3.22	1.22	4.11
Total	89	3.08	.77	.08	2.92	3.24	1.00	5.00

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Perception	Based on Mean	1.361	5	83	.248
	Based on Median	1.035	5	83	.402
	Based on Median and with adjusted df	1.035	5	70.746	.404
	Based on trimmed mean	1.302	5	83	.271

ANOVA

Perception

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.890	5	.378	.612	.691
Within Groups	51.222	83	.617		
Total	53.112	88			

ANOVA Effect Sizes[a,b]

		Point Estimate	95% Confidence Interval	
			Lower	Upper
Perception	Eta-squared	.036	.000	.081
	Epsilon-squared	-.023	-.060	.026
	Omega-squared Fixed-effect	-.022	-.060	.025
	Omega-squared Random-effect	-.004	-.011	.005

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
b. Negative but less biased estimates are retained, not rounded to zero.

One-way ANOVA (Areas of Expertise)

Descriptives

Perception

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
1	14	2.97	.57	.15	2.64	3.30	1.55	3.55
2	24	2.70	.52	.10	2.47	2.92	1.92	3.55
3	12	3.52	.76	.22	3.03	4.01	2.33	4.22
4	19	3.30	.21	.04	3.20	3.40	3.11	3.83
5	9	2.93	.23	.07	2.75	3.11	2.55	3.22
6	2	3.05	.00	.00	3.05	3.05	3.05	3.05
7	2	4.11	.00	.00	4.11	4.11	4.11	4.11
8	6	3.25	.00	.00	3.25	3.25	3.25	3.25
9	2	3.00	.00	.00	3.00	3.00	3.00	3.00
Total	90	3.0868	.55	.05	2.96	3.20	1.55	4.22

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Perception	Based on Mean	9.42	8	81	<.001
	Based on Median	3.28	8	81	.003
	Based on Median and with adjusted df	3.28	8	31.65	.008
	Based on trimmed mean	9.10	8	81	<.001

ANOVA

Perception

		Sum of Squares	df	Mean Square	F	Sig.
Perception	Between Groups	9.44	8	1.18	5.21	<.001
	Within Groups	18.33	81	.22		
	Total	27.77	89			

ANOVA Effect Sizes[a]

		Point Estimate	95% Confidence Interval Lower	Upper
Perception	Eta-squared	.34	.11	.42
	Epsilon-squared	.27	.03	.36

	Omega-squared Fixed-effect	.27	.03	.36
	Omega-squared Random-effect	.04	.00	.06

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Perception

Tukey HSD

(I) College	(J) College	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1	2	.27	.16	.72	-.23	.78
	3	-.54	.18	.09	-1.14	.04
	4	-.32	.16	.58	-.86	.20
	5	.04	.20	1.00	-.60	.69
	6	-.07	.35	1.00	-1.21	1.07
	7	-1.13	.35	.05	-2.27	.01
	8	-.27	.23	.95	-1.01	.46
	9	-.02	.35	1.00	-1.16	1.12
2	1	-.27	.16	.72	-.78	.23
	3	-.82*	.16	<.001	-1.36	-.28
	4	-.60*	.14	.00	-1.06	-.13
	5	-.23	.18	.94	-.82	.35
	6	-.34	.35	.98	-1.46	.76
	7	-1.40*	.35	.00	-2.52	-.29
	8	-.54	.21	.23	-1.24	.14
	9	-.29	.35	.99	-1.41	.81
3	1	.54	.18	.09	-.04	1.14
	2	.82*	.16	<.00	.28	1.36
	4	.22	.17	.93	-.33	.78
	5	.59	.20	.12	-.07	1.26
	6	.47	.36	.92	-.68	1.63
	7	-.58	.36	.79	-1.74	.57
	8	.27	.23	.96	-.48	1.03
	9	.52	.36	.87	-.63	1.68
4	1	.32	.16	.58	-.20	.86
	2	.60*	.14	.00	.13	1.06
	3	-.22	.17	.93	-.78	.33
	5	.36	.19	.60	-.24	.98
	6	.25	.35	.99	-.87	1.38

	7	-.80	.35	.36	-1.93	.32
	8	.05	.22	1.00	-.65	.76
	9	.30	.35	.99	-.82	1.43
5	1	-.04	.20	1.00	-.69	.60
	2	.23	.18	.94	-.35	.82
	3	-.59	.20	.12	-1.26	.07
	4	-.36	.19	.60	-.98	.24
	6	-.11	.37	1.00	-1.30	1.06
	7	-1.17	.37	.05	-2.36	.00
	8	-.31	.25	.94	-1.11	.48
	9	-.06	.37	1.00	-1.25	1.11
6	1	.07	.35	1.00	-1.07	1.21
	2	.34	.35	.98	-.76	1.46
	3	-.47	.36	.92	-1.63	.68
	4	-.25	.35	.99	-1.38	.87
	5	.115	.37	1.00	-1.06	1.30
	7	-1.06	.47	.39	-2.57	.45
	8	-.20	.38	1.00	-1.43	1.03
	9	.05	.47	1.00	-1.46	1.56
7	1	1.13	.35	.05	-.01	2.27
	2	1.40*	.35	.00	.29	2.52
	3	.58	.36	.79	-.57	1.74
	4	.80	.35	.36	-.32	1.93
	5	1.17	.37	.05	-.00	2.36
	6	1.06	.47	.39	-.45	2.57
	8	.86	.38	.40	-.37	2.09
	9	1.11	.47	.33	-.40	2.62
8	1	.27	.23	.95	-.46	1.01
	2	.54	.21	.23	-.14	1.24
	3	-.27	.23	.96	-1.03	.48
	4	-.05	.22	1.00	-.76	.65
	5	.31	.25	.94	-.48	1.11
	6	.20	.38	1.00	-1.03	1.43
	7	-.86	.38	.40	-2.09	.37
	9	.25	.38	.99	-.98	1.48
9	1	.02	.35	1.00	-1.12	1.16
	2	.29	.35	.99	-.81	1.41
	3	-.52	.36	.87	-1.68	.63
	4	-.30	.35	.99	-1.43	.82
	5	.06	.37	1.00	-1.11	1.25
	6	-.05	.47	1.00	-1.56	1.46

7	-1.11	.47	.33	-2.62	.40
8	-.25	.38	.99	-1.48	.98

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

Perception

Tukey HSD[a,b]

College	N	Subset for alpha = 0.05 1	2
2	24	2.70	
5	9	2.93	
1	14	2.97	
9	2	3.00	
6	2	3.05	
8	6	3.25	3.25
4	19	3.30	3.30
3	12	3.52	3.52
7	2		4.11
Sig.		.20	.16

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 4.44.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

VITA

Afnan Alyanbaawi grew up in Mecca, Saudi Arabia. In 2009, she received a Bachelor of Art in Classical Arabic Rhetoric & Literary Criticism and a minor degree in Education from Umm Al-Qura University, Saudia Arabia. In 2011, Afnan relocated to the United States to pursue a Master of Education in Educational Technology at Cleveland State University. She received her degree master's degree from Cleveland State University in 2014. After teaching in the Educational Technology department at the University of Jeddah in Saudia Arabia and seeing the impact of technology in education, she decided to pursue a doctoral degree at the University of Tennessee Knoxville. Her present areas of interest include mobile learning in higher education and online learning.