MOBILE TECHNOLOGY IN HIGHER EDUCATION: AN EXTENDED TECHNOLOGY ACCEPTANCE PERSPECTIVE

by

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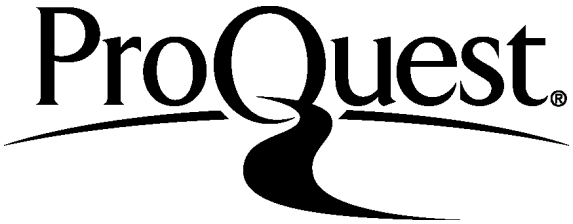

Abstract

There is lack of research that provides institutions with information on educator acceptance of mobile technology in higher education within the United States. The objective of this research study is to study the mobile technology acceptance of educators in the higher education industry in the United States. The literature review and the theoretical background of technology acceptance model laid the foundation for the research question and the hypothesis of this research study. This study utilized the Chen et al. (2013) extended technology acceptance model, that extended the original Davis (1989) TAM. In this research study, Chen et al. (2013) survey instrument provided the necessary tool to collect data from educators in higher education within the United States. The results showed statistical significance exist in relationships across the assessed factors of perceived usefulness, perceived ease of use, perceived usefulness, attitude toward use, and behavioral intention, that contribute to the acceptance of mobile technology in higher education. The implications of the study are that institutions face a challenging task to understand the technology acceptance of educators as they incorporate the use of mobile technology to support their work and improve instructional practices.

Dedication

I dedicate this study to my family and friends. A special feeling of gratitude to my amazing parents, Seema and Errol Pires whose sacrifices have made me the person that I am today. My loving wife, Monica who has been a pillar of support throughout this journey. I dedicate this study to my soon to be born daughter as we eagerly await her arrival.

I would also like to dedicate this dissertation to my mentor, Aubrey Long, PhD who has been an inspiration and support as I make progress in life. I would like to appreciate the help and efforts of all my colleagues.

Acknowledgments

I give thanks to the LORD for giving me the ability, courage, support system, and blessings throughout this long journey. I would like to express my since appreciation to my committee chair, Dr. Meredith Weiss, for her continued assistance, guidance, and support. Sincere thanks to my committee, Dr. Gail Ferreira and Dr. Christopher Lucarelli, for their efforts and all that they have done in making this journey a reality for me. I would like to thank the participants of my study who took time out of their busy schedules to participate in the study. Without them, I could not be able complete this study. A special thanks to Dr. Harold Whitfield for his assistance. I appreciate my uncle Dr. Sunil David and my aunt Dr. Valentina David for providing the building blocks for me to achieve this milestone.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

The growth of technology has affected all organizations, including the education industry, which also changed delivery of learning and instruction using the emerging new technologies. This growth resulted in a need for higher education not only to embrace technology, but also to have educators and learners adopt the technologies, as they became an integral part of the profession. An organization benefits if its employees accept and utilize the resources available to assist them. Technology acceptance, according to Straub, Keil, and Brenner (1997), included developing perceptions about the usefulness and ease-of-use of the various modes. To understand the acceptance of mobile technology by educators in higher education, it is important to study those that utilize mobile technologies in the industry. As Davis, Bagozzi, & Warshaw (1989) stated mobile technology cannot have an impact if it is not used; further, to predict, explain, and increase user acceptance, one needs to understand why people reject or accept certain technological tools.

The infusion of new technologies has dramatically affected the way persons send and receive information (Lewis, Fretwell, Ryan, & Parham, 2013). If Moore's Law that suggests the doubling of computing processing power at any point in time every eighteen months, and Metcalf's Law that suggests the doubling of available bandwidth at constant

pricing every eighteen months hold true, mobile technologies will continue to be critical to the success of the higher education industry.

Background of the Study

Prior research on technology acceptance in higher education focused on various subjects, such as electronic communication (Adria & Rose, 2004), digital media (Liu, Liao, & Pratt, 2009), digital divide (Kent, 2012), mobile learning (Akour, 2010), online enrollment processes (Rodriguez, 2013), and Web-based e-learning technology (Coffman, 2014). Therefore, the current study is significant because it evaluates user acceptance of mobile technology in higher education from an educator perspective as more mobile technologies influx the market. While certain explored teacher technology acceptance (Stone, 2014) and usage in general, no previous research evaluated the acceptance of mobile technology from an educator perspective in the higher education industry.

Statement of the Problem

Chen, Sivo, Seilhamer, Sugar, & Mao (2013) stated that mobile technology plays an increasingly important role in both formal and informal learning. The researchers indicated that more studies could help practitioners and researchers understand why users adopt or do not adopt mobile learning, how to devise practical methods for integrating mobile applications into the curriculum, and ways to evaluate the acceptance and usability of mobile learning systems. Educational institutions need to find an optimum way to train and motivate faculty to adopt and utilize mobile technology. The current research examined educator acceptance and provided answers for educational institutions

as they evaluate options to train and motivate their faculty to use mobile technology for instructional purposes.

Purpose of the Study

It is important for higher education institutions to understand educator constraints in adopting mobile technology, and their acceptance of mobile technology for instructional use. The purpose of the study was to contribute to the body of knowledge in the field of information technology management by investigating mobile technology acceptance in higher education from educators' perspectives. As new electronic devices continue to appear in the marketplace, the use of technologies may have both intended and unintended implications for society and education (Capo, 2011). Egbert, Paulus, & Nakamichi, (2002) stated that, when teachers received adequate training and resources, their use of technology as well as their confidence and attitudes toward the technology improved. The current study used a path analysis design to measure the mediating effects on the use of mobile technology in higher education.

Rationale

The Davis (1989) TAM is a widely accepted and established model used to examine constructs and their correlation to an outcome with regard to technology. Utilizing the Chen et al. (2013) extended technology acceptance model, the foundation of the current study is on the widely utilized and accepted information system theory.

The study provides an important theoretical framework for decision-making for educational institutions as they seek improvement in user acceptance of technology in the higher education setting. The study adds to the knowledge in the field of information

technology by providing statistical research that uses path analysis to disentangle the various causal processes underlying the acceptance of technology in higher education.

Research Questions

The research question controlling the study addresses gaps identified in the literature relating to the acceptance of mobile technology in higher education. In this study, the research addresses the following:

RQ1: Are the constructs of perceived resources, perceived ease of use, perceived usefulness, and attitude towards use significant predictors of educators' acceptance of mobile technology in higher education as defined by actual use?

The following hypotheses guided the study:

Hypothesis 1. Perceived resources will have positive direct effect on perceived usefulness.

Hypothesis 2. Perceived resources will have a positive direct effect on perceived ease of use.

Hypothesis 3. Perceived resources will have a positive direct effect on attitude toward using mobile technology.

Hypothesis 4. Perceived resources will have a positive direct effect on behavioral intention to use mobile technology.

Hypothesis 5. Perceived ease of use will have a positive direct effect on perceived usefulness.

Hypothesis 6. Perceived ease of use will have a positive effect on attitude toward using mobile technology.

Hypothesis 7. Perceived usefulness will have a positive direct effect on attitude toward using mobile technology.

Hypothesis 8. Perceived usefulness will have a positive direct effect on behavioral intention to use mobile technology.

Hypothesis 9. Attitude will have a positive direct effect on behavioral intention to use mobile technology.

Hypothesis 10. Behavioral intention will have a positive direct effect on frequency of mobile technology use.

Hypothesis 11. Behavioral intention will have a positive direct effect on the length of time of mobile technology use.

Significance of the Study

The existing literature on mobile technologies focused on different topics from mobile technologies enhancing the e-learning opportunity (Chuang, 2009) to mobile technologies supporting distance learning (Kinshuk, Suhonen, Sutinen, & Goh, 2003). Clausen (2007) suggested that educators and their students were using available technologies less than initially expected. Timothy (2009) added that studies on technology acceptance issues in education, grounded on the technology acceptance model, focused on various subjects including graphics, mainframe applications, accounting, and the Internet. Thus, no research to date examined the acceptance of mobile technology from the educators' perspectives in higher education. According to Timothy (2009), researchers had added incentive to study technology acceptance in educational settings because national and local policies guiding the use of technology in

classrooms forced them to spend much of their planning time considering ways to use technology to harness effective lesson delivery. Consequently, the current study may provide significant knowledge for the field of information technology management. Specifically, higher education institutions might use the results to make informed decisions on resource utilization when determining which technologies best enhance teaching in higher education.

Definition of Terms

Technology acceptance

According to Davis (1989), technology acceptance is the degree to which a person perceives that using a particular system can enhance job performance. Study of technology acceptance using the path analysis research model determines current technology acceptance as well as future prediction of technology acceptance regarding mobile technology in higher education. Chuttur (2009) stated user motivation could explain or predict a response of system use directly influenced by external factors.

This study examined the impact of the following factors on user acceptance of technology: a) Perceived Resources (R), according to Mathieson, Peacock, & Chin (2001), described the extent to which an individual perceived that he or she had the personal and organizational resources needed to use an information system. Chen et al. (2013) added that perceived resources available would directly affect the users' perception of usefulness, ease of use, attitude, and intention to use; b) Perceived Ease of Use (EU), taken from Davis et al.'s (1989) TAM proposal, noted perceived usefulness and perceived ease of use were key variables that captured user perceptions. Perceived ease of use was the degree to which the prospective user expected the system to be free of

effort; c) Perceived Usefulness (PU) was the degree to which users perceived a specific system could increase their ability to undertake a particular task (Davis, 1989);. d) Attitude (A), according to Chen et al. (2013), described the affective components toward information technology, including positive and negative feeling about technology use; .e) Behavioral Intention (BI) based on Davis et al. (1989), implied the strength of an educator's intentions to use mobile technology in higher education; and f) Actual Use (U), based on Davis et al. (1989), referred to an educator's actual usage of mobile technology in higher education.

Mobile technology

Growth of Wi-Fi technology has offered educators the ability to utilize portable computing devices (Jacob & Issac, 2008) referred to as mobile technology. The most important advantage of this technology is mobility (Sarker & Wells, 2003) that enables anytime, anywhere computing (Varshney & Vetter, 2000). For the purposes of this research, mobile technology includes any portable computing device with touch-screen features, capable of running applications and connecting to the Internet via wireless and wireless data networks. The study examined educator utilization of smart phones and tablet computers with WI-FI and wireless data capabilities in the higher education industry.

Assumptions and Limitations

Theoretical

Nah, Siau, & Sheng (2005) stated that mobile technology was strategic for many organizations, disciplines, and activities and that the use of mobile technology extended desktop-based online learning environment into the mobile and wireless

channels. Given the increase of mobile technology in learning, it is also important to look at higher education and the user acceptance of mobile technology from the viewpoint of educators.

Topical

Studies that explain and predict the user acceptance of technology widely use the technology acceptance model. Therefore, an assumption in the current study was that educators would have the ability to express their views individually through the provided Web-based questionnaire.

Methodological

An assumption of the quantitative method is that researchers can detach to avoid personal bias infringing on the description of reality (Firestone, 1987). In the current study, there was an assumption that the researcher would remain detached. Utilizing a survey to collect data and analyzing it using statistical methods aided that detachment and made the study an empirical inquiry (Hathaway, 1995). Another assumption was that the participants in the research would be honest in their responses.

A limitation of the study might be the perception that all educators utilize technology at some level, which could be untrue. Another limitation could involve basing the study, in part, on the existing literature, which was minimal and might not reflect broader realities associated with technology acceptance of mobile technology for educators in higher education.

Nature of the Study

The information system theory guiding this study was the Technology Acceptance Model (TAM) proposed by Davis (1989) in his doctoral thesis at the MIT Sloan School of Management. TAM suggests a causal relationship between perceived usefulness, perceived ease of use, attitude towards use, behavioral intent to use mobile technology, and the actual use of mobile technology. The extended technology acceptance model used in this study derived from Chen et al. (2013) study that adopted the extended technology acceptance model from Mathieson et al. (2001) and Ku (2009).

CHAPTER 2. LITERATURE REVIEW

Various studies noted that users of mobile technology valued availability and efficiency. Consequently, younger generations adopted information and communciation technology primarily inclusive of mobile technology (Al-Adwan, Al-Adwan, & Smedley, 2013). However, the expansion of mobile technology transcended into other realms such as the educational sector that developed, adopted, implemented, and utilized information and communication technology. The adoption of e-learning platforms addressed user learning needs in accordance with the educational design (del Barrio-Garcia, Arquer, & Remero-Frias, 2015). Thus, Al-Adwan and Smedley (2012) suggested a popular approach to learning that would use the continuous growth of the Internet and technological innovations within institutions of higher education.

E-learning

Technological advancements and innovations continue to change, thereby leading to the expansion of e-learning in various countries all over the world (del Barrio-Garcia et al., 2015). Technology employed within e-learning systems either supplements or completely replaces traditional methods of learning (Shawar, Al-Sadi, & Sarie, 2007). According to Al-alak and Alnawas (2011) defined e-learning as:

> the acquisition and use of knowledge distributed and facilitated primarily by electronic means . . . in their review of the definitions of e-learning found that characteristics of e-learning process are mainly based on the internet; information disseminates and knowledge flows in the form of network courses; worldwide sharing of learning resources; and flexibility of learning (no constrains) as a virtual learning environment is created to overcome distance and time issues. (pp. 202-203)

Further, e-learning encompasses the use of electronic media inclusive of audio, computer videoconferencing, interactive TV, satellite, and the Internet to create a new environment that promotes learning (Al-alak & Alnawas, 2011).

The National Centre for E-learning and Distance Learning (2008),established a set of goals to promote e-learning. Those goals for e-learning are below:

- To develop an infrastructure designed for e-learning.
- To collaborate effectively with corporate partners, government, and higher education to resolve e-learning challenges.
- To enhance the provision of e-learning solutions.
- To develop quality assessment standards for e-learning.
- To develop a set of rules and regulations to govern e-learning.
- To create an awareness of e-learning programs (The National Centre for E-Learning and Distance Learning, 2008).

E-learning is only effective "when users choose to migrate or move from less efficient systems to relatively more advanced and more beneficial systems" (Al-Harbi, 2011). Technological advancements associated with the development of new information technology and multimedia technology radically changed learning and fostered a new process within institutions of higher education. Consequently, some of those institutions have replaced traditional instruction with innovative ways of teaching through mobile technology and e-learning systems. Studies conducted by Liaw, Huang, & Chen (2007) demonstrated the significance of e-learning in academia as it pertained to multimedia constructs that propagated enjoyment. Campbell and Swiff (2005) examined the success of e-learning among universities of higher education that focused on those systems;

however, Liu and Wang (2009) contended educational programs must find new ways to train staff to manage the flow of knowledge from a new system. del Barrio-Garcia et al. (2015) posited that the success of e-learning as an information and communication technology system could aid understanding of both user attitudes and user levels of acceptance. Al-alak and Alnawas (2011) asserted that institutions of higher education should foster and develop interactive collaboration between instructors and peers.

Jairak, Praneetpolgrang, & Mekhabunchakji (2009) utilized a mixed methods approach to examine the implementation of mobile technology in e-learning and the acceptance of e-learning among students in higher education institutions. Data derived from 390 students in five different private and public universities across Thailand (e.g., Private Universities: North-Chiangmai University, Payap University, and Sripatum University; Public Universities: Rajamangala University of Technology Lanna and Rajabhat Chiangmai University) (2009). Jairak et al.'s (2009) study employed six constructs to measure 20 items. Performance expectancy and social factors each measured four items, while effort expectancy, facilitating conditions, behavioral intention, and attitude toward using technology each measured three items.

Demographic data revealed that, of the 390 student respondents, approximately 70.3% were female, about 33.6% of student respondents attended private universities in Thailand, and 66.4% of respondents attended public universities. Approximately 95.1% of students indicated that they utilized mobile devices. More than 70% reported using smart phones with 50% of those respondents accessing the Internet from their mobile. Of all respondents, over half (57.7%) reported having no familiarity with e-learning. Research data showed that 40.8% of their friends and 40.3% of their teachers could

significantly influence students to use such technologies. However, findings from this study showed that, although others (fellow students, seniors, or teachers) suggested they should utilize mobile technology, they might not influence students in universities throughout Thailand, thereby showing a moderate level of social factors associated with mobile technology (a mean value of 3.41) (Jairak et al., 2009).

Student respondents reported that mobile technology was easy to learn, use, and understand as demonstrated by a mean value of effort expectancy of 3.51 (Jairak et al., 2009). Results showed that performance expectancy had a positive relationship on attitude towards using technology as demonstrated by $\beta = 0.398$, $p<0.001$. Effort expectancy and social factors both had a significant positive correlation with attitudes toward the use of e-learning as revealed by ($\beta = 0.219$, $p<0.001$) and ($\beta = 0.142$, $p<0.01$), respectively.

Facilitating conditions including knowledge, resources, and support to utilize e-learning did not show a signficant positive correlation with student attitudes towards use, which failed to support the study's hypothesis. Performance expectancy did not display a signficant association with behavioral intention also rejecting the hypothesis. Performance expectancy and effort expectancy within this study directly coincided with the Technology Acceptance Model of perceived usefulness and perceived ease of use.

Technology Acceptance Model

The original Technology Acceptance Model (TAM) examines the effect of users' attitudes and beliefs on user acceptance of information technology or rejection of such technologies (Jairak et al., 2009). Fishbien and Ajien's (1990) Theory of Reasoned Action across academic disciplines supplied the basis for The Technology Acceptance Model proposed by Davis (1989). .

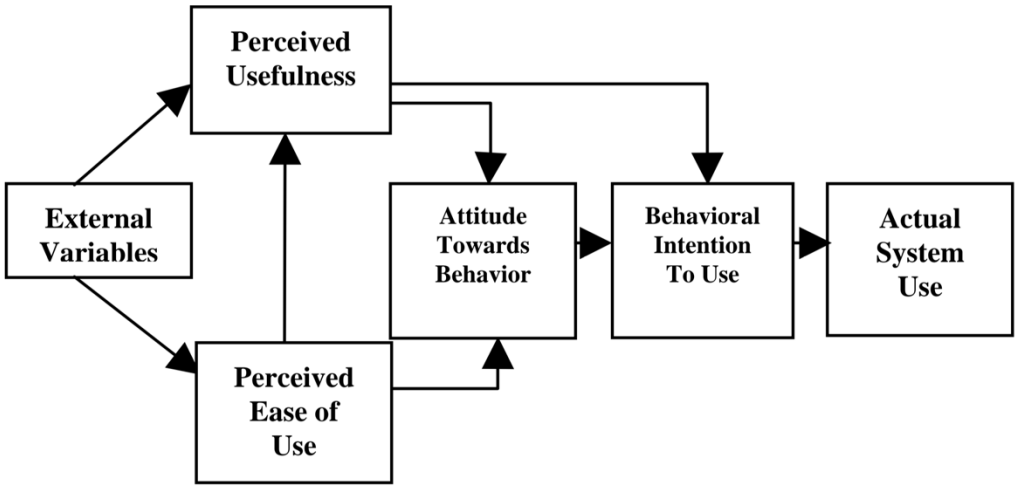

Figure 1. Original Technology Acceptance Model (Jairak, K., Praneetpolgrang, P., & Mekhabunchakij, K. (2009). An acceptance of mobile learning for higher education students in Thailand. Special Issue of the International Journal of the Computer, the Internet and Management, 17(SP3), 36.)

Studies by Adedoja, Adelore, Egbokhare, & Oluleye (2013) used the Technology Acceptance Model to examine acceptability, predicted acceptability, and modifications needed within information technology. However, Davis et al.'s (1989) Technology Acceptance Model did not account for social influences involved in the acceptance of

information technology, which was inadequate to support the theoretical framework of various studies (as depicted in Figure 2).

Perceived usefulness

The underlying beliefs associated with the Technology Accepance Model are two-fold. The first is perceived usefulness, defined as "the degree to which a person believes using a particular system would enhance his or her job performance" (Jairak et al., 2009). Seminal work developed by Davis, Bagozzi, and Warshaw (1989) encouraged various researchers to analyze the effective utilization and acceptance of technology within the educational sector. One such study measured student cognition, e-learning satisfaction, and student perception in Malaysia (del Barrio-Garcia et al., 2015). Research findings demonstrated that student perceptions regarding the usefulness of the information and communication technology employed within the study directly influenced e-learning satisfaction. Evidence acquired from additional research studies in varying settings would provide an educational context to examine "the mediating role of Satisfaction between Perceived Usefulness and Attitude towards the system" meticulously (del Barrio-Garcia et al., 2015). Results from Al-alak and Alnawas (2011) revealed a statistical significance of perceived usefulness ($\beta = 0.28$, $p<0.01$), thereby supporting the study's hypothesis.

del Barrio-Garcia et al. (2015) analyzed results validating the usefulness of mobile wireless technology in collaborating, interacting, and supporting students in real-time. However, a majority of students in their study revealed an inherent level of skepticism associated with mobile wireless technology and disruptions that might arise including dependency, redundancy, and misuse. No students in that study currently utilized mobile wireless technology, proving that social factors in Malaysia strongly influenced student usage. In their study, Sevillano-Garcia and Vázquez-Cano (2015) examined and assessed internal and external variables that directly impacted the

acceptance, functionality, incidence, and use of digital mobile devices among students in higher education.

Jairak et al. (2009) remarked that a student's perception of the usefulness of mobile technology had association with a high level of student acceptance toward e-learning systems. A similar study by Al-Adwan et al. (2013) conducted on 107 students between 18 and 25 years of age (61% of whom were female) showed that perceived usefulness significantly influenced student intention to use e-learning technology ($\beta = 0.265$, $p<0.05$). Findings also showed that perceived usefulness yielded no significant influence on students' attitude towards use ($\beta = 0.462$, $p>0.05$), thereby rejecting the study's hypothesis. The study's regression analysis revealed that the significance of perceived ease of use influenced perceived usefulness ($\beta = 0.340$, $p<0.01$). However, the results revealed that attitude towards use had no significant influence on student intention to use e-learning ($\beta = 0.325$, $p>0.01$). Results also showed that both perceived flexibility ($\beta = 0.428$, $p<0.001$) and perceived interactivity ($\beta = 0.383$, $p<0.001$) demonstrated a significantly strong influence on student perceptions of the usefulness of e-learning.

Perceived ease of use

The second belief is perceived ease of use, defined as the degree with which a person believes that a particular system will be free of effort (Jairak et al., 2009). Findings from Al-Harbi's (2011) study demonstrated that Internet experience had a small, yet significant, influence on perceived ease of use ($\beta = 0.147$, $p<0.01$), while Internet self-efficacy showed both a strong and signficant influence on perceived ease of use ($\beta = 0.361$, $p<0.001$). E-learning acceptance strongly correlated with perceived e-learning accessibility. Students in tertiary education in Saudi Arabia were more likely to accept

and utilize e-learning when the system was easily accessible. Findings also reported a significantly strong effect on attitude toward using e-learning (β = 0.331), and perceived ease of use had an even stronger influence on attitude toward using e-learning (β = 0.404, p<0.001), which supported the study's hypotheses. Results from Al-alak and Alnawas (2011) revealed a statistical significance of perceived ease of use (β = 0.36, p<0.01), thereby supporting the study's hypothesis.

User perception

User interest is one of the most significant aspects underlying the perception of mobile learning among users. User perception indicates the usefulness and perceived ease of use. Several studies demonstrated that positive user perceptions with mobile learning heightened the level of interest users had in the process (Venkatesh & Davis, 2000; Venkatesh, Nargundkar, Sayed, & Shahaida, 2006). Venkatesh & Davis (2000) discussed the weak direct relationship that existed between perceived usefulness and attitude as well as the strong direct correlation between perceived usefulness and user intention. User perception regarding mobile learning may plausibly yield positive experiences that increase interest in and user acceptance of mobile learning.

The perception of e-learning systems by Middle Eastern lecturers remains unclear because e-learning is still in its primary stage in that region. Al-alak and Alnawas (2011) investigated lecturers' attitudes toward the acceptance and adoption of e-learning in Jordan. Results showed that teacher perceptions alongside personal and psychological factors strongly influenced fellow instructors' attitudes in adopting and using technology (2011). Research findings revealed that instructors and students needed to change their attitudes, behaviors, beliefs, habits, and perspective in order to safeguard the adoption

and use of technology in e-learning. However, since students have varying attitudes and perspectives toward technology, positive attitudes, beliefs, and perspectives toward technology can foster acceptance, while negative attitudes tend to decrease the acceptance and adoption of such technologies.

Al-alak and Alnawas (2011) posited that the skills needed by instructors strongly influenced their adoption of e-learning and the respective technology. Research demonstrated instructors' need to understand the technology or application fully in addition to the implications associated with such technologies, such as enriching the learning experience of their students. Researchers also examined instructor adoption of the right tool that might improve the design of online courses and make the use of such technologies more interesting and interactive. However, some instructors perceive the adoption of mobile technology as an obstacle that will eventually hinder them from using e-learning systems.

Theory of a Reasoned Behavior

The Theory of a Reasoned Behavior, originally developed by Azjen & Fishbern (1980), aided understanding behaviors and predicting outcomes. The Theory of a Reasoned Behavior assumes that "a person takes into consideration the implications of his/her action before s/he decides to actually engage or not in certain behavior. It also posits that the main determinant of a person's behavior is behavior intent" (Al-alak & Alnawas, 2011, p. 205).

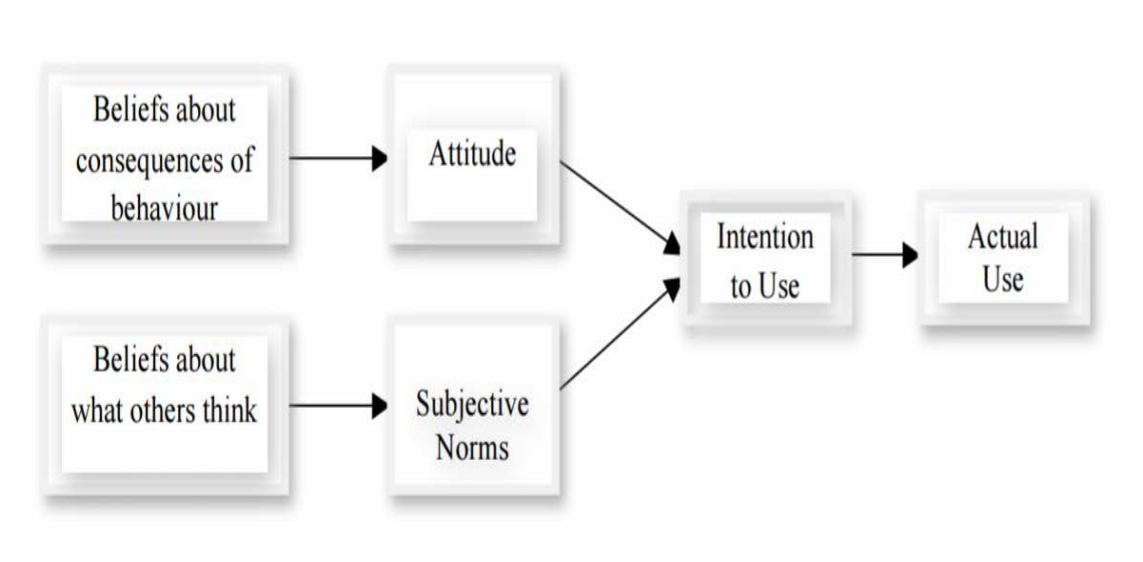

Figure 2. Theory of Reasoned Behavior (Al-Adwan, A., Al-Adwan, A., & Smedley, J. (2013). Exploring students acceptance of e-learning using Technology Acceptance Model in Jordanian universities. International Journal of Education and Development using Information and Communication Technology, 9(2), 4-18.)

A person's attitude is thereby determined by individual perception of expected consequences associated with performing a given behavior alongside the consequences linked with those behaviors. Individuals with strong intent exhibit behaviors to perform, while individuals with weaker intent will typically fail to perform (Al-alak & Alnawas, 2011).

The Theory of a Reasoned Behavior depicts and identifies underlying factors associated with the development and change of behavioral-based intent. Anxiety, experience, knowledge, management support, and normative pressure can influence a users' behavioral intent and use of technology (Liang, Saraf, Hu, & Xue, 2007). Results from the Liang et al. (2007) study revealed acceptance of six of the seven hypotheses, listed below, as yielding a positive relationship.

> H1: There is a positive relationship between perceived usefulness and behavioral intention.

H2: There is a positive relationship between perceived ease of use and behavioral intention
H4: There is a positive relationship between experience to the use of information technology and the behavioral intention to adopt e-learning sysems.
H5: There is a negative relationship between the computer and behavioral intention to adopt e-learning systems.
H6: There is a positive relationship between computer knowledge and behavioral intention to adopt e-learning systems.
H7: There is a positive relationship between management support and intention to adopt e-learning systems. (Liang et al., 2007)

Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology evolved from the Technology Acceptance Model in an effort to enhance the use of extensions and variations developed from future research studies (Lin, Zimmer, & Lee, 2013).

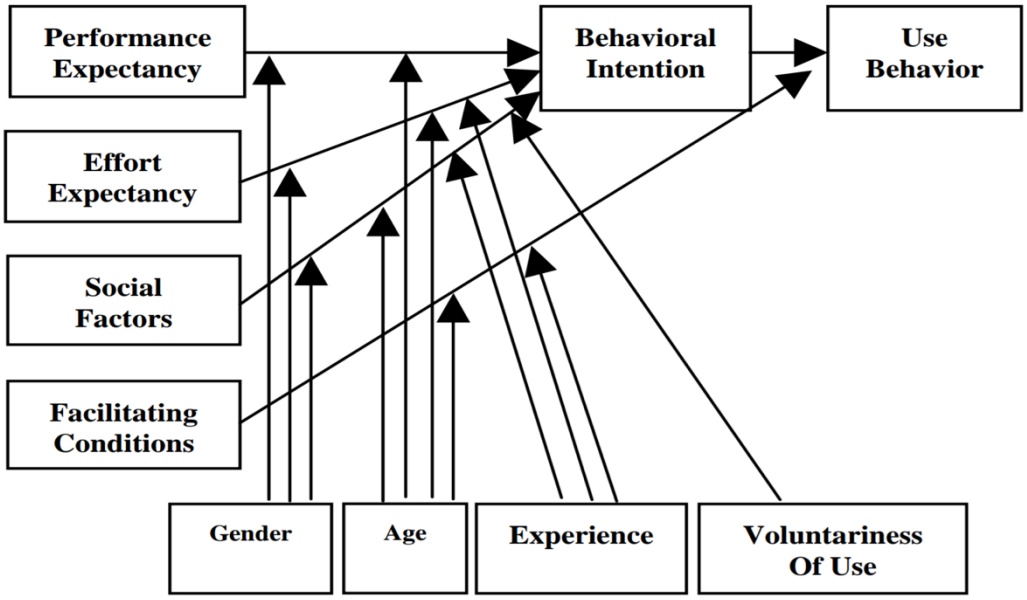

Figure 3. The Unified Theory of Accepatnce and Use of Technology (Jairak, K., Praneetpolgrang, P., & Mekhabunchakij, K. (2009). An acceptance of mobile learning for higher education students in Thailand. Special Issue of the International Journal of the Computer, the Internet and Management, 17(SP3), 36.)

Subsequent research studies incorporated the use of external variables to the core constructs within TAM. The core constructs of the model combined with the non-core constructs developed by King and He (2006) are below. The Technology Acceptance Model alongside the Unified Theory of Acceptance and Use of Technology apply to "study the technology innovation for supporting higher education, including the following applications: Web-based course management, and Web-based learning" (Lin, Zimmer, & Lee, 2013).

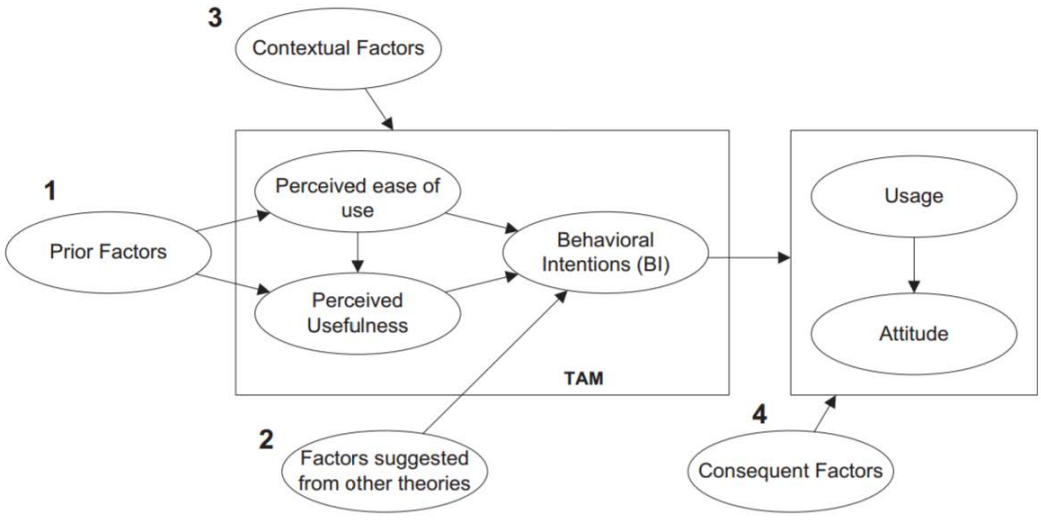

Figure 4, The non-core constructs developed by King and He (2006) applied to the core constructs of the TAM. (King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. Information & Management, 43, 740-755.)

Intention to use

Tung and Cheung (2008) proclaimed that the degree of perceived ease of use and perceived usefulness associated with e-learning systems could significantly influence a users' intent to utilize e-learning systems. Instructors with a positive perception of the perceived value of using technology were more likely to adopt distance learning systems. Individuals' cognitive abiltiies, experiences, and personality generate a belief about their

innate ability to perform certain tasks, generally associated with a perceived level of difficulty and risks.

User attitude toward use

Perceived ease of use signficantly influences student attitude towards use and perceived usefulness of e-learning systems and services in institutions of higher education. On the other hand, key research findings noted that student attitude toward use had no significant inflluence on their intention to use the technology employed in e-learning systems, thereby rejecting the hypothesis and further complicating the assertions proposed in the original Technology Acception Model (Al-Adwan et al., 2013). Research conducted after Al-Adwan et al.'s (2013) study also supported these results. Studies by Teo and Schalk (2009) supported such findings. Results from their study demonstrated that student attitude toward computer use did not significantly influence students' intention to use such technologies.

Behavioral intention

Results of Jairak et al.'s (2009) study demonstrated a significant positive correlation between effort expectancy and behavioral intention ($\beta = 0.095$, $p<0.05$); social factors and behavioral intention ($\beta = 0.274$, $p<0.001$); facilitating conditions and behavioral intention ($\beta = 0.257$, $p<0.001$); and attitudes toward using technology and behavioral intention ($\beta = 0.278$, $p<0.001$). These findings supported the hypotheses in Jairak et al.'s (2009) study.

Studies, such as Al-Harbi's (2011) study of students in Saudi Arabian universities, examined varying factors that influenced user acceptance and ultimate use of e-learning to examine this phenomenon among students in higher education. The researcher disseminated 531 questionnaires to students at King Abdul Aziz University in Saudi Arabia to investigate student acceptance of e-learning in higher education.

Al-Harbi (2011) collected demographic data in addition to information pertaining to students' attitude towards e-learning, Internet experience, perception, and self-efficacy Approximately 56% of students had Internet experiences because most respondents had previous computer and Internet courses in high school. Slightly less than 3% of students proclaimed they had no prior Internet experience. Results showed determinants of behavioral intention inclusive of attitude ($\beta = 0.323$, $p<0.001$), university support ($\beta = 0.177$, $p<0.001$), and subjective norms ($\beta = 0.219$, $p<0.001$) (2011). These determinants significantly influence behavioural intention. Internet self-efficacy had a significant influence on behavioural intention ($\beta = 0.083$, $p<0.05$) with a significance of ($\beta =0.122$, $p<0.01$) reported on perception of e-learning accessibility as a positive influence on behavioural intention. Prior Internet experience ($\beta = 0.060$) did not demonstrate a strong correlation with perceived use, thereby rejecting the study's hypothesis.

Acceptance of E-Learning

Despite the adoption and implementation of Internet-based learning systems among institutions of higher learning located around the world, the success of learning systems is contingent on an understanding of the users' likelihood of accepting and using such technologies. Yet, many higher education institutions readily encounter challenges linked to the adoption of effective and successful strategies such as course delivery using e-learning systems. Understanding student acceptance of e-learning systems and services is crucial in developing and implementing a successful learning environment based on e-learning (Jairak et al., 2009). Colleges and universities must examine, assess, and understand the correlation between student perception and participation in e-learning and institute an effective, successful, and efficient approach to e-learning to improve the

university's learning process (Al-Adwan et al., 2012). In Thailand, for example, researchers examined acceptance of m-learning and mobile technology in higher education using behavioral intention to use m-learning, Results showed that students in higher education accepted mobile learning due to their beliefs that mobile technology could enhance the provision of knowledge and support through the implementation of resources essential in mobile learning (Jairak et al., 2009).

Al-Adwan et al.'s (2013) study examined the underlying effort needed to successfully adopt e-learning services by investigating and assessing challenges that hindered students' acceptance of e-learning systems and services. The researchers investigated student attitudes and beliefs. The Arab Open University in Jordan was first to adopt e-learning. The university's partnership with the United Kingdom Open University was significant in adoption of E-learning on a national scale (Al-Adwan et al., 2013). Jordan focused on adopting and using e-learning systems and services to enhance the student-based learning outcomes of on-campus students and invested in e-learning technology.

User interest

Rogers, Connelly, Hazelwood, & Tedesco (2010) and Wang, Shen, Novak, & Pan (2009) conducted studies that proved mobile learning produced strong interest among users. Adedoja et al.'s (2013) study demonstrated a positive correlation between user interest and user acceptance of mobile technology. While there was increased interest and positive attitudes revealed among users in higher education, the adoption of mobile technology platforms relied on the way educators structured their learning activities. Educators, instructors, and mentors significantly influence user acceptance and utilization

of mobile technology in relation to perceived usefulness and ease of use. Increased user interest enhances the potential to integrate additional mobile learning opportunities within education (Uzunboylu et al., 2010).

Perceived enjoyment

Perceived enjoyment, thereby, serves as a key factor in influencing mobile learning. Huang, Lin, and Chuang (2007) assessed the impact of perceived enjoyment in accordance with individual engagement. Perceived enjoyment is "the extent to which the activity of using the technology is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Huang et al., 2007). The study measured intrinsic motivation, enjoymen,t and increased interest, which influenced user acceptance of mobile learning significantly. Users proclaim that learning via mobile devices is indeed enjoyable (Clarke, Keing, Lam, & McNaught, 2008).

Social influence

Social environments foster and create social influence, which affects user acceptance of technology in higher education institutions. Previous research examined technology acceptance and usage in a variety of online learning settings by utilizing constructs surrounding perceived ease of use, perceived usefulness, and subjective norms (Adedoja et al., 2013). It is, therefore, important to examine the social influences associated with accepting, adopting, implementing, and utilizing new technology.

Subjective Norms

Subjective norms measure the inherent influence instructors, educators, mentors, and peers have on user acceptance of technology in higher education (Adedoja et al., 2013). Research on the topic may enable researchers to acquire knowledge and

information regarding technology acceptance from an educator's perspective. Subjective norms alongside influences of other people, including fellow peers and instructors, influence the acceptance and usage of technological innovations primarily in the earliest phase of adopting e-learning systems (Al-Harbi, 2011).

Normative pressure

Normative pressure does not have a positive effect on users' behavioral intentions to adopt e-learning systems (Al-alak & Alnawas, 2011). Normative pressure can dissuade users from utilizing technology, thereby yielding the opposite effects of what was originally intended. Results from Al-alak and Alnawas (2011) demonstrated normative pressure as ($\beta = -0.22$, $p<0.01$), which failed to support the study's hypothesis.

Mobile Learning

Previous research examined mobile learning (m-learning) in relation to its environment. Huang et al. (2007) verified the applicability of the Technology Acceptance Model in explaining and predicting user acceptance of mobile learning. Huang et al. (2007) selected a group of 313 students in higher education, including both undergraduates and graduate students, in two Taiwanese universities. External variables have the innate ability to predict user acceptance of future technological innovations as deemed applicable within the Technology Acceptance Model (Lin et al., 2013). However, the model's constructs require expansion to incorporate other factors in accordance with the context, its users, and the specific target technology utilized (Moon & Kim, 2001).

Mobile learning is the next stage in the underlying development of distance learning. Increased accessibility to mobile technology has created a paradigm shift toward lifelong learning. A study conducted by Nassuora (2012) explored the possibility

of user acceptance of mobile learning by closely examining varying factors that affected the use of m-learning among students in higher education in Saudi Arabia. Researchers employed the Unified Theory of Acceptance and Use of Technology to identify factors that influenced a users' intention to utilize m-Learning. Results demonstrated that 82.5% of higher education students in Saudi Arabian universities reported no familiarity with mobile learning. Findings suggested a positive correlation between performance expectancy and behavioral intention (0.112), effort expectancy and behavioral intention (0.279), social factors and attitude towards behavior (0.131), and facilitating conditions (0.210).

The results obtained from Nassuora (2012) could serve as preliminary research regarding the development and acceptance of mobile learning technology among students in higher education. A positive attitude towards the use of m-learning technology in higher education in Saudi Arabia could perpetuate a behavioral intention to utilize m-learning. Institutions of higher education inclusive of Saudi Arabian colleges and universities must, therefore, focus on the design of m-learning technological systems that influence student perception since positive perception leads to the ultimate success of m-learning systems. Jairak et al. (2009) recommended a more in-depth asssessment of e-learning and the underlying factors of mobile technology in Thailand. Despite the lack of familiarity with mobile technology among a majority of students in higher education in Thailand, performance expectancy and effort expectancy showed a high level of acceptance indicative of a good overall perception of mobile technology

Distance Learning

Additional studies further examined user acceptance of technology within distance learning. Findings reveal that user acceptance of technology in distace learning did not solely influence the adoption and utilization of E-learning systems. User attitudes, beliefs, and experiences with communication technology, computers, prior information, and technological readiness significantly affects user adoption of E-learning systems. Studies performed by Concannon et al. (2005) yield similar findings. However, the presence of distance learning systems in institutions of higher education does not lead to its use. Educators generally prefer traditional classes as they are more familiar and comfortable with a traditional learning environment. Students reveal personal benefits of using technology in higher education. These students proclaim that "written electronic communication with lecturers was less intimidating than talking to lecturers face-to-face or over the phone: I guess because with email I can think thoroughly about what I want to ask and stuff" (Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010).

Waycott's et al. (2010) mixed method investigation aided in understanding the perspectives of both students and staff members regarding the use of information and communication technologies as learning-teaching tools in higher education. An examination of students and staff enabled researchers to assess the underlying evidence of the digital divide between *digital natives* (younger generations) and *digital immigrants* (older generations). The aim of the study was to acquire "a better understanding of the role technologies play in supporting learning and teaching activities, and insight into what students and staff perceive to be benefits and limitations of using technologies in higher education" (Waycott et al., 2010). The researchers employed a mixed methods approach to conduct an in-depth investigation (qualitative measures) and a survey of

students and staff (quantitative measures) in three universities in Australia, analyzing the accessibility and utilization of technology (emails, mobile phones, and personal computers) and emerging technology (blogs, podcasts, social software, etc.). Students and staff responded in relation to the technologies common in everyday life, how they used such technologies, and the benefits and limitations associated with using technology in higher education.

Results noted family members influenced participants' views on the access to and use of technology (Waycott et al., 2010). They reported that family often influenced their everyday life choices pertaining to technology. Students primarily used technology within the context of discussion forums, emails, the Internet, learning management systems, PowerPoint, and lecture recordings, while staff focused primarily on discussion forums, emails, learning management systems, and lecture recordings. Findings within academic institutions of higher education revealed that students actively used information and communication technology to communicate with staff members, collaborate with peers, conduct research, and support distance learning. Staff used information and communication technology to provide resources and support for students, support distance learning, and facilitate learning by providing feedback and assessment.

Limitations

In an article entitled, *An acceptance of mobile learning for higher education*, Jairak et al. (2009) examined the use of personal computers in Thailand, a developing country that encountered a set of limitations due to the increased implementation of e-learning and mobile technology in higher education. Physical limitations associated with

the use of a personal computer hindered learner access to learning materials. Mobile devices have become increasingly popular in m-learning.

Research findings further explicated the underlying reasons why academic institutions of higher education failed to adopt e-learning initiatives in Jordan. Hesistancy and a keen unwillingness to adopt e-learning initiatives created the following limitations (Al-alak & Alnawas, 2011):

- Failure to deploy the equipment and infrastructure needed to affect the growth of e-learning.
- Lack of adequate training for students, teachers, and trainers.
- Lack of given conditions necessary in the development of high quality content and services within the educational sector.
- Failure to accelerate the network on a national scale .

Improvements in interfaces should ensure that e-learning systems are user friendly (Al-Adwan et al., 2013). This may essentially encourage students to seek the benefits and opportunities associated with E-learning systems and services to improve learning, thereby yielding increased adoption, participation, acceptance, and use of e-learning within academic institutions of higher education.

Al-Harbi (2011) also discussed the lack of access to essential communication and information technology tools as a challenge by examining tertiary education in the educational system in Saudi Arabia. The study identified certain limitations students and staff faced when using technology in higher education. Access to technology, communication issues, difficulty learning how to use technology, and usability challenges

limit the use of technology among students and staff in higher education. One student stated:

> My computer for some reason will not dowload iLectures. And I think that most tutors and lectures presume that students know how to use, how to access those. And I had a lot of trouble trying to find it and then it's not working. (Waycott et al., 2010, p. 1208)

Staff expressed concern with the increased workload associated with using technology, thereby giving students the perception that staff members were always available. One staff member stated that:

> I think the university has gone along the way of lookig at providing a service to students without worrying particularly about what demands this might place on its staff. And I think this is often done at the expense of staff time. So there's that sense of being always available for example. (Waycott et al., 2010, p. 1208)

Digital divide

Digtial divide is a phrase synonomous with the challenges that groups of individuals (students, teachers, etc), countries, or nations endure due to their lack of access to innovative technology (Bimber, 2000; DiMaggio et al., 2001; Lohnes & Kinzer, 2007; Norris, 2001;). Prensky (2001) discussed the presence of a digital divide between different generations, while other researchers examined digital divide based on age ethnicity, gender, geographic locations, and income levels (Bausell & Klemick, 2007; Farrell, 2005; Light, 2001; Sax et al., 2001). Researchers attributed age-based differences to the experience that individuals in certain generations had with computers, mobile technology, and the Internet. Kennedy et al. (2008) examined the dichotomy present among students and teachers with 41 technology-based activities. Findings revealed a limited amount of evidence indicative of a digital divide between students and staff members (Prensky, 2001).

This paper contributes to the existing body of literature and scholarly debate regarding the acceptance and utilization of mobile technology in institutions of higher education as it provides the necessary knowledge and information to close the gap that currently exist between the technology acceptance of mobile technology by students and educators in higher education. The existence of only a few studies regarding the teachers' perceptions of E-learning proves that there is a dire need to examine and assess the acceptance of mobile technology from an educators' perspective in higher education institutions. This will enable researchers to understand why educators in higher education accept mobile technology as a way to examine ways in which to adopt mobile learning and integrate the use of mobile technology within the curriculum. By examining ways in which attitudes, beliefs, behaviors, and perception toward mobile technology affect their intention to utilize such technologies, this study will be able to meticulously examine how educators' attitudes, beliefs, behaviors, and perception influence their intention to use and ultimate acceptance of mobile technology in higher education. This study seeks to enhance the provision of knowledge within the field of information technology management so that institutions of higher education could make informed decisions on how to best use resources when identifying, adopting, and implementing technology that yields increased acceptance by educators in higher education.

CHAPTER 3. METHODOLOGY

The purpose of the proposed study was to contribute to the body of knowledge in the field of information technology management by conducting a study to investigate the technology acceptance of mobile technology in higher education from an educator perspective. As new electronic devices continue to appear in the marketplace, the use of technologies may have both intended and unintended implications for society and education (Capo, 2011). The current study used a path analysis design to measure the mediating effects on the use of mobile technology in higher education.

The proposed research question addressed gaps identified in the literature related to the acceptance of mobile technology in higher education. The research addressed the following question: Are the constructs of perceived resources, perceived ease of use, perceived usefulness, and attitude towards use; significant predictors of educators' acceptance of mobile technology in higher education as defined by actual use?

Research Design

The study used path analysis, which is an extension of multiple regression (Streiner, 2005). Path analysis goes beyond regression to allow for the analysis of more complicated models (Streiner, 2005). Path analysis is a variant of multivariate regression analysis in which a path or flow diagram and path coefficients represents causal relations between several variables and provide estimates of the strength of relationship between two variables when holding all other variables constant (Jupp, 2006).

This study utilized a previously designed extended technology acceptance model by Chen et al. (2013). Chen et al.'s model accounted for all the variables necessary to study the acceptance of mobile technology based on prior research. Statistical analysis using regression analysis measured the statistical strength of each pathway in the path analysis model. Using a path analysis multivariate research design, the research examined the acceptance of mobile technology for educators and learners in higher education. Because technology acceptance could have multiple causes, the topic was better suited to a multivariate research design such as path analysis.

The study used a non-experimental correlational causal-comparative research approach, which investigated the cause-effect relationship between variables. With a sophisticated statistical model, the study used correlational research to determine the extent of a relationship between variables. The research was non-experimental because it involved neither a) random assignment of participants to group, nor b) the active introduction or manipulation of an intervention by a researcher (Cook & Campbell, 1979).

Sample

The sample size consisted of 180 participants with a confidence level of .95%, response distribution of 50%, and a margin error of 5%. This sample size number derived from the G*Power 3.1 software by incorporating the numeric value of 5 for the number of predictors and using the F tests and linear multiple regression statistical test. The sample included part-time and full-time educators in higher education currently teaching at an undergraduate or graduate level in the United States that agreed to complete the voluntary survey on SurveyMonkey®. Since various studies have been conducted with

regards to technology acceptance in higher education in different countries across the world, this study focuses on educators in the United States to add to knowledge of the behavior of United States educators when determining the factors influencing the acceptance of mobile technology uses in higher education.

Setting

The current research study examined the acceptance of mobile technology by educators currently teaching part-time or full-time at institutions of higher learning within the United States. The participants were current educators at the time of completing the survey. The participants were either full-time, part-time, or adjunct faculty teaching at an undergraduate or graduate program that met the following criteria:

- Any age, either male or female, and any race
- Current educator in higher education at the undergraduate or graduate level
- Currently teaching part-time or full-time
- Live in the United States

The sample size consisted of 180 participants with a confidence level of .95%, response distribution of 50%, and a margin error of 5%. This sample size number derived from the G*Power 3.1 software by incorporating the numeric value of 5 for the number of predictors and using the F tests and linear multiple regression statistical test. The sample included current educators in higher education in the United States that agreed to complete the voluntary survey on SurveyMonkey®.

Instrumentation/Measures

The information system theory that guided this study was the Technology Acceptance Model (TAM) proposed by Davis (1989) in his doctoral thesis at the MIT

Sloan School of Management. TAM suggests a causal relationship between perceived usefulness, perceived ease of use, attitude towards use, behavioral intent to use mobile technology, and the actual use of mobile technology. The extended technology acceptance model used in this study derived from the Chen et al. (2013) study that adopted the extended technology acceptance model from Mathieson et al. (2001) and Ku (2009).

Data Collection

The first step included obtaining a Capella University mentor/committee and IRB approval to conduct the study and collect the data required. The researcher uploaded the Chen et al. (2013) survey into SurveyMonkey®. Recruitment occurred by using the survey flyer made available in various online venues and data derived from SurveyMonkey®. The participation in the study was voluntary and the participants could opt out of the study anytime during the survey. Originally, data collection was set for a four-week period; however, given the overwhelming response from participants, data collection stopped after seven days because the number of survey responses exceeded the required 138 participants. The researcher exported the data from SurveyMonkey®, placed it in an Excel spreadsheet, and uploaded it into Statistical Package for Social Sciences (SPSS) (v23.0) for data analysis.

Data Analysis

Data analysis was with AMOS 23.0, computer software marketed by SPSS (Arbuckle, 2008). AMOS stands for Analysis of Moment Structures and is for path analysis. Path analysis usually involves the analysis and comparison of two models, a full model with all the components included and a reduced model, which has some of the

paths deleted if they do not contribute significantly to the outcome. The basis of the full model was on Chen et al.'s (2013) extended technology acceptance model (TAM). Path analysis includes, as special cases, many well-known conventional techniques, such as regression analysis. The path coefficients for the proposed analyses derived from a series of linear regression analyses. The overall fit measures used to determine whether the data fit the proposed model included several indices generated by the software. However, the study includes only the Chi-square test or the comparative fit index (CFI) (McDonald, 1989).

Path analysis has its own unique vocabulary (Arbuckle, 2008). Independent variables are *exogenous variables* and dependent variables are *endogenous variables*. In addition, some variables are *manifest variables* and some are *latent variables*. Manifest variables are those observable in the data set, whereas latent variables are not directly observable or measurable. In path analysis, the representation of manifest variables is by squares or rectangles; whereas, latent variables use circles or ovals. The current study used only manifest variables.

A series of arrows illustrates path directionality and shows assumed causal relationships (Arbuckle, 2008). A single-headed arrow points from cause to effect and a double-headed, curved arrow indicates correlated variables without an assumed causal relationship.

Validity and Reliability

Robson (2002) stated that validity determined the accuracy of the study, while reliability focused on the consistency in measurements. The extended technology acceptance survey utilized in this research derived from the Chen et al. (2013) survey that

extended the previously validated Davis (1989) survey used in numerous technology acceptance research studies. Selim (2003), Koufaris (2002), Lau, Yen, & Chau (2001) and numerous other studies found the Davis (1989) instrument to be statistically valid and reliable for determining technology acceptance. The researcher used SurveyMonkey® to transfer the survey instrument to participants and SPSS) software to analyze the collected data. The study incorporated path analysis to determine estimates of the magnitude and significance of hypothesized causal connections between sets of the study variables. According to Wuensch (2012), path analysis, developed by Wright (1934), could determine whether a multivariate set of non-experimental data fits well with a particular causal model. The researcher checked data accuracy manually while entering the data and rechecked to ensure the data entered was free of errors.

Ethical Considerations

Ethical considerations are always a factor when completing a study about people (Creswell, 2009). In the present study, minimal ethical considerations existed concerning sampling because each participant had equal opportunity for selection. The researcher considered the basic ethical principles of the Belmont Report (1979) in the sampling procedures. There were no expected concerns with collecting data. Once the data were in place, the researcher was responsible for making morally sound decisions while conducting the study by referring to absolute values, such as honesty, fairness, and respect for others.

For the purpose of this study, survey recipients participated of their own free will without any monetary or other incentives. Participants could trust that the researcher would respect the privacy of the information they provided, and that their answers to the

study questions would not put them at risk. The researcher took all steps to protect the confidentiality of individually identifiable information.

The information derived from SurveyMonkey® and de-identified to preserve the anonymity and confidentiality of each participant. There was no identifiable information collected through the survey responses. To assure confidentiality, the researcher securely stored the data in a locked location, and access to computerized data required user authentication. At the end of the study and after a certain period, the researcher will properly dispose, destroy, or delete all research data and documents

CHAPTER 4. RESULTS

Introduction

The purpose of this study was to investigate the acceptance of mobile technology in higher education from the perspective of educators. As new electronic devices continue to appear in the marketplace, the use of technologies may have both intended and unintended implications for society and education (Capo, 2011). This study used path analysis to measure the mediating effects on the use of mobile technology in higher education.

The information system theory that guided this study was the Technology Acceptance Model (TAM) proposed by Davis (1989) in his doctoral thesis at the MIT Sloan School of Management. TAM suggests a causal relationship between perceived usefulness, perceived ease of use, attitude towards use, behavioral intent to use mobile technology, and the actual use of mobile technology. The extended technology acceptance model used in this study derived from the Chen et al. (2013) study that adopted the extended technology acceptance model from Mathieson et al. (2001) and Ku (2009).

Chen et al. (2013) developed the survey instrument used in the study. Delivery of the study was online through SurveyMonkey® with participant recruitment through social media. Specifically, after obtaining the necessary approvals, a link to the survey posted in an online group comprised of over 5,000 individuals who taught or had interest in teaching in higher education.

Chapter 4 includes a discussion of the sample demographics, reliability analysis, descriptive statistics, data screening, research question/hypothesis testing, and

conclusions. Data collection extended from October 9, 2015 to October 15, 2015. After data collection, the researcher exported the data directly from SurveyMonkey® to SPSS 23 and AMOS 23 for analysis. The following provides a discussion of the sample demographics.

Sample Demographics

Data derived from 181 educators who worked full or part-time at a college or university in the United States. Sixty-three percent (*N* = 114) were female and 37% (*N* = 67) were male. The three largest age groups were 45-54 (34.3%, *N* = 62), 35-44 (27.6%, *N* = 50), and 55-64 (21%, *N* = 38), which represented 82.9% (*N* = 150) of the sample. See Table 1.

Table 1.Age of Educators

Age	*N*	*%*	*Cumulative %*
25 to 34	15	8.3	8.3
35 to 44	50	27.6	35.9
45 to 54	62	34.3	70.2
55 to 64	38	21.0	91.2
65 to 74	15	8.3	99.4
75 or older	1	0.6	100.0
Total	181	100.0	

Approximately one-third (33.1%, *N* = 60) of participants had taught at a college or university for 6-10 years; 26.5% (*N* = 48) had taught for 16 or more years; and 21.5% (*N* = 39) had taught at a college or university 0-5 years. Educator tenure is in Table 2.

Table 2.Years as an Educator at a College and/or University

Years	*N*	*%*	*Cumulative %*
0-5 Years	39	21.5	21.5
6-10 Years	60	33.1	54.7
11-15 Years	34	18.8	73.5
16 Years or More	48	26.5	100.0
Total	181	100.0	

Instrument Reliability for Sample

The researcher investigated the reliability of the survey instrument for the sample with Cronbach's alpha. There were five variables of interest in the study, perceived resources, perceived ease of use, perceived usefulness, attitude toward use, behavioral intention, and technology use with two dimensions, incorporating frequency of use and duration of use. Cronbach's alpha associated with the mean correlation between each pair of items and the number of items in the scale. Therefore, a scale must have a minimum of two items in order to compute for reliability. Thus, the researcher could not compute the reliability of the subscales for technology use because each dimension had only one item on the survey. The internal consistency for the subscales ranged from .745 for perceived resources to .903 for perceived ease of use. Reliability coefficients are in Table 3.

Table 3. Reliability Coefficients

Variable	*N* of Items	Cronbach's alpha
Perceived Resources	3	.745
Perceived Ease of Use	3	.903
Perceived Usefulness	6	.806
Attitude Toward Use	5	.827
Behavioral Intention	3	.902

Descriptive Statistics

Calculating the mean for each scale provided summary scores for the subscales. Scores could range from 1-5. Educators scored the highest on the behavioral intention domain (M = 4.02, SD = 0.88) and scored the lowest on actual use 2 (M = 2.20, SD = 1.40). Descriptive statistics are in Table 4.

Table 4. Descriptive Statistics

Variable	*N*	*Minimum*	*Maximum*	*M*	*SD*
Perceived Resources	181	1.00	5.00	3.49	1.01
Perceived Ease of Use	181	1.33	5.00	3.81	0.86
Perceived Usefulness	181	1.17	5.00	3.47	0.76
Attitude Toward Use	181	1.80	5.00	3.87	0.75
Behavioral Intention	181	1.00	5.00	4.02	0.88
Actual Use 1	181	1.00	5.00	2.33	1.48
Actual Use 2	181	1.00	5.00	2.20	1.40

Data Screening

Skewness and kurtosis statistics and histograms aided screening the normality of the data. Skewness and kurtosis coefficients were within normal limits if they were

between ±1. As indicated in Table 5, the skewness and kurtosis coefficients were within normal limits.

Table 5.Skewness and Kurtosis Coefficients

	N	Skewness		Kurtosis	
Variable	Statistic	Statistic	Std. Error	Statistic	Std. Error
Perceived Resources	181	-.321	.181	-.511	.359
Perceived Ease of Use	181	-.521	.181	-.231	.359
Perceived Usefulness	181	-.374	.181	-.089	.359
Attitude Toward Use	181	-.370	.181	-.320	.359
Behavioral Intention	181	-.905	.181	.693	.359
Actual Use 1	181	.736	.181	-.923	.359
Actual Use 2	181	.889	.181	-.571	.359

Figure 5 depicts the histogram for perceived resources, which underscored the normality of the data.

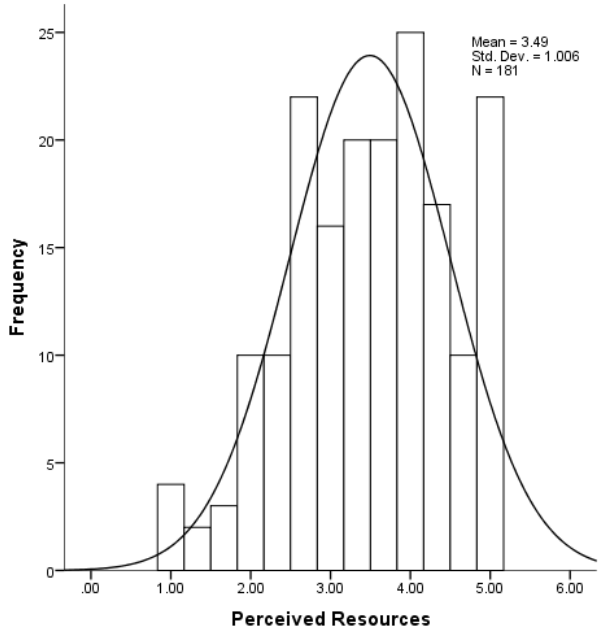

Figure 5. Histogram for perceived resources.

The scores for perceived ease of use had normal distribution. Figure 6 serves as illustration.

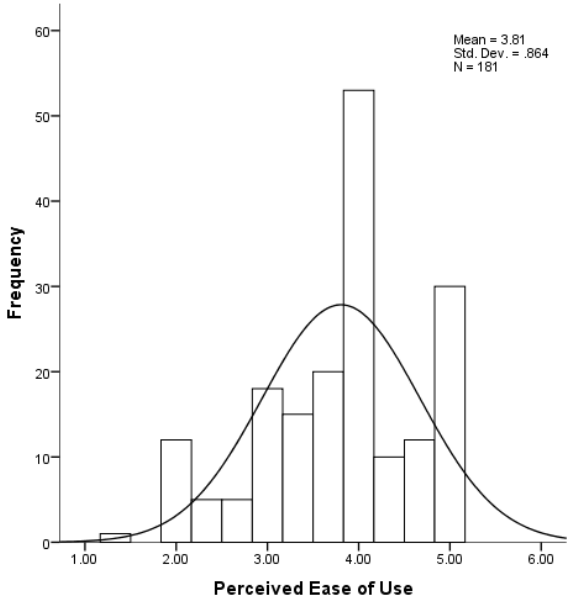

Figure 6. Histogram for perceived ease of use.

The scores for perceived usefulness had normal distribution as shown in Figure 7.

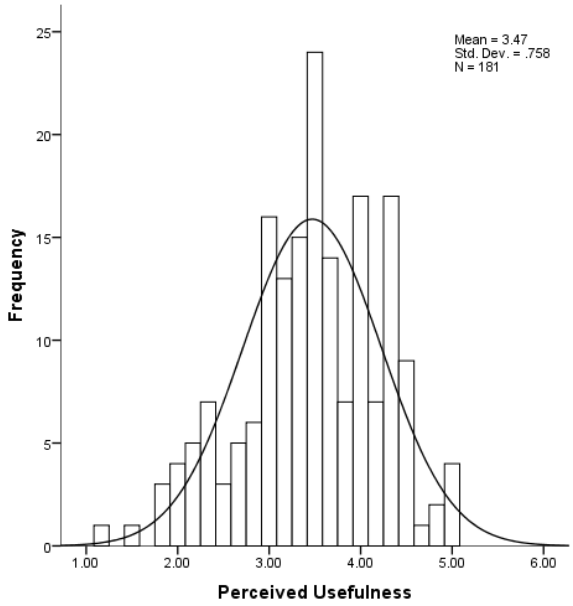

Figure 7. Histogram for perceived usefulness.

The distribution of scores for attitude toward use was within normal limits depicted in Figure 8.

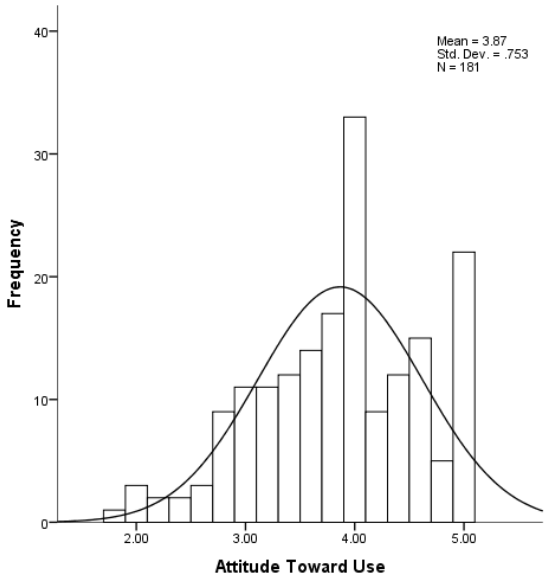

Figure 8. Histogram for attitude toward use.

The scores for behavioral intention had approximate normal distribution as shown in Figure 9.

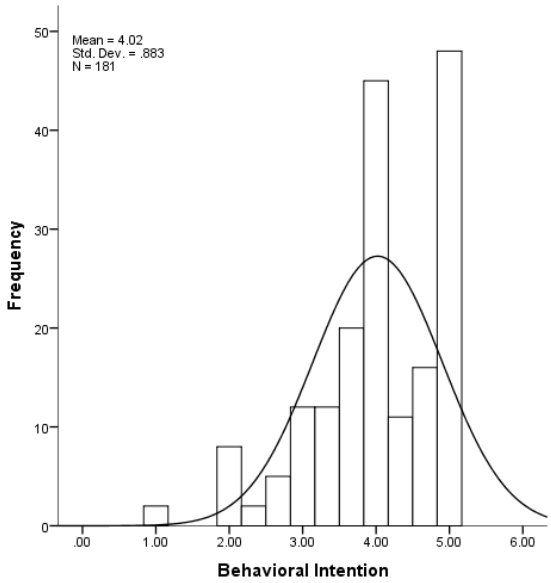

Figure 9. Histogram for behavioral intention.

The distribution of scores for actual use 1 was within normal limits as illustrated in Figure 10.

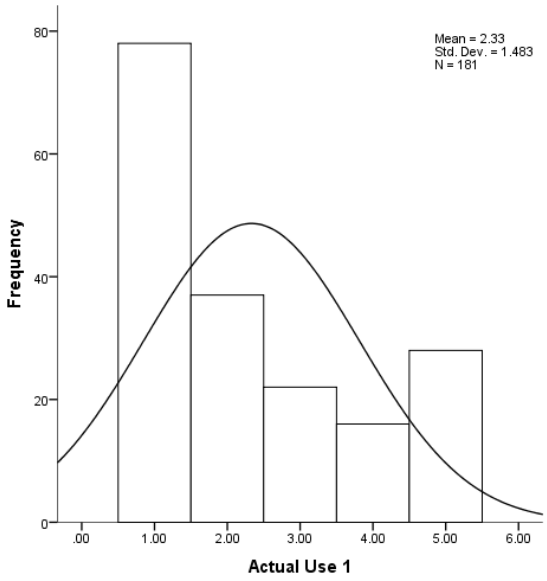

Figure 10. Histogram for actual use 1.

The distribution of scores for actual use 2 was within normal limits as shown in Figure 11.

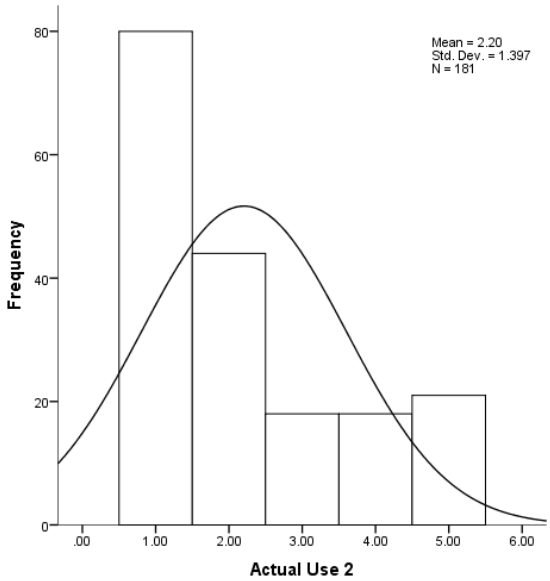

Figure 11. Histogram for actual use 2.

Since the data were normally distributed, no data transformations were necessary and the analyses proceeded as planned.

Hypothesis Testing

Eleven hypotheses associated with the primary research question, as follows:

Hypothesis 1. Perceived resources will have a positive direct effect on perceived usefulness.

Hypothesis 2. Perceived resources will have a positive direct effect on perceived ease of use.

Hypothesis 3. Perceived resources will have a positive direct effect on attitude toward using Mobile Technology.

Hypothesis 4. Perceived resources will have a positive direct effect on behavioral intention to use Mobile Technology.

Hypothesis 5. Perceived ease of use will have a positive direct effect on perceived usefulness.

Hypothesis 6. Perceived ease of use will have a positive effect on attitude toward using mobile technology.

Hypothesis 7. Perceived usefulness will have a positive direct effect on attitude toward using mobile technology.

Hypothesis 8. Perceived usefulness will have a positive direct effect on behavioral intention to use mobile technology.

Hypothesis 9. Attitude will have a positive direct effect on behavioral intention to use mobile technology.

Hypothesis 10. Behavioral intention will have a positive direct effect on mobile technology use frequency.

Hypothesis 11. Behavioral intention will have a positive direct effect on mobile technology use length of time.

Path analysis with AMOS 23 aided hypotheses testing and added the subsequent path to the model.

Hypothesis One

Perceived resources will have a positive direct effect on perceived usefulness. Perceived resources significantly and positively related to perceived usefulness; $\beta = .54$; $R^2 = .29$, $p < .001$, thus supporting H_1. An R^2 value of .29 means that perceived resources can explain 29% of the variance in perceived usefulness. The path model is illustrated in Figure 12 illustrates the path model.

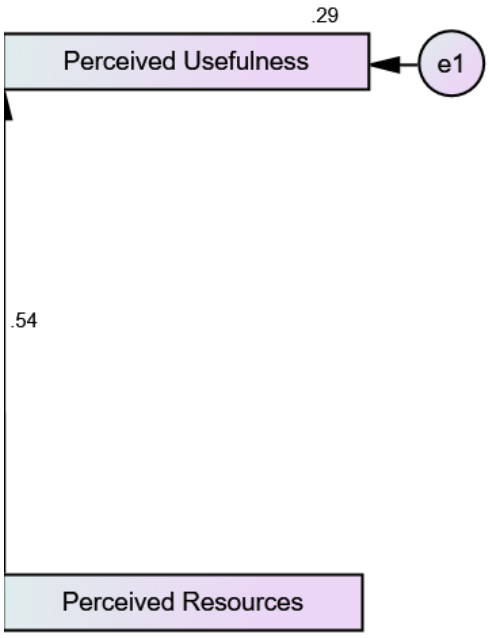

Figure 12. Hypothesis 1.

Hypothesis Two

Perceived resources will have a positive direct effect on perceived ease of use. Perceived resources significantly and positively related to perceived ease of use; $\beta = .46$; $R^2 = .22$, $p < .001$, therefore supporting H_2. An R^2 value of .22 means that perceived resources can explain 22% of the variance in perceived usefulness. Figure 13 illustrates the path model.

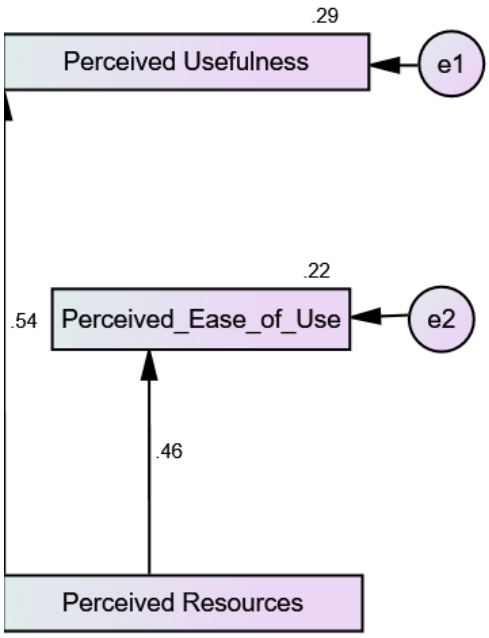

Figure 13. Hypothesis 2.

Hypothesis Three

Perceived resources will have a positive direct effect on attitude toward using mobile technology. Perceived resources significantly and positively related to attitude toward using mobile technology; $\beta = .55$; $R^2 = .30$, $p < .001$, therefore supporting H_3. An R^2 value of .30 means that perceived resources can explain 30% of the variance in attitude toward using mobile technology. Figure 14 illustrates the path model.

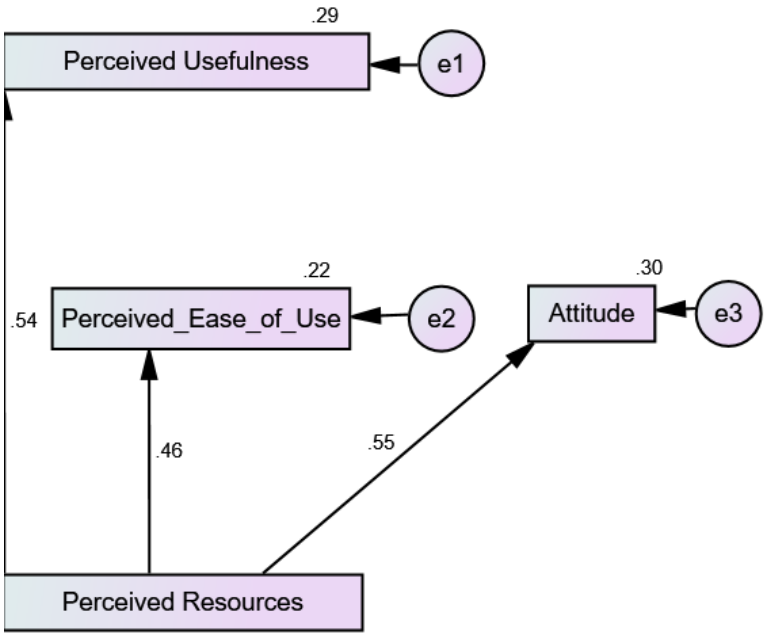

Figure 14. Hypothesis 3.

Hypothesis Four

Perceived resources will have a positive direct effect on behavioral intention to use mobile technology. Perceived resources significantly and positively related to behavioral intention to use mobile technology; $\beta = .39$; $R^2 = .15$, $p < .001$, therefore supporting H_4. An R^2 value of .15 means that perceived resources can explain 15% of the variance in behavioral intention to use mobile technology. Figure 15 illustrates the path model.

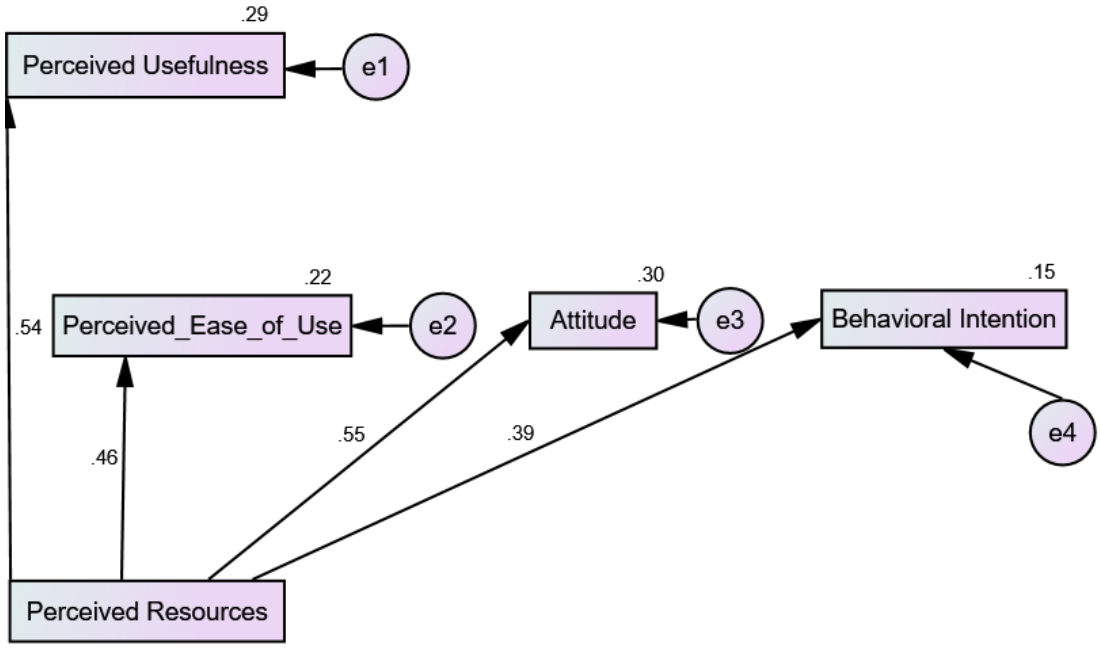

Figure 15. Hypothesis 4.

Hypothesis Five

Perceived ease of use will have a positive direct effect on perceived usefulness. Perceived ease of use significantly and positively related to perceived usefulness; $\beta = .35$, $p < .001$, therefore supporting H_5. Figure 16 illustrates the path model.

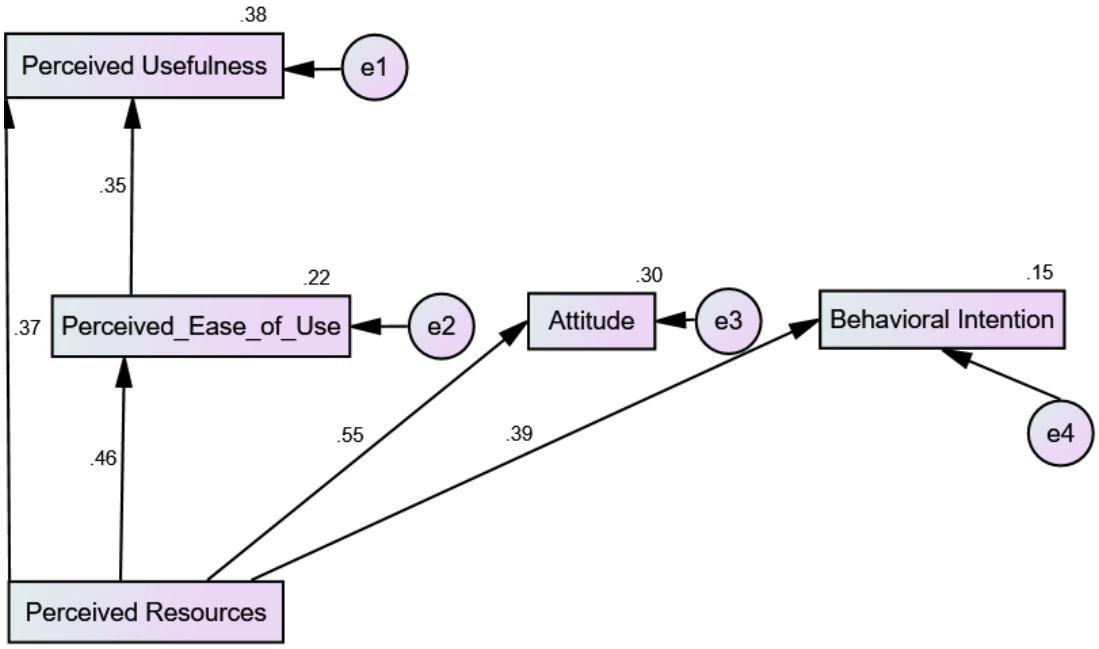

Figure 16. Hypothesis 5.

Hypothesis Six

Perceived ease of use will have a positive effect on attitude toward using mobile technology. Perceived resources significantly and positively related to attitude toward using Mobile Technology; $\beta = .47$; $R^2 = .48$, $p < .001$, therefore supporting H_6. An R^2 value of .48 means that perceived resources can explain 48% of the variance in attitude toward using mobile technology. Figure 17 illustrates the path model.

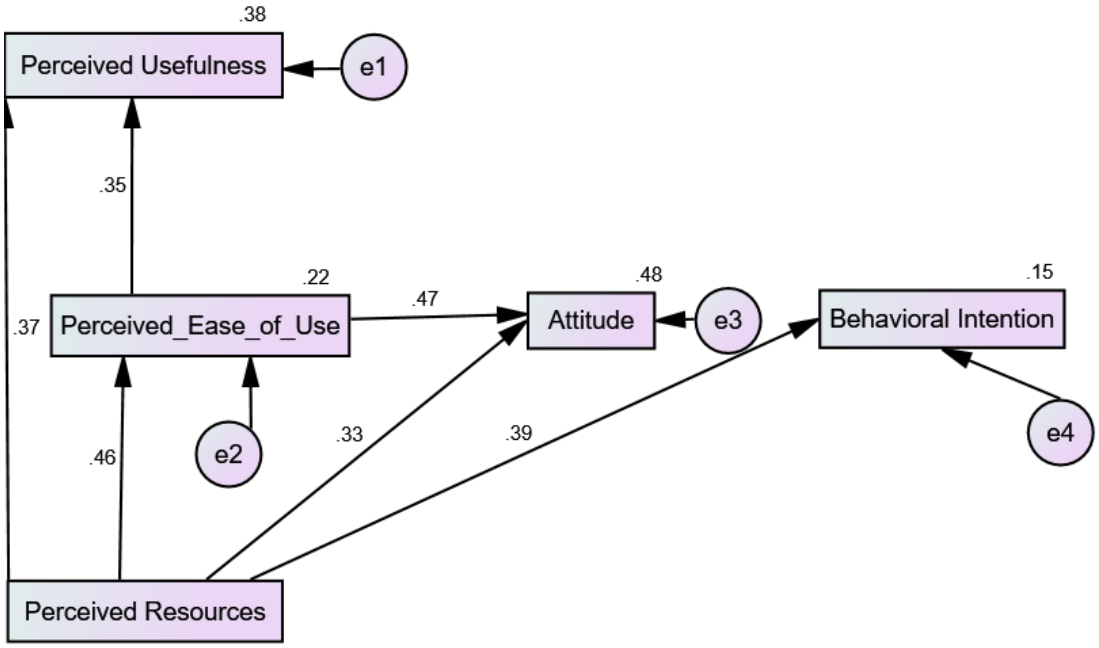

Figure 17. Hypothesis 6.

Hypothesis Seven

Perceived usefulness will have a positive direct effect on attitude toward using mobile technology. Perceived usefulness significantly and positively related to attitude toward using Mobile Technology; $\beta = .42$; $p < .001$, therefore supporting H_7. Figure 18 illustrates the path model.

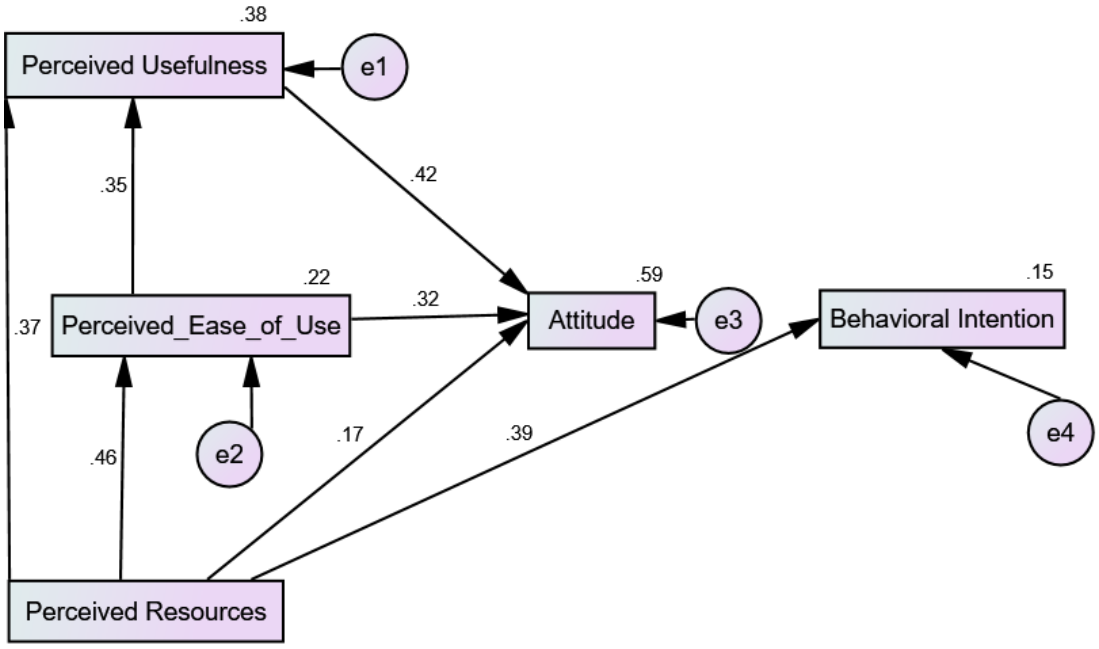

Figure 18. Hypothesis 7.

Hypothesis Eight

Perceived usefulness will have a positive direct effect on behavioral intention to use mobile technology. Perceived usefulness significantly and positively related to behavioral intention to use mobile technology; $\beta = .55$ $p < .001$, therefore supporting H_8. Figure 19 illustrates the path model.

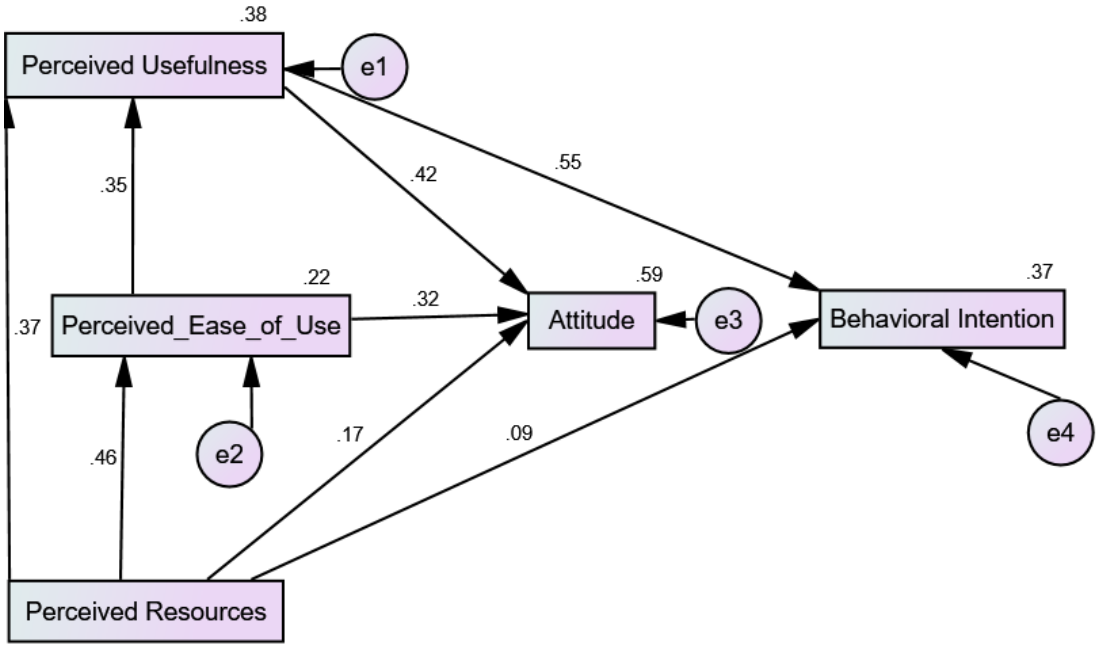

Figure 19. Hypothesis 8.

Hypothesis Nine

Attitude will have a positive direct effect on behavioral intention to use mobile technology. Attitude toward using mobile technology significantly and positively related to behavioral intention to use mobile technology; $\beta = .56$ $p < .001$, therefore supporting H_9. Figure 20 illustrates the path model.

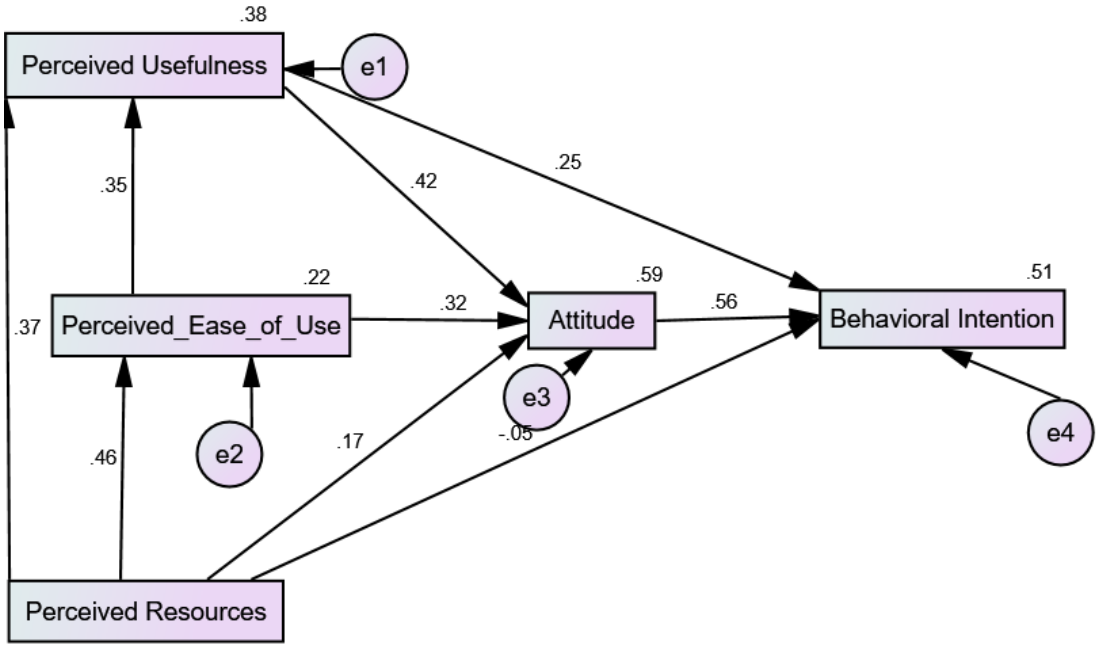

Figure 20. Hypothesis 9.

Hypothesis Ten

Behavioral intention will have a positive direct effect on mobile technology use frequency (Actual Use 1). Behavioral intention was significantly and positively related to mobile technology use frequency (Actual Use 1); $\beta = .48$; $R^2 = .23$, $p < .001$, therefore supporting H_{10}. An R^2 value of .23 means that behavioral intention can explain 23% of the variance in mobile technology use frequency (Actual Use 1). . Figure 21 illustrates the path diagram..

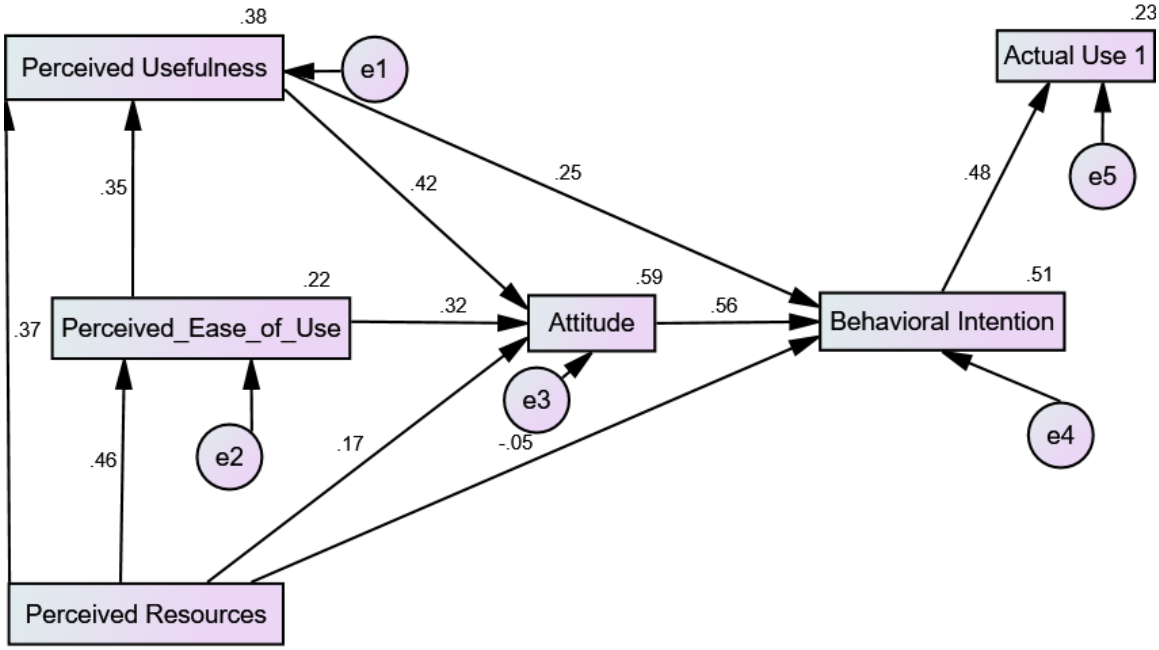

Figure 21. Hypothesis 10.

Hypothesis Eleven

Behavioral intention will have a positive direct effect on mobile technology use length of time (Actual Use 2). Behavioral intention significantly and positively related to mobile technology use length of time (Actual Use 2); $\beta = .35$; $R^2 = .12$, $p < .001$, therefore supporting H_{11}. An R^2 value of .12 means that behavioral intention can explain 12% of the variance in mobile technology length of time (Actual Use 2). The comparative fit index for the model was .89, which indicates a good fit for the data. Figure 22 illustrates the path diagram.

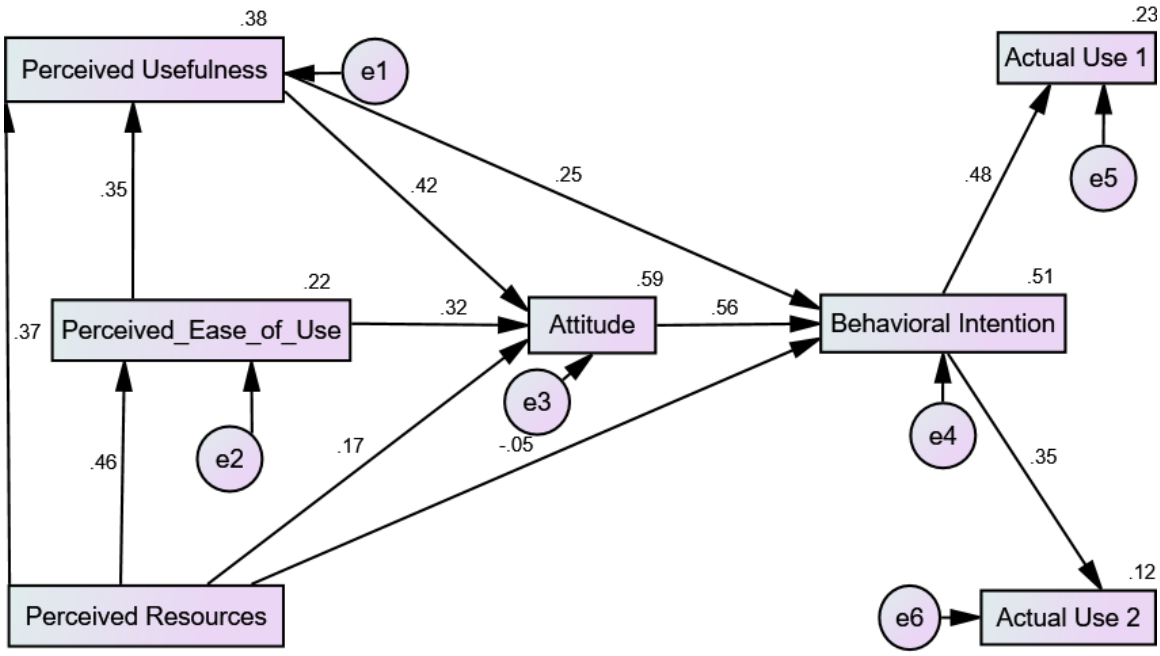

Figure 22. Hypothesis 11.

Table 6 provides a summary of all the hypotheses tested and their outcomes.

Table 6. Summary of All Hypotheses Tested

Hypothesis	Significance	Outcome
H_1: Perceived resources will have a positive direct effect on perceived usefulness.	$p < .001$	Supported
H_2: Perceived resources will have a positive direct effect on perceived ease of use.	$p < .001$	Supported
H_3: Perceived resources will have a positive direct effect on attitude toward using mobile technology.	$p < .001$	Supported
H_4: Perceived resources will have a positive direct effect on behavioral intention to use mobile technology.	$p < .001$	Supported
H_5: Perceived ease of use will have a positive direct effect on perceived usefulness.	$p < .001$	Supported
H_6: Perceived ease of use will have a positive effect on attitude toward using mobile technology.	$p < .001$	Supported
H_7: Perceived usefulness will have a positive direct effect on attitude toward using mobile technology.	$p < .001$	Supported
H_8: Perceived usefulness will have a positive direct effect on behavioral intention to use mobile technology.	$p < .001$	Supported
H_9: Attitude will have a positive direct effect on behavioral intention to use mobile technology.	$p < .001$	Supported
H_{10}: Behavioral intention will have a positive direct effect on mobile technology use frequency.	$p < .001$	Supported
H_{11}: Behavioral intention will have a positive direct effect on mobile technology use length of time.	$p < .001$	Supported

Conclusions

The constructs of perceived resources, perceived ease of use, perceived usefulness, behavioral intention, and attitude towards use were significant predictors of

educators' acceptance of mobile technology in higher education as defined by actual use. Specifically, perceived resources had a positive direct effect on perceived usefulness. Perceived resources had a positive direct effect on perceived ease of use. Perceived resources had a positive direct effect on attitude toward using mobile technology. Perceived resources initially had a positive direct effect on behavioral intention to use mobile technology; however, it was no longer significant after constructing the path from perceived usefulness to behavioral intention. In addition, once establishing the path from attitude toward using mobile technology with behavioral intention to use, the path from perceived resources to behavioral intention became negative. This indicated that attitude toward using mobile technology mediated the relationship between perceived resources and behavioral intention.

Perceived ease of use had a positive direct effect on perceived usefulness. Perceived ease of use had a positive effect on attitude toward using mobile technology. Perceived usefulness had a positive direct effect on attitude toward using mobile technology. Perceived usefulness had a positive direct effect on behavioral intention to use mobile technology. Attitude had a positive direct effect on behavioral intention to use mobile technology. Behavioral intention had a positive direct effect on mobile technology use frequency. Behavioral intention had a positive direct effect on mobile technology use length of time. Chapter 5 discusses implications and offers recommendations.

CHAPTER 5. DISCUSSION, IMPLICATIONS, RECOMMENDATIONS

In the current quantitative study, the intent of the researcher was to assess the application of the extended technology acceptance model presented by Chen et al. (2013) to explain the acceptance of mobile technology by current educators in higher education within the United States. One hundred eighty-one current educators in higher education within the U.S. participated in the study, using the survey instrument designed on SurveyMonkey®. Analysis examined the influencing factors determining why educators adopt or do not adopt mobile technology.

This chapter provides a summary of the research including an explanation of the findings and conclusions from the data collected during the study. In addition, the chapter includes a discussion of the implications of the study, limitations of the study, recommendations for future direction of the research, and a conclusion.

Summary

The primary focus of the study was to collect perceptions of the factors related to mobile technology acceptance from current educators in higher education. The study utilized TAM in the extended form utilized by Chen et al. (2013) that included the variables of actual use 1 or frequency of use and actual use 2 or the length of use. TAM has wide use in research to assess the acceptance of technology. The research assessed whether true correlation existed between perceived resources, perceived ease of use, perceived usefulness, attitude toward use, behavioral intention, actual use 1, and actual use 2. Participants included 181 current educators who answered 100% of the questions on the survey instrument. The survey instrument, adopted from the Chen et al. (2013) study, extended the original TAM model and used the TAM theoretical model for its

study. The survey instrument consisted of 26 questions based on a five-point Likert scale, ranging from Strongly Agree to Strongly Disagree. The first four questions collected demographic information. The remaining 22 questions measured technology acceptance and identified the factors that influenced the acceptance of mobile technology by current educators in higher education within the U.S.

The results derived from the path analysis show the constructs of perceived resources, perceived ease of use, perceived usefulness, behavioral intention, and attitude towards use and were significant predicators of acceptance of mobile technology in higher education as defined by actual use. The following research question guided the study:

RQ1: Are the constructs of perceived resources, perceived ease of use, perceived usefulness, and attitude towards use; significant predictors of educators' acceptance of mobile technology in higher education as defined by actual use?

Data analysis using the SPSS 23 and AMOS 23 determined a positive correlation between educators' actual use and the five independent factors (perceived resources, perceived ease of use, perceived usefulness, attitude towards use, and behavioral intention to use). The demographic analysis of the data showed that sixty-three percent of respondents (N = 114) were female and 37% (N = 67) were male. The three largest age groups were 45-54 (34.3%, N= 62), 35-44 (27.6%, N = 50), and 55-64 (21%, N = 38), which represented 82.9% (N= 150) of the sample. Approximately one-third (33.1%, N = 60) of educators had taught at a college or university for 6-10 years; 26.5% (N = 48) had taught for 16 or more years; and 21.5% (N = 39) had taught at a college or university for 0-5 years.

Data analysis showed that perceived resources had a positive direct effect on perceived usefulness. Perceived resources had a positive direct effect on perceived ease of use. Perceived resources had a positive direct effect on attitude toward using mobile technology. Perceived resources initially had a positive direct effect on behavioral intention to use mobile technology; however, it was no longer significant after constructing the path from perceived usefulness to behavioral intention. In addition, once establishing the path from attitude toward using mobile technology with behavioral intention to use, the path from perceived resources to behavioral intention became negative. This indicated that attitude toward using mobile technology mediated the relationship between perceived resources and behavioral intention.

Perceived ease of use had a positive direct effect on perceived usefulness. Perceived ease of use had a positive effect on attitude toward using mobile technology. Perceived usefulness had a positive direct effect on attitude toward using mobile technology. Perceived usefulness had a positive direct effect on behavioral intention to use mobile technology. Attitude had a positive direct effect on behavioral intention to use mobile technology. Behavioral intention had a positive direct effect on mobile technology use frequency. Behavioral intention had a positive direct effect on mobile technology use length of time.

Implications

When assessing the factors that determined why educators in higher education accept or reject mobile technology, the key element was attitude towards the mobile technology. It is crucial for the success of incorporating mobile technology to first address the attitude of educators towards accepting mobile technology. The results

confirmed the main constructs of the TAM model, showing perceived usefulness and perceived ease of use as the main determinants of educators' attitude towards acceptance of mobile technology, which, in turn, was of greater significance when determining the behavioral intention to use mobile technology. Findings revealed that behavioral intention to use mobile technology could predict educators' actual use of mobile technology. .

Limitations

This study assessed the mobile technology acceptance of current educators in higher education in the U.S. based on the Chen et al. (2013) extended technology acceptance model. One limitation of this study was that participation required the current educators to have access to the Internet to complete the survey. Furthermore, participant recruitment was within the U.S. only because the study focused on mobile technology acceptance of current educators in higher education within the U.S. Another limitation was the self-reported frequency in relation to the constructs of actual use 1 and actual use 2. Davis (1989) stated that self-reported frequency did not represent the precise measure of usage, but it was an appropriate relative measure. Last, the study relied on Davis's (1989) technology acceptance model and used the extended technology acceptance model, which is only one of the variants of the TAM.

Recommendations for Future Research

Future research could look at assessing mobile technology acceptance using a different variant of the TAM to compare with the results of this study. Because the survey instrument in this study was open only to educators with Internet access who were part of the closed online group of educators, future research could make the survey available to a

wider group of educators without the limitation or restriction of being online or a part of the closed online group educators. Future studies could use a system to track the data that represents actual usage of mobile systems for higher education instruction by having a system in place that would record the number of times and the amount of time an educator spends on mobile technology for instructional use.

The Technology Acceptance Model does not take into account social influences involved in the acceptance of information technology and could not solely be used to support this study's theoretical framework. It is therefore important to also examine the social influences associated with accepting, adopting, implementing, and utilizing new technology. By utilizing a theoretical framework that encompasses the Technology Acceptance Model and Unified Theory of Acceptance and Use of Technology for this study, researchers will be able to assess how social factors influence user acceptance of mobile technology in higher education.

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APPENDIX A. STATEMENT OF ORIGINAL WORK

Academic Honesty Policy

Capella University's Academic Honesty Policy (3.01.01) holds learners accountable for the integrity of work they submit, which includes but is not limited to discussion postings, assignments, comprehensive exams, and the dissertation or capstone project.

Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person's ideas or works.

The following standards for original work and definition of *plagiarism* are discussed in the Policy:

> Learners are expected to be the sole authors of their work and to acknowledge the authorship of others' work through proper citation and reference. Use of another person's ideas, including another learner's, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)
>
> Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else's ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

Capella University's Research Misconduct Policy (3.03.06) holds learners accountable for research integrity. What constitutes research misconduct is discussed in the Policy:

> Research misconduct includes but is not limited to falsification, fabrication, plagiarism, misappropriation, or other practices that seriously deviate from those that are commonly accepted within the academic community for proposing, conducting, or reviewing research, or in reporting research results. (p. 1)

Learners failing to abide by these policies are subject to consequences, including but not limited to dismissal or revocation of the degree.

Statement of Original Work and Signature

I have read, understood, and abided by Capella University's Academic Honesty Policy (3.01.01) and Research Misconduct Policy (3.03.06), including the Policy Statements, Rationale, and Definitions.

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the APA *Publication Manual*.

Learner name and date	Dennis E. Pires - October 26, 2015
Mentor name and school	Dr. Meredith Weiss – Capella University

APPENDIX B. SURVEY INSTRUMENT

SURVEY INSTRUMENT

(1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Perceived Resources (R)

1. I have a mobile technology for higher education use.
2. I had directions on how to use mobile technology in higher education.
3. I had support services to help me use mobile technology.

Perceived Ease of Use (EOU)

4. It was easy to use mobile technology.
5. It was easy to get mobile technology to do what I wanted it to do.
6. It was easy for me to become skillful at using mobile technology.

Perceived Usefulness (U)

7. Using mobile technology in class improved my work efficiency.
8. Using mobile technology enhanced the quality of my work.
9. Using mobile technology made it easier to access my coursework.
10. Using mobile technology made it easier to complete my coursework.
11. Using mobile technology interfered with my coursework.
12. Mobile technology was useful in class.

Attitude (A)

13. It is beneficial to use mobile technology.
14. It is fun to use mobile technology.
15. My experience with mobile technology was good.
16. Mobile technology improves my teaching experience.
17. The college/university courses provide good opportunities to use mobile technology.

Behavioral Intention (BI)

18. Assuming that I have access to mobile technology, I will frequently use it to access my courses in the future.
19. I would like to have additional features in the mobile technology for my classes.
20. I would like to have additional mobile applications for learning besides just mobile technology.

Actual Usage (USE)

21. On average, how frequently do you use mobile technology for teaching daily (Use 1)?
22. On average, how long do you stay on the mobile technology each time you it for teaching (Use 2)?