Mobile Technology in Higher Education: An Extended Technology Acceptance Perspective

Dennis Pires
piresd@cookman.edu
College of Business and Entrepreneurship
Bethune-Cookman University
Daytona Beach, FL

Leila Halawi
halawil@erau.edu
Department of Aeronautics Graduate Studies
Worldwide Campus
Embry-Riddle Aeronautical University
Daytona Beach, FL

Abstract

There is a lack of research that provides institutions with information on educators' acceptance of mobile technology in higher education within the United States. 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 before COVID-19. The results showed statistical significance exists in relationships across the assessed factors of perceived usefulness, perceived ease of use, perceived attitude toward use, and behavioral intention, which contribute to the acceptance of mobile technology in higher education. The study implies 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.

Keywords: mobile technology, technology acceptance, higher education, instructional technology

1. INTRODUCTION

The growth of technology has affected all organizations, including the education industry, which also changed the 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. To understand the acceptance of mobile technology by educators in higher education, it is essential to study those that utilize mobile technologies in the industry. As Davis, Bagozzi, & Washaw (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 accept or reject certain technological tools.

The infusion of new technologies has dramatically affected the way individuals 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 regular pricing every eighteen months hold, mobile technologies will continue to be critical to the success of the higher education industry.

Chen, Sivo, Seilhamer, Sugar, & Mayo (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 knowledge, 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 educate and motivate their faculty to use mobile technology for instructional purposes prior to COVID-19.

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 study provides an essential theoretical framework for decision-making for educational institutions as they seek improvement in user acceptance of technology in the higher education setting.

2.LITERATURE REVIEW

Various studies noted that users of mobile technology valued availability and efficiency. Consequently, younger generations adopted information and communication 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 following the pedagogical design (del Barrio-Garcia, Arquer, & Remero-Frias, 2015). Thus, Al-Adwan and Smedley (2012) suggested a modern 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). The technology employed within e-learning systems, either supplements or completely replaces traditional methods of learning (Shawar, Al-Sadi, & Sarie, 2007).

Further, e-learning encompasses the use of electronic media inclusive of audio, computer videoconferencing, interactive T.V., 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 create 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 valid "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 order. Del Barrio-Garcia et al. (2015) posited that the success of e-learning as an information and communication technology system could aid an 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: the 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 elements, while effort expectancy, facilitating conditions, behavioral intention, and attitude toward using technology each measured three things.

Technology Acceptance Model

The original Technology Acceptance Model (TAM) examines the effect of users' attitudes and beliefs on user acceptance of information technology or the 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). For a thorough review of TAM, you can refer to the study by Pires & Halawi (2019).

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 thriving learning environment based on eLearning (Jairak et al., 2009). Colleges and universities must examine, assess, and understand the correlation between student perception and participation in e-learning and institute a productive, successful, and efficient approach to e-learning to improve the university's learning process (Al-Adwan et al., 2012).

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 the first to adopt e-learning. The university's partnership with the United Kingdom Open
University was significant in the 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 keen 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 about 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 critical factor in influencing mobile learning. Huang, Lin, and Chuang (2007) assessed the

impact of perceived satisfaction on 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, enjoyment,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, essential to examine the social influences associated with accepting, adopting, implementing, and utilizing a 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 influence can dissuade users from utilizing technology, thereby yielding the opposite effects of what was initially intended. Results from Al-alak and Alnawas (2011) demonstrated normative force as (β = -0.22, p<0.01), which failed to support the study's hypothesis.

Mobile Learning

Previous research examined mobile learning (m-learning) about 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 by 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 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 mlearning systems. Jairak et al. (2009) recommended a more in-depth assessment of elearning 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 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 distance 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 affect 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 the 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 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 study aimed 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 about the technologies conventional in everyday life, how they used such techniques 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 about technology. Students primarily used technology within the context of discussion forums, emails, the Internet, learning management systems, PowerPoint, and lecture recordings, while staff focused mostly 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. This developing country encountered a set of limitations due to the increased implementation of eLearning 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 explained the underlying reasons why academic institutions of higher education failed to adopt e-learning initiatives in Jordan. Hesitancy and a keen unwillingness to take 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 (AlAdwan et al., 2013). This may necessarily 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.

3. METHODOLOGY

The current study used a path analysis design to measure the mediating effects on the use 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?

The sample size consisted of 180 participants with a confidence level of .95%, a response distribution of 50%, and a margin error of 5%. 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

Data analysis was with AMOS 23.0, computer software marketed by SPSS (Arbuckle, 2008). The basis of the full model was on Chen et al. 's (2013) extended technology acceptance model (TAM). For a thorough review of the validity and reliability of the constructs, you can refer to the study by Pires & Halawi (2019).

4. RESULTS

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. Approximately one-third (33.1%, N = 60) of participants had taught at a college or university

Hypothesis Testing

Eleven hypotheses associated with the primary research question. Table 1 lists all the hypotheses and states whether they were supported.

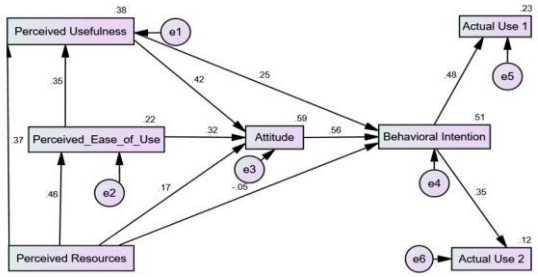
Table 1 provides a summary of all the hypotheses tested and their outcomes.

Table 1. 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

Figure 1. The path diagram



. Path model

5. DISCUSSION, IMPLICATIONS and, RECOMMENDATIONS

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.

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. .

6. 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.

7. RECOMMENDATION FOR FUTURE RESEARCH

It is important that you consider that this study was concluded prior to the covid-19 pandemic. As a result of the pandemic most universities completed their spring semesters online, thereby requiring many faculties who had never taught online to do so. This could impact their perception of the use of technology with online education – therefore a post covid study should be performed

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.

8. REFERENCES

Adedoja, G., Adelore, O., Egbokhare, F., & Oluleye, A. (2013). Learners' acceptance of the use of mobile phones to deliver tutorials in a distance learning context: A case study at the University of Ibadan. *The African Journal of Information Systems, 5*(3), 80-93.

l-Adwan, A. & Smedley, J. K. (2012). Implementing e-learning in the Jordanian higher education systems: Factors affecting impact. *International Journal of Education and Development Using Information and Communication technology, 8*(1), 121135.

Al-Adwan, A., Al-Adwan, A., & Smedley, J. (2013). Exploring student's acceptance of elearning using Technology Acceptance Model in Jordanian universities. *International Journal of Education and Development using Information and Communication Technology, 9*(2), 4-18.

Al-alak, B. A., & Alnawas, I. A. M. (2011). Measuring the acceptance and adoption of elearning by academic staff. *Knowledge Management & E-Learning: An International Journal, 3*(2), 201-221.

Al-Harbi, K. A. (2011). E-learning in the Saudi tertiary education: Potential and challenges. *Applied Computing and Informatics, 9*, 31-46.

Arbuckle, J. L. (2008). Amos 17.0 User's Guide. Chicago: SPSS.

Campbell, C. R., & Swiff, C. O. (2006). Perceptions of compressed video distance learning (DL) across location and levels of instruction in business courses. *Journal of Education for Business, 81*(3), 170-174.

Capo, B. (2011). Web 2.0 technologies for classroom instruction high school teachers' perception and adoption factors. *The Quarterly Review of Distance Education, 12*(4), 235-253.

Chen, B., Sivo, S., Seilhamer, R., Sugar, A., & Mao, J. (2013). User acceptance of mobile technology: a campus-wide implementation of blackboard mobile[tm]

learn application. *Journal of Educational Computing Research, 49*(3), 327-343.

Clarke, P., Keing, C., Lam, P., & McNaught, C. (2008). Using SMSs to engage students in elearning. In *Proceedings of World Conference on Educational Multmedia, Hypermedia and Telecommuncations*. (pp. 6132-6141). Chesapeake, VA: AACE.

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality and benefits of e-learning. *British Journal of Educational Technology, 36*(3), 501-512.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

del Barrio-Garcia, S., Arquer, J. L., & Remero-Frias, E. (2015). Personal learning environments acceptance model: The role of need for cognition, e-learning satisfaction and students' perceptions. *Educational Technology & Society, 18*(3), 129-141.

Huang, J. H., Lin, Y., & Chuang, S. (2007). Elicidating user behavior of mobile learning: A perspective of the extended technology acceptance model. *The Electronic Library, 25*(5), 585-598.

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.

Lewis, C. C., Fretwell, C. E., Ryan, J., & Parham, J. B. (2013). Faculty use of established and emerging technologies in higher education: a unified theory of acceptance and use of technology perspective. *International Journal of Higher Education, 2*(2), 22-34.

Liaw, S., Huang, H., & Chen, G. (2007). An activity-theoretical approach to investigate learners' factors toward elearning systems. *Computers in Human Behavior, 23*, 1906-1920.

Lin, S., Zimmer, J. C., & Lee, V. (2013). Podcasting aceptance on campus: The differing perspectives of teachers and students. *Computers & Education, 68*, 426-428.

Liu, Y., & Wang, H. (2009). A comparative study on e-learning technologies and products: From the east to the west. Systems *Research & Behavioral Science, 26*(2), 191-209.

McDonald, R. P. (1989). An index of goodness-of-fit based on noncentrality. *Journal of Classification, 6*, 97-103.

Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a world wide web context. *Information Management, 38*(4), 217-230.

Nassuora, A. B. (2012). Students acceptance of mobile learning for higher education in Saudi Arabia. *American Academy & Scholarly Research Journal, 4*(2), 1-6.

Rogers, Y., Connelly, K., Hazelwood, W., & Tedesco, L. (2010). Enhancing learning: A study of how mobile devices can facilitate sense making. *Personal & Ubiquitous Computing, 14*(2), 111-124.

Shawar, B., Al-Sadi, J., & Sarie, T. (2007). Integrating the learning management system with mobile Technology: The 2007 International Conference on e-learning. *EBusiness, Enterprise Information Systems, and E-Government*, 31-36.

The National Center for e-learning and distance learning. (2008). *National e-Learning Center*. Retrieved from http://elc.edu.sa/?q=en

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education, 52*(2), 381-389.

Wang, M., Shen, R., Novak, D., & Pan, X. (2009). The impact of mobile learning on students' learning behaviours and performance: Report from a large blended classroom. *British Journal of Educational Technology, 40*(4), 673-695.

Waycott, J., Bennett, S., Kennedy, G., Dalgarno, B., & Gray, K. (2010). Digital divides? Student and staff perceptions of information and communication technologies. *Computers & Education, 54*, 1202 1211.