CEC Theses and Dissertations   College of Engineering and Computing

2015

The Construction and Validation of an M-Learning Framework for Online and Blended Learning Environments

Dick T. Hamann
Nova Southeastern University, hamannd@cfl.rr.com

This document is a product of extensive research conducted at the Nova Southeastern University College of Engineering and Computing. For more information on research and degree programs at the NSU College of Engineering and Computing, please click here.

Follow this and additional works at: http://nsuworks.nova.edu/gscis_etd

Part of the Adult and Continuing Education Administration Commons, Adult and Continuing Education and Teaching Commons, Community College Education Administration Commons, Computer Sciences Commons, and the Educational Methods Commons

Share Feedback About This Item

The Construction and Validation of an M-Learning Framework for Online
and Blended Learning Environments

by

Dick Hamann

A dissertation report submitted in fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Computing Technology in Education

Graduate School of Computer and Information Sciences
Nova Southeastern University

2015

We hereby certify that this dissertation, submitted by Dick Hamann, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

_____   _____
Martha M. Snyder, Ph.D.   Date
Chairperson of Dissertation Committee

_____   _____
Gertrude W. Abramson, Ed.D.   Date
Dissertation Committee Member

_____   _____
Steven R.Terrell, Ph.D.   Date
Dissertation Committee Member

Approved:

_____   _____
Eric S. Ackerman, Ph.D.   Date
Dean, Graduate School of Computer and Information Sciences

Graduate School of Computer and Information Sciences
Nova Southeastern University

2015

An Abstract of a Dissertation Report Submitted to Nova Southeastern University in
Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

The Construction and Validation of an M-Learning Framework for Online and Blended Learning Environments

by
Dick Hamann
March 2015

With the wide adoption of mobile technologies, new opportunities exist with regard to how these technologies can be used to support teaching and learning. However, there is limited empirical evidence on the use of mobile learning (m-learning) frameworks that support adult students in online and blended learning environments and consider ways to support administrators, faculty, and students in the adoption of mobile technologies for teaching and learning.

The goal was to develop and validate an m-learning framework capturing the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support adult community college students. Using design and development research methods, an m-learning framework was constructed and validated. Based on the literature review and the results of the data analysis, the framework was developed and included three sections: major categories; needs within categories; and attributes of the needs. Each section is composed of at least one of those major categories: section 1 composed of Access and Security; section 2 composed of Applications and Instructional Materials; and section 3 composed of Control and Monitoring Systems. Combined, all three sections account for five major categories. The final m-learning framework was design to include specific guidelines to help administrators and faculty make decisions about the adoption of m-learning technologies to support teaching and learning in online and blended learning environments.

Acknowledgements

First and foremost, I would like to thank my committee members for their guidance and support during the dissertation process. To my dissertation chair, Dr. Marti Snyder, whose continuous support and advice motivated me to stay on track and finish the study. Without her exceptional guidance, feedback and support, I am certain that I would have not been successful. To Dr. Trudy Abramson, whose initial advice to focus the project and her feedback throughout every step of the process gave me the confidence and assurance to move forward. To Dr. Steven Terrell, whose insightful input forced me to look deeper into the study and to make the necessary adjustments to meet the goals of the study. Their support will never be forgotten.

My most sincere sentiments of gratitude are extended to my family and friends for their understanding during this journey by keeping my spirits high and well-grounded with positive and unconditional love and support.

I would also like to acknowledge the support and contributions from the students, faculty and administrators at Seminole State College for allowing me to conduct the study at their institution. Special thanks to the entire faculty who took the time to encourage their students to participate in the study and for their honest and unbiased responses. Also, many thanks to Brittany Resman and Dr. Mark Morgan, from the college's Institutional Research Office, for their support in collecting and compiling all the data for this study, and for their continued encouragement.

Table of Contents

List of Tables

List of Figures

Figures

Chapter 1

Introduction

Background

Colleges and universities are struggling to support and meet the demands of today's information technology-enabled society, while concurrently offering engaging learning environments that motivate students to persist and achieve their academic goals. For example, according to Jeng, Wu, Huang, Tan, and Yang (2010), mobile technologies have become an integral part of people's daily lives and are used for communication, entertainment, and education. The authors suggested that based on this widespread use, "educators now strive to facilitate learning by applying mobile technology and appropriate learning strategies" (p. 3). Similarly, Wains and Mahmood (2008) noted that mobile devices, such as smartphones, media players, and tablets, are now equipped with technologies and applications that can provide rich, interactive multimedia content for educational purposes. Appropriate mobile learning (m-learning) strategies can help educators engage their students, hence facilitating teaching and learning processes.

In 2014, the International Telecommunications Union reported that seven billion people have active cellular subscriptions and over three billion are accessing the Internet via their mobile devices (ITU, 2014). Given the exponential growth of mobile technology users, and advancements made in terms of increased functionality, applications, and processing power, Fardoun, Villanueva, Garrido, Rivera, and Lopez (2010) stated that mobile learning provides a fruitful opportunity to design and develop instructional activities and tools that can support traditional, online, blended, and other innovative educational processes.

To facilitate effective online learning, several researchers have proposed m-learning frameworks derived from different perspectives. For instance, Danaher, Gururajan, and Hafeez-Baig (2009) proposed a framework based on three key principles: engagement, presence, and flexibility (Figure 1). These researchers defined *engagement* as "the active participation of the learner in the learning activities in mobile learning and teaching environments" (p. 25). *Presence* is defined as ''a simultaneous awareness and locatedness of self and others in a learning and teaching environment . . . 'encompassing the emotional element of being human''' (p. 26). *Flexibility* refers to the "mobility offered by the technologies, as well as to the issues of running a wireless infrastructure around an institution, the cost of setting up the infrastructure for wireless networks and the flexibility of movements of students and trainers around campuses" (p. 28). The authors offer specific strategies that can be used to promote each of these principles within a mobile learning environment and suggest that this framework can be used as a lens through which mobile learning programs can be evaluated.
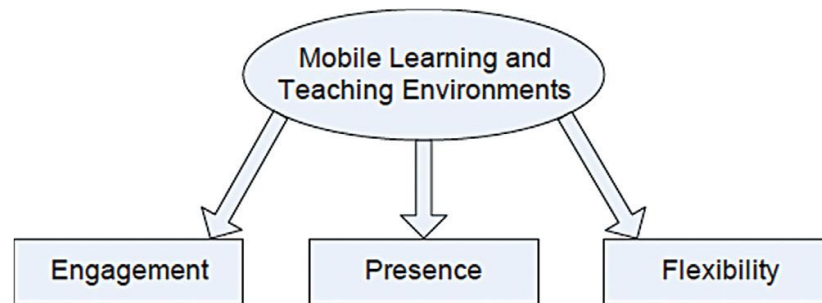
Figure 1. M-learning framework. Adapted from "Transforming the Practice of Mobile Learning: Promoting Pedagogical Innovation Through Educational Principles and Strategies That Work," by P. Danaher, R. Gururajan, and A. Hafeez-Baig, 2009. In R. Hokyoung & D. Parsons (Eds.), *Innovative Mobile Learning: Techniques and Technologies*, p. 23. Copyright 2009 by Information Science Reference.

Other researchers, such as Kearney, Schuck, Burden, and Aubusson (2012), proposed a framework to capture central pedagogical features of m-learning environments. Their framework incorporated four dimensions: "place, connection, immediacy and activity" (p. 5). Kearney et al.

developed their framework based on the work of Vavoula and Sharples (2009), who proposed a three-level framework for evaluating m-learning, comprising a microlevel concerning usability, a mesolevel focusing on the learning experience (especially on communication in context), and a macrolevel dealing with integration within existing organizational contexts. Kearney et al. proposed a framework emphasizing a combination of specific mobile pedagogy characteristics within the concept of time-space and m-learning.

Common themes identified in these frameworks—m-learning device portability and learner mobility, interactivity, control, and communication—highlight the maximum opportunity to develop a framework that will not only focus on content delivery, but also focus on the use of technology-mediated learning and interaction to promote engagement and persistence in online environments.

Problem Statement

With improved and more powerful mobile devices rapidly entering the market and becoming readily available—and more robust telecommunications networks and widespread consumer adoption—the ability to support learning with these technologies is more feasible than ever (Park, 2011; Crompton, 2013). As previously mentioned, m-learning frameworks such as those proposed by Kearney et al. (2012) and Danaher et al. (2009) have common themes such as: m-learning device portability and learner mobility, interactivity, control, and communication. However, these frameworks focus mainly on the learners' abilities to consume, produce, and exchange content to achieve subject-matter learning. Limited empirical evidence exists pertaining to the administrative, communication, and instructional needs of administrators, faculty, and students in the adoption of mobile technologies for teaching and learning.

Dissertation Goal

The goal of this design and development study (Richey & Klein, 2007) was to develop and validate an m-learning framework that captures the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support teaching and learning in online and blended learning environments. The framework was developed based on existing research literature in m-learning, as well as input from students, faculty, and administrators at a four-year college in the state of Florida. Within the framework, specific guidelines were provided to help administrators and faculty make decisions about the adoption of m-learning technologies. The framework was validated internally by obtaining input from the three stakeholder groups (i.e., students, faculty, and administrators) about the content and use of the framework. Richey and Klein (2007) suggested that validation research is crucial to substantiate models' post-development integrity and use. Internal validation is used to verify the model's components, while external validation focuses on the model's impact. External validation falls beyond this scope of this study.

Research Questions

Within the context of online and blended teaching and learning in higher education, the following research questions guided the investigation:

1. What are the benefits and limitations of m-learning technologies, and how are these technologies being used to support teaching and learning in higher education? A literature review was conducted to identify relevant information that will inform the initial preliminary framework design.

2. What are the stakeholder (i.e., students, faculty, and administrators) needs that must be considered when adopting m-learning technologies to support online and blended

teaching and learning in higher education? A needs assessment was conducted to identify stakeholder needs.

3. How can stakeholder needs inform the design of a framework for m-learning integration for delivery of online education in higher education? Both the literature review and the needs assessment were used to develop the m-learning framework.

4. What are stakeholder reactions to a proposed m-learning framework? Input regarding the design, content, and use of the framework was obtained from these three stakeholder groups.

5. What modifications are needed to improve the researcher's proposed m-learning framework?

A review of the research literature pertaining to m-learning and a needs assessment and focus groups designed to identify the needs of students, faculty, and administrators informed the preliminary framework design and answer research questions one through three. To answer research question four and five, focus groups with the three stakeholder groups were held to gather input regarding the design, content, and use of the proposed framework and any modifications to the framework will be identified and implemented. Finally, to validate the framework, a Delphi panel comprised of a subset of participants from the three stakeholder focus groups was sought to empirically verify the framework's components and processes.

Relevance and Significance

According to Richey and Klein (2007) technology influences both our personal lives and the design and development profession. They stated "technology has always served as an impetus to design and development research with formal inquiry typically following the initial

practical exploration and experimentation with technologies" (p. 19). Therefore, they suggested that the nature of research problems pertaining to technology-related design and development should focus on emerging and innovative technology and the most effective techniques and tools for producing technology-based products.

Emerging educational technologies are described as computers, software applications, or any other electronic technologies that can significantly change the education and learning process. With the expansion of broadband capabilities during the last decade, Internet-based technologies and tools have evolved to dominate face-to-face (F2F), blended, and fully online instruction. Technological innovations, such as learning management systems (LMS), video conferencing, and media-rich content delivery, have revolutionized course content, perceptions and views of learning. Other technologies, such as the use of online software to evaluate content, structure, and core concepts; video and expanded links to define and demonstrate ideas; and simulation and modeling for lab experimentation, continue evolving to support online learning environments (Bonvillian & Singer, 2013; Havice, Davis, Foxx, & Havice, 2010).

Havice et al. (2010) refer to a new generation of students who grew up during the digital revolution and are technologically savvy. These students have unique learning styles, and their need for instant gratification via technology demands that higher learning institutions reexamine their teaching and learning strategies and delivery methods. Internet-based learning is one result of that reexamination. Students' prior experiences with technology, the availability of technical support, and a user-friendly and accessible LMS are all essential aspects of the online classroom that affect persistence rates. When educational technology in online learning environments does not meet students' standards, students will not persist in the programs those environments are designed to support (Stevenson, 2013). Mobile technologies, which were developed primarily for

business and communication purposes, can serve as an emerging technology that enhances learning and teaching experiences and addresses the difficulties in engaging and retaining adult online students. Regarding mobile device use, mobiThinking (2013), a compendium of mobile statistics and research, reported the following information:

- There are currently almost 322 million mobile users in the United States, totaling approximately 100% of the population (some people have more than one device).

- Of these mobile users, there are 256 million with a 3G/4G data plan (81% of the population).

- In the United States, 25% of mobile Web users are "mobile only"—they rarely use a desktop to access the Web (http://www.mobiforge.com/?mT).

Given the growth and accessibility of mobile technology and services, the opportunities for students, faculty, and administrators to use technology for teaching, learning, and student services support is more feasible today than ever before.

Barriers and Issues

The study of any organization is complex and involves the coordination of many different types of resources including human resources and technical resources. In order to develop a framework that reflects the needs of administrators, faculty, and students it was important to follow an organized, systematic, and iterative process of organizing, collecting, and analyzing data. In addition, it was imperative that all communication between and among participants in the study was clear. The researcher is an upper-level administrator at the college and has a good rapport with the administration, faculty, and students. This positive relationship helped facilitate the communication process among participants and the implementation of the study.

Limitations

Limitations included the following:

1. This large-scale survey of students started with a very small number of students responding to the study. However, to mitigate this issue, the researcher partnered with the faculty to offer extra-credit for those who completed and submitted the survey, or made the actual submission of the survey a graded assignment.

2. Participants included only freshman and sophomore students who were currently taking online or blended courses, and faculty who were teaching freshman and sophomores in this modality. This sampling did not include input from students and faculty who do not participate in online and blended courses, but who could benefit from mobile technologies or are already using them for instructional purposes despite not taking blended or online courses.

3. The list of administrators who participated in the study was drawn mostly from the areas of Student Affairs, Financial Aid, and Student Activities. However, in an attempt to mitigate this limitation, the researcher also solicited survey feedback from academic administrators such as deans and program managers who have regular contact with students outside of the classroom.

Delimitations

The m-learning framework was designed in one four-year college within the Florida College System (FCS). In addition, only freshman and sophomore students and the faculty who teach freshman and sophomore courses were included. Therefore, the resulting framework may not be generalized or be applicable at larger more complex institutions offering graduate level degrees. Only students and faculty who were participating in online and blended delivery of

instruction were surveyed. Furthermore, the researcher did not solicit responses from students, faculty and administrators from other four-year colleges in the FCS so the framework reflects the feedback provided by a single institution.

List of Acronyms

CCCSE – Center for Community College Student Engagement

E-learning – Electronic learning

F2F – Face-to-Face

FTIC – First Time in College

LMS – Learning Management System

M-learning – Mobile Learning

ITU – International Telecommunications Union

FCS – Florida College System

SSC – Seminole State College

Definitions of Terms

Persistence - The behavior of continuing an action despite the presence of obstacles (Rovai, 2003).

Mobile Learning (m-learning) - Any form of learning that is mediated through a mobile or mobile handheld device (Pegrum, Oakley & Faulkner, 2013).

E-Learning- Learning that takes place on-campus or off-campus via the Internet and Web-based technologies, programs and applications (Moore, Dickson-Deane & Galyen, 2011).

Hybrid or Blended Learning - The practice of using both online and in-person learning experiences when teaching students (Hidden Curriculum, 2014).

Design and Development Research - The systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools and new or enhanced models that govern their development (Richey & Klein, 2007).

Summary

This chapter identified a problem related to the limited empirical evidence pertaining to the use of m-learning frameworks that support freshman and sophomore students in online and blended learning environments and also consider the needs of administrators, faculty, and students in the adoption of mobile technologies for teaching and learning. Mobile technology adoption issues become even more crucial in order to impact significant interactivity and interactions among members of working groups within educational environments. Part of the challenge is to take advantage of mobile technology's potential for teaching and learning purposes while, at the same time, enabling students to integrate their educational activities with their everyday life experiences in the virtual environment supported by mobile devices.

The goal was to develop an m-learning framework for college students in online and blended learning environments. This framework captured the administrative, communication, and instructional elements that need to be considered when adopting m-learning technologies to support and enhance persistence of freshman and sophomore college students.

The following two chapters are organized as follows: Chapter two presents a literature review concentrating on persistence in education and emphasizing the online learning environment and mobile technologies and their educational capabilities. Chapter three describes the research design and includes details about specific research instruments, processes, and procedures that

were implemented. The results are presented in Chapters 4 and conclusions, implications,

recommendations, and a summary of the study are presented in Chapter 5

Chapter 2

Review of the Literature

A review of the research literature guided the identification of the benefits and limitations of m-learning as well as existing frameworks that can be used to inform the design and development of an m-learning framework within the context of engaging and promoting persistence among freshman and sophomore students. The review of the literature is divided in three main topics: persistence and engagement in education with an emphasis on the online learning; a review of mobile technologies and their educational and non-instructional capabilities and finally, a review of studies that used a design and development research method to develop frameworks or similar research studies.

Persistence and Engagement in Online Education

Student retention or lack of persistence in higher education is a long-standing problem in higher education. Rovai (2003) defined *persistence* as the behavior of continuing an action despite the presence of obstacles. Nora and Snyder (2011) defined *learning persistence* as the state in which learners continually involved themselves in the instructional process in order to complete their education goals. Rovai (2003) further stated that adults attend school because they choose to do so. In contrast, children attend school because it is mandatory. Therefore, in adult education, persistence is a positive indicator that a course or program is satisfying students' needs. Park, Boman, Care, Edwards, and Perry (2008) noted the U.S. Department of Education identifies persistence as a major indicator of successful programs, which can translate into financial rewards for the institutions that house those programs.

The Center for Community College Student Engagement (CCCSE) is an organization led and staffed by a team headquartered in the Community College Leadership Program at The University of Texas at Austin. For more than ten years CCCSE has shared the results of their nationally recognized flagship student engagement survey with hundreds of educational institutions around the United States. During this period, community colleges have used the center's surveys to assess their students' level of engagement to determine their actions to improve institutional and instructional practices that will result in better student outcomes. According to CCCSE (2013) learning, persistence, and success in college are consistently associated with students being actively engaged with college faculty and staff, with other students, and with the subject matter they are studying. After analyzing data from hundreds of community colleges located around the country that included over 90,000 student participants, CCCSE (2013) reported "that student engagement— in particular, the *CCSSE* benchmarks of *active and collaborative learning* and *support for learners*—is an important predictor of college completion" (p. 3).

CCCSE used four survey tools to identify the relationships between engagement and success in education at the participating institutions. Particularly related to engagement in education, the center used two of those tools to collect and evaluate the data. The first is the Survey of Entering Student Engagement (SENSE), which was administered to first time in college (FTIC) students during their first few weeks of school (i.e., fall term). Survey questions focused on student experiences from their decision to enter college to the end of the third or fourth week of the term. The second tool was the Community College Survey of Student Engagement (CCSSE), which was administered later in the school year (i.e., Spring term) and collected data about the overall student college experience and behavior related to levels of

learning, persistence and completion. Overall results showed that the majority of students, 70%, do not take advantage of the many services available to students to promote interaction, engagement and support. However, those students who participated in engaging opportunities at their college reported higher achieving goals and the colleges experienced higher course completion rates from this group.

Many researchers have identified that persistence is positively influenced by higher student engagement, participation, and interaction between students and instructors, which leads to successful learning outcomes and lower attrition rates (Carr, 2000; Nora & Snyder, 2011; Tello, 2007; CCCSE, 2013). The same factors are applicable to persistence in online learning. Hachey, Wladis and Conway (2012) conducted a study at a college located in New York. At the time of the study, the college enrollment reached over 23,000 students with enrollees coming from 150 countries. The college also offered an online Associate of Arts (AA) degree and close to 100 online courses in liberal arts and career majors. The objective for their study was to determine if there were patterns of experience such as interaction with faculty, familiarity with tools, course delivery methods, etc. and exposure to online learning courses that led to improved persistence and student retention. Hachey et al. (2012) concentrated on looking at reenrollment rates for online courses from fall to spring terms for at least three prior years. College data analysis and responses to surveys of students who participated in online courses clearly showed that prior online course experience strongly correlated with future online course success and persistence. The authors indicated that knowing a student's prior online course success explained 13.2% of the variation in retention and 24.8% of the variation in online success in their sample.

Terrell, Snyder and Dringus (2012) focused on issues of connectivity between dissertation students in a limited-residency doctoral program and their faculty and peers and how

these issues may affect their persistence in completing the program. Terrell et al. used a web-based survey tool to collect qualitative data from 17 students actively working on their dissertation. The questionnaire was designed to collect demographic data; participants' feedback about communications among students and faculty, and students and peers; and information about the program's technology use and support. After coding and analyzing the data, the authors developed a grounded theory indicating the value and importance of peer communication and student-to-faculty communication to doctoral students working on their dissertation and how these relationships can positively influence persistence in completing the program.

Due to the proliferation and widespread acceptance of online courses, the retention issue has become a bigger one since institutions generally report higher attrition rates in online courses than in courses with traditional instructional delivery (Boston, Ice & Gibson, 2011; Pittenger & Doering, 2010). Crosta (2013) analyzed six years of transcript data on 14,429 first-time college students who enrolled at one of five community colleges in a single state. The results revealed that the highest failure rate for early dropouts occurred in fully online courses (37 %) compared to hybrid or blended courses (25%) and face-to-face (F2F) courses (29%).

Allen and Seaman (2013) co-directors of the Babson Survey Research Group, conduct an annual survey in partnership with The College Board, a nonprofit membership association dedicated to connecting students to college success and opportunities, and the study's data collection organization. Their 2013 study sample for the prior year was comprised of all active, degree-granting U.S. higher education institutions. Out of 4,523 institutions invited to participate, a total of 2,512 responses were included in the analysis, representing 55.5% of the total sample size and 80% of total enrollments in the country. The study revealed that during 2012, the number of students taking at least one online course surpassed 6.7 million, equal to

almost one-third of all U.S. higher education students. In addition, approximately 70% of administrators in a sample of over 2,500 higher education institutions expected to initiate or grow their online programs, and providing equal access was the primary motivation for the continued expansion of online education. However, Allen and Seaman also expressed concerns regarding the programs' attrition rates, compared to their face-to-face (F2F) counterparts.

According to Lynch (2010), online learning, which has quickly become an accepted and sometimes preferred instruction mode, offers unique resources and an instructional environment that enhances learning, but it also has presented unique challenges regarding student engagement and success rates. Therefore, the issue of student persistence, especially in the online environment, is of particular importance for higher education administrators. Higher education institutions have always been concerned with retention rates, but this concern has become a more pressing issue because of the proliferation and widespread acceptance of online courses. Although most students have extensive online communication experience via informal social media and Web-based tools, they often lack the ability to communicate in a formal, online academic setting, and as a result, many college students struggle with the online technologies they must utilize to access and contribute to their distance learning courses (Boston et al., 2011; Lynch 2010; Pittenger & Doering, 2010).

The preceding studies highlight characteristics of online students as well as some practices for online classroom educators to prevent attrition. However, it is just as important to evaluate the support systems outside of the classroom and their role in promoting persistence in online courses. CCSSE (2013) pointed out that participation in experiential learning and interaction beyond the classroom has a notably positive relationship with three specific benchmarks of their study: active and collaborative learning, academic challenge, and student-

faculty interaction. In addition, Stevenson (2013) argued that proper resources and access to advising, academic support (e.g., online tutoring and testing services), technical support and financial aid are among the most critical and important services that need to be available to help students be successful in online education. The use of mobile technologies is one of those tools that could be used to enhance communications and interaction with online students in order to promote success and persistence in online education.

Mobile Learning and M-Learning Frameworks

McCraken (2009) suggested that beyond academic activities, program completion increases as access to support mechanisms (e.g., tutoring, skills training, career placement, etc.) becomes available. While these services are typically available to traditional, face-to-face (F2F) students, they have not been as consistently provided for online learners. However, with the introduction of innovative Web-based technologies, it is unnecessary to segregate student populations based on course delivery method. Technology can facilitate support mechanisms for online students, which can be provided on-demand or as requested.

According to Greenfield (2011), to address persistence and attrition, higher education institutions must find innovative ways to encourage student participation and interaction among faculty and students in online learning. Emerging from the Internet and Web-based electronic learning (e-learning) technologies, m-learning is becoming more prominent and is expected to have a significant impact on student retention rates for online courses.

The new generation of students has grown up during the digital revolution and is technologically savvy. They have unique learning styles and their need for instant gratification via technology demands that institutions of higher learning reexamine their teaching and learning strategies and delivery methods (Havice, Davis, Foxx, & Havice, 2010). College students report

that they are comfortable participating in courses in which multiple technologies are infused. Their familiarity with interactive multimedia, which may include text, audio, video and other streaming digital media content, motivates students to interact and engage in the learning process. In several studies, students who downloaded such media files reported that they had an overall understanding of the material and learning expectations by listening to lectures and using other visual tools as their primary source of information (Havice et al., 2010).

Based on the notion that today's students have grown up immersed in a technology rich environment, it is possible to assume they are capable, interested and willing to use different and innovative technologies to support their academic goals (Vesisenaho et al., 2010). Today's students utilize their personal mobile technologies (i.e. smartphones, PDAs, tablets) everywhere they go, including their classrooms. Their proficiency with these tools presents opportunities for schools to take advantage of these innate skills. However, we must ask: Are mobile devices a distraction, or can teachers use them as effective learning tools both inside and outside of the classroom (Vesisenaho et al., 2010)?

Because of multiple devices owned by a single person, the number of mobile subscriptions for 2013 reached close to the seven billion mark, which is higher than the human population (ITU, 2013). Due to this rapid deployment and growth of the technology, m-learning appears to have the potential to make education more accessible to and inclusive of all learners. Nonetheless, for mobile technologies to have a positive impact on education, guidelines are needed for the application of mobile technologies to support instructional and non-instructional activities. According to Alexander (2004) and Park (2011), the most important aspects of instructional design, in the context of m-learning, are the identification of the mobile technology, the learner, and the learning content. Park further stated that m-learning refers to the use

of mobile or wireless devices for the purpose of learning while on the move. Despite m-learning's perceived benefits, El-Hussein and Cronje (2010) suggested that mobile device use for instruction delivery represents new problems for instructional designers. To address these problems, the traditional instructional design theories and models need to incorporate guidelines for teaching and learning in mobile environments and with mobile technologies. Recent studies have shown that in general students are ready to accept and use mobile devices for the purpose of education (Corbeil & Corbeil, 2011; Mahat et al., 2012; Park, 2011; Taleb & Sohrab, 2012). However, typically citizens around the world utilize the technology for video gaming, information sharing and searching, and for socializing, but not necessarily for learning on their mobile devices. College educators and administrators must capitalize on this increasing use and familiarity with mobile technologies, which is readily placing the access in the hands of the learners, to develop learning materials that can be delivered at the place and time when users need them and want them.

Kukulsa-Hulme, Evans, and Traxler (2005) and Park (2011) described m-learning as the act of students taking advantage of educational opportunities offered by mobile technology. Park (2011) also added that most recent innovations in program applications and social software using Web 2.0 technologies (e.g., blogs, wikis, Twitter, YouTube) or social networking sites (such as Facebook and MySpace) have made mobile devices more dynamic and pervasive, and also promise more educational potential.

The most logical use for mobile devices is to access networks, services, and resources on demand (Wagner, 2008). They provide users access to a large resource pool, regardless of physical location. Users no longer need to be tethered to a chair and a personal computer (PC) to access the Internet and Web services. Improved and more powerful mobile devices rapidly

entering the market and becoming readily available—and more robust telecommunications networks and widespread consumer adoption—the ability to support learning with these technologies is more feasible than ever (Vesisenaho et al., 2010). Gikas and Grant (2013) pointed out that m-learning is at the heart of the next wave of emerging technologies, which is slowly reaching educational institutions. They suggested that applications of mobile computing devices and their wireless access to social media, library resources and online learning management systems have opened the door to three common activities: engaging learners with constant connectivity, (b) fostering collaborative learning and (c) enabling authentic learning on the move.

While some definitions of mobile learning focus of the technology or the mobility of the technology, others focus on the size of the device. However, in general mobile learning tends to be defined by the context, in which it is used, the experiences reported by the users and the tools and applications for use. Table 1 presents an overview of various mobile learning definitions as described by several researchers over the years.

Table 1. *Mobile Learning Definitions*

Author(s)	Year	Definition
Doneva, Nikolaj, and Totkov	2006	A next stage of e-learning through the use of mobile and portable devices and wireless network and communication technologies for teaching and learning.
Sharples, Taylor, and Vavoula	2007	The processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies.

Ally	2009	The process of using a mobile device to access and study learning materials and to communicate with fellow students, instructors or institution.
Park	2011	The act of students taking advantage of educational opportunities offered by mobile technology.
Pegrum, Oakley and Faulkner	2013	It covers any form of learning that is mediated through a mobile or, more precisely, mobile handheld devices.

Most mobile devices can connect to the Internet via a commercially available wireless telecommunications carrier or to an institution's local wireless or wired infrastructure. These technologies already have full connectivity to social networks such as Facebook®, Google®, Twitter®, and others. Users know how to navigate systems with the technology embedded in a device and access the portable applications (Vesisenaho et al., 2010). Pegrum, et al. (2013) further reported that the popularity of mobile handheld devices have increased dramatically in recent years and that they are distinct from *portable* devices such as laptops, which can be transported to different locations, but lack the convenience and flexibility of smaller handheld devices.

Kearney et al. (2012) developed and tested an m-learning pedagogical framework through activities in two mobile learning projects located in teacher education communities: *Mobagogy*, a project in which faculty and staff in an Australian university; and *The Bird in the Hand Project*, which explored the use of smartphones by student teachers and their mentors in the United Kingdom. Several activities that contributed to the framework development included exploring the sociocultural characteristics specific to m-learning; reviewing the literature on m-

learning; identifying and examining approaches by interviewing global experts in the field; and

initiating and implementing specific m-learning pedagogies with participants in the context of

higher education. The final framework Kearney et al. developed included personalization,

authenticity, and collaboration as the three most important m-learning features, within time and

space boundaries. The authors also included two subscales for each of the three features depicted

in Figure 2.
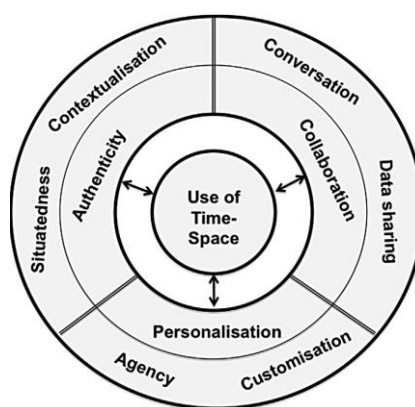
Figure 2. Framework comprising three distinctive characteristics of m-learning experiences,
with subscales. From "Viewing Mobile Learning From a Pedagogical Perspective," by M.
Kearney et al., 2012, *Research in Learning Technology, 20*(14406), p. 8 Copyright 2012 M.
Kearney et al. Permitted to use graph on September 30, 2013 via email.

However, Kearney et al. proposed a framework, which highlighted a combination of specific

mobile pedagogy characteristics within the concept of time-space and m-learning, which did not

address the ability to integrate the technology outside of the classroom and as a support

mechanism to promote interaction with students and administrators as well.

A different approach for an m-learning framework was developed by Samak and

Impagliazzo (2013). Their model, *mLearn,* concentrated on the mobile technology itself and its

ability to display text and non-text (video, audio and images) information delivered to the users

in an optimal manner. The authors professed that the design of the framework extends the e-

learning delivery of instruction to mobile handheld devices within a learning environment, but

without the limitations of time and space. Additionally, the *mLearn* model has been modified to meet the physical and technological limitations of mobile devices, such as smart phones and tablets.

Samak and Impagliazo (2013) suggested that the majority of content that is designed for e-learning is not appropriate for the smaller handheld devices due to the limitations of screen sizes, memory and storage capacity, and bandwidth available to the Internet. Therefore, content intended for m-learning must be modified to be delivered in concise and modular learning units. These authors focused their model on the following three specific approaches for the delivery of content including, exposition, exploration, and communication. Exposition supports asynchronous learning by allowing students to download learning objects prior to the formal learning lesson and provides a learning path to follow. Exploration provides the learner with more control over the material, but since there is not a prescriptive learning path, this approach is more suitable for those who already have a basic knowledge of the subject matter and are used to learning on their own. Web pages are the best example of this approach. Last is the communication learning approach, which allows students and faculty to communicate directly with each other via mobile devices. This approach requires the ability for the mobile devices to have access to asynchronous and synchronous methods of communications such as chat, email, and video and audio conferencing, which are currently available in most smart phones as a basic functionality.

The mLearn framework developed by Samak and Impagliazo (2013) proposed a design of an integrated high-level architecture for a mobile learning platform taking advantage of the flexibility of mobile devices to share content, and their ability to allow for interactivity among learners and instructors while participating in a learning environment using the three delivery

approaches previously described (Figure 3). However, this framework describes an architecture

that addresses how e-learning content should be delivered and presented when using mobile

devices, but it does not identify specific guidelines for integrating instructional and no-

instructional functions into the educational process to support students' learning and success.
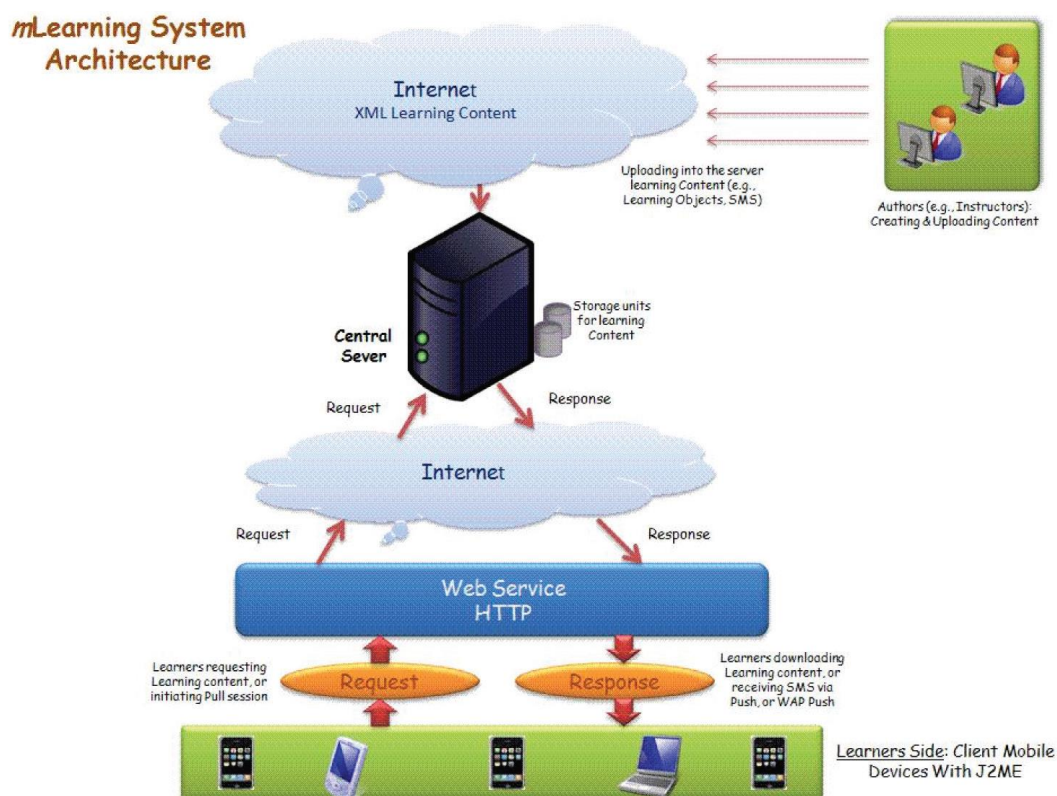
Figure 3. mLearn Learning Environment. Samak, M., & Impagliazzo, J. (2013). mLearn:Designing a Platform for Mobile Learning. In *Outlooks and Opportunities in Blended and Distance Learning* (pp. 108-114). Copyright by IGI Global. Reprinted by permission of the publisher.

In contrast to Samak and Impagliazo's (2013) model and moving away from the concept

of the mobile technology itself, Cochrane and Bateman (2013) stated that m-learning is not about

delivering learning material and other content to a mobile device or the technology, but about

being able to successfully operate, understand and learn across different learning spaces.

Therefore, their focus was to explore the potential for pedagogical transformation enabled by the educational opportunities provided by the devices that students already own, such as smart phones. Early in 2006 these authors worked with Unitec, the largest New Zealand's institute of technology, to develop an m-learning pilot project within the institute's Bachelors of Product Design (BPD) program. The three-year study led to the development of an implementation framework for mobile learning using mobile Web 2.0 guidelines. Simply stated, mobile Web 2.0 is the expansion of just accessing websites over mobile phones to a larger range of services and tools accessible by multiple mobile devices and not just phones. Web 2.0 guidelines become then the base platform environment that integrates several applications and ensures that devices can take advantage of low cost, high-speed wireless environments, and standard design elements are used to access the web services and applications (Rollet, Lux,Strohmaier, Dosinger & Tochtermann, 2007).

Cochrane and Bateman (2013) implemented over 30 mobile Web 2.0 learning framework projects between 2006 and 2011 in multiple courses, both technical and non-technical, at Unitec. Subsequently, in 2011 the framework was also implemented in an international collaborative project between six different courses in four different countries. The original pilot identified the following six critical success factors, which led to the development of a mobile Web 2.0 framework: "the pedagogical integration of the technology into the course and assessment; lecturer modelling of the pedagogical use of the tools; creating a supportive learning community; appropriate choice of mobile devices and Web 2.0 social software; technological and pedagogical support; creating sustained interaction that facilitates the development of ontological shifts, both for the lecturers and the students" (p. 12). The authors asserted that their mobile Web 2.0 framework allowed for the design of student-generated content and learning contexts in and

beyond the classroom. In addition, collaborative and intentional communities of practice (CoPs) were fostered using mobile Web 2.0 guidelines. A key component of the framework is the emphasis on selecting desired learning practices and then choosing the appropriate technology to support these practices. Based on this key component, the framework intended to guide implementation strategies and match them with the collaborative and communicative features available in mobile Web 2.0 tools, making sure that appropriate instructional and transformational choices are made that will ultimate impacting learning and collaborative student experiences.

As described by Cochrane and Bateman (2013), their implementation strategy places the emphasis upon lecturer professional development and student participation with the goal of transforming pedagogy using mobile Web 2.0 guidelines rather than concentrating on the development of complex mobile applications. Although, the authors incorporated social tools and activities outside of the classroom, they focused their framework on the use of mobile technologies within the context of what occurs within the instructional process (pedagogy) and neglected to incorporate activities, which could also improve student engagement and success such as tutoring, academic advising, financial aid, and academic planning and success courses.

A complementary study to Cochrane and Bateman's research conducted by Pollara (2011), investigated how undergraduate students were using mobile devices inside and outside of the classroom and how their perceptions and uses compared to faculty perceptions of student use of the technology to enhance and participate in their educational process. In addition, Pollara also examined the perceptions that students and faculty had on the impact that mobile technology has on student learning, participation and engagement. Although Pollara did not set out to develop a

mobile learning framework or target online learners specifically, the survey tools, research methodology and outcomes are very much in line with this study.

Pollara (2011) employed a mixed-method approach for data collection. Quantitative data were obtained through an online survey and qualitative data were collected through an open-ended question on the survey and through interviews with both faculty and students. There were six research questions, but two in particular are significant and most relevant to this study (p.40):

1. How would the formal use of mobile devices impact student learning, engagement and participation in the classroom?

2. Are students and faculty ready to adapt the use of mobile devices in the classroom?

Pollara's (2011) study was conducted in a research 1 university located in southern US. Participants were faculty and undergraduate students at this university. A random sample of 5,000 undergraduate students representative of the population was selected and the faculty sample was selected in coordination with deans of various schools. The survey instrument and interview protocol were developed and validated based on the research questions, expert input, a pilot study and relevant literature. A total of 308 students from the sample responded to the survey. Their age ranged from 17 to 39, with mean age 20.99 and median 20. The sample population contained 49% males and 51% females. However, only 31% of the student respondents were male. The university employs 1,236 faculty and 109 responded to the survey, representing 8.8% response rate. The respondents' ages ranged from 25 to 78. The mean was 49.55 with 65% being males. The results of the faculty surveys indicated that over 50% of the faculty members were familiar with mobile technologies and know how to perform basic tasks on a mobile device. However, this familiarity is only with daily functional tasks such as checking email, calendar, setting alarms, etc. For more complicated tasks that are needed to be useful as an

educational tool (i.e. podcasting, accessing LMS and posting comments), the respondents reported less familiarity and technical skills.

Faculty were also asked to report on their perceptions of student use of mobile devices and how they were being used to enhance education. Most faculty (74%) believed that students are using their mobile devices more for socialization than education, and that they are using the devices during class to communicate about subjects completely unrelated to the content of the class. However, faculty also believed that student participation and engagement would increase when students use their mobile devices for activities designed to be done outside of the classroom, but would not be positively impacted when the devices are used while in class.

In contrast to the faculty responses, over 90% of the students felt that they are familiar with mobile technologies and can perform more complicated tasks that would allow them to retrieve information, which could enhance learning opportunities (i.e. podcasting and listening to lectures, radio shows, and even video lectures). In addition, over 80% reported that they use the devices for educational purposes. In relation to the impact of mobile technologies in participation and engagement, the students responded positively indicating that they felt that they would participate and would be more engaged if mobile devices were used for instructional purposes. Furthermore, students responded positively that they could easily perform tasks associated with their education on their mobile devices and that these devices would make it easier for them to complete assignments and learn in places and at times when they could not before, thus improving engagement and completion of their coursework.

The comparison of both student and faculty results indicated that faculty are misjudging the way students use their mobile devices. Although both groups reported that mobile devices are being used for socialization, the student responses indicated that most students use them to

perform educational tasks and are using them as a learning tool. Additionally, the analysis of the open-ended responses, revealed that the faculty at this particular institution are generally "not interested" in using mobile devices for their classes, and they considered it a "distraction" rather than a potential tool for learning. In contrast, students who participated in the open-ended questions reported that they would like to see mobile devices incorporated in their classes to access their LMS, complete assignments and access course materials at the convenient time and place.

Pollara's (2011) study demonstrated that students are ready to engage and welcome mobile technologies to enhance their educational experience, but faculty are somewhat reluctant and skeptical of the benefits that could be afforded by implementing mobile learning in the classroom. Although very insightful, this study was limited to undergraduate students and faculty in one university. Administrators and out-of-the classroom functions were not part of the research at all. However, the instruments utilized in the study, with some variation and enhancements, presented an optimal base tool for this research.

Design and Development Research Studies

The purpose of design-based research (also known as development research) is to build a cohesive connection between educational research and real-world problems (Richey, 1998; Richey & Klein, 2007; Rowland, 1993; & Reeves & Herrington, 2005). There is particular emphasis on an iterative research process that not only evaluates an innovative product or intervention (usually related to technology), but also aids in the process to refine such product while producing design and development principles, which can guide further expansion and replication at larger scales.

Over the years, researchers have defined design and development research in many ways, but with a common understanding that it drives change and innovation. Table 2 compiles a list of some of those definitions.

Table 2. *Design and Development Research Definitions*

Author(s)	Definitions
Rowland (1993)	Design is a discipline inquiry engaged in for the purpose of creating some new thing of practical utility. It involves exploring an ill-defined situation, finding – as well as solving – a problem(s), and specifying ways to effect change (p. 1109).
Richey (1998)	Development research is the systematic study of processes involved in the construction, validation and implementation of instructional design models (p. 8).
Reeves and Herrington (2005)	Design research is grounded in the practical reality of the instructor, from the identification of significant educational problems to the iterative nature of the proposed solutions (p. 107).
Richey and Klein (2007)	Development research is the systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools and new or enhanced models that govern their development (p. xv).

According to Reeves (2006) design and development researchers are constantly required to engage in the process of design and redesign, looking to improve the possibilities of designing better and more effective solutions to the problems of practitioners, while seeking opportunities to better understand the implication of design theory and principles. Richey and Klein (2007) suggested that there are three areas where researchers can readily use as sources of design and development research problems (p. 16):

1. Actual workplace setting and projects

2. Technology (especially the newer and more innovative examples)

3. Theoretical questions prompted by current research and development literature.

In the following paragraphs, examples representing each of these research problem categories are described.

First, as an example of a *workplace setting* research problem, a framework at a hospital in Taiwan designed to improve caring in clinical practice. Hsu, Lee-Hsieh, Turton and Cheng (2014) conducted a study to develop online courses on patient caring to be used by the hospital's nurses. These researchers used a model based on Analysis, Design, Development, Implementation and Evaluation (ADDIE) to conduct and complete their project.

Hsu et al. (2014) evaluated scheduling practices at a hospital and determined that nurses' workload was high, but also loosely regulated and unpaid overtime was very common given the unstructured management of nurses' schedule. Because of these inefficiencies nurses routinely did not complete the 150 hours of continuing education classes mandated by the Taiwan Ministry of Health and Welfare every six years to renew the nursing license. Even though this problem persisted across the country, the educational materials available to nurses in Taiwan continued to fail in meeting the needs of the training required by nurses as mandated.

Hsu et al. (2014) first conducted a needs analysis of target learners, which included an assessment of nurses' learning needs; what motivated them and learning characteristics; and access to technology to determine the learning goals. The researchers conducted in-person interviews with 20 nurses that lasted an average of 150 minutes each. In parallel, they also conducted semi-structured interviews with patients who met the following criteria: 1) hospitalized for at least 3 days, (2) were able to communicate in Taiwanese or Mandarin and (3) had clear consciousness. A total of 14 patients, including some family members, were interviewed. The interviews with the nurses revealed that most nurses received the training in person via an instructor using pre-designed presentations in a conference room dimly lit. The nurses reported that they took advantage of the training time and the environment in the room to catch up on their sleep or rest from their busy schedule. However, the nurses also expressed that they would probably be more motivated to complete the training if it was accessible and available from their homes.

With the information collected, both from the nurses and patients, the researchers entered the *design stage* of the project using the learning objectives to design the content of the course materials, learning strategies, evaluation methods and teaching methods. They also consulted regularly with an expert panel of three individuals whose expertise was in the areas of sociology, education and nursing, to review the objectives and the materials that they had designed. Next, the team focused on the *development stage*. The authors created scripts for 72 videos from the experiences reported by all interviewees. There were 48 scripts using patient experiences and 24 scripts using nurse experiences. With proper authorization and protection of identities, some actual recordings of the patients were used in the production of the videos to illustrate or emphasized a point. The videos also included links and access to multiple quizzes and

assessment tools that the nurses needed to complete and pass in order to meet the requirements of the course. Once the hospital's institutional review board reviewed and approved the project the authors began the *implementation stage.* Fourteen nurses in a pilot group were asked to participate by taking the course online during their free time and at their convenience for a period of 30 days. At the end of this period, all nurses were asked to participate in the *evaluation stage* of the project, which included reflections quizzes, course evaluation questionnaires, focus groups and self-evaluations. All four evaluations yielded positive results, which translated in better patient care as reported by 113 patients who surveyed shortly after the completion of the course by the nurses.

Using design and development methods, the researchers developed an online curriculum model during a two-year period from August 2011 to September 2013. Hsu et al.'s (2014) study demonstrated how design and development methods can be used to inform and influence organizational change to identify, improve and support a better product or service.

Next, in study pertaining to *technology,* Kruger and Bester (2013) sought to develop guidelines that would assist faculty in deploying and using mobile devices to support teaching and learning practices at a large private university in South Africa. The authors identified that in South Africa there were very few cases, if any, where mobile technologies were used outside of just e-readers to impact learning in higher education in the country. Prior to 2013, students at the university received printed textbooks included as part of their tuition and fees. However, starting in January 2013, students were given a mobile device in the form of a tablet with the necessary electronic books (e-books) loaded instead of the printed textbooks. The authors determined that faculty and students faced similar challenges around several key issues. First, tablet computers, like other mobile technologies, had the potential to become a distraction in class if not used for

specific learning activities. Second, most faculty had never used a tablet for teaching and assessment activities. Third, many students in the university came from communities where access to wireless networks did not exist. Fourth, lack of exposure to the use of technology for teaching and learning was also prominent. All of these challenges combined led them to a key research question: "What are the principles (critical issues) for the optimum utilization of tablets and e-books to improve the quality of teaching, learning and assessment in a private higher education institution in South Africa?" (p. 239). The authors used a design-based research approach to develop a solution to this educational challenge, which would result in an implementation using theory-based and practical interventions.

e-Kruger and Bester (2013) used qualitative and quantitative data collection methods, which included questionnaires, focus groups and interviews, document analysis and evaluation forms. The authors introduced specific interventions in the classroom for faculty to follow. The interventions were separated into six different activities implemented over a period of one year. Table 3 is a summary of the interventions developed by the authors.

Table 3. *Summary of Research Interventions*

Intervention	Activity	Data Collection Tool
1 – Technology training	Face-to-face tablet and e-book training workshops were planned, delivered and observed on all 12 campuses of the university.	Feedback requested in the form of surveys.
2 – Electronic learning	Use of online space built to develop a community of practice across all 12 campuses separated by distance and time.	Participants were asked to complete an electronic questionnaire, identifying themselves how much technology was currently integrated.
3 – Research development and training seminar	Seminar was offered on each campus to provide opportunities	Same questionnaire used in intervention 2 was to be

	for faculty to interact and share experiences.	completed again to monitor progress.
4 – Central research	Selected faculty who had embraced the used of the technology were brought together to share experiences and to report on the progress of the first six months of the project.	Interviews and casual conversation.
5 – Extended electronic learning	The community of practice used across all campuses was reviewed and enhanced with additional experiences and shared resources.	Faculty were asked to complete a survey that will help them plot themselves on a Technology Integration Matrix.
6 – Second development and training seminar	A face-to-face seminar offered to more experienced and newcomers combined to enhance learning opportunities.	N/A

Kruger and Bester (2014) published preliminary results from the initial intervention. Over 42% of the 37 participants indicated they were "concerned and skeptical throughout" given the current state of use of the technology at this institution. However, the researchers had a great degree of confidence that their design and development approach will also provide them with the necessary tools to develop detailed guiding principles for the use of the new technology in the classroom and beyond.

Finally, as an example of *theoretical questions prompted by current research and development literature project*, Davis, Sullivan, Arias, Schultz, Marulis and Iwashyna (2014) conducted a study for a design process in the development of educative curriculum materials that is theoretically and empirically driven using a design-based research approach. Davis et al. hypothesized that existing commercial curriculum materials and teacher-developed materials could be further enhanced with educative features that will support and improve teachers and students' learning. This study focused on those resources used by teachers in classrooms to guide

their instructions. In particular, their focus was on elementary science and how teachers typically utilize printed-based guides and student worksheets and notebooks as the main source of curriculum materials. The authors defined *educative features* as "text and graphics that can be incorporated into curriculum materials with the intention of supporting teacher learning" (p. 25). Thus, the educative features developed in this project are meant to support teachers' understanding of scientific practices and content, providing narratives and teachers' engagement in literacy practices and assessment practices. However, the authors also indicated that despite this focus on science curriculum materials and instruction, the principles and processes identified during their design process would be transferable and useful for other disciplines and subject matters.

Using the context of two curricular units designed with the National Science Foundation (NSF) funding and targeted at promoting upper elementary children engagement in science inquiry and investigation, Davis et al. (2014), initially tested the efficacy of educative features available for teachers in these units. Based on design and development research elements, the authors engaged in an iterative process of designing materials, testing them in actual classrooms and refining them based on the feedback given by participants and the findings as they occurred. Three teachers participated in the initial phase, with a total of combined 107 children from the three classes where similar materials were used to teach science related subjects. Their design process included the following activities:

1) Content analysis of the print curriculum to identify the demands and needs of the curricular units and the learning opportunities they provided students.

2) The analyses determined the design of the tools used to guide additional classroom date collection (i.e. observation protocols, interview protocols, field notes and video records).

3) Classroom data was coded identifying when and how the instruction aligned or departed from the curricular units. Likewise, student assessments of learning and notebook entries were also analyzed for alignment or departure from content.

4) Semi-structured interviews were conducted with teachers to triangulate the researchers'' observations and the teachers' logs for accuracy and validation.

Using the data collected, the authors developed a design process, which in turn guided the development of educative features. Their design process included three basic steps:

Step1: *Analysis of Curriculum Units*; which concentrated the analyses of the curriculum material units based five factors: science content, scientific practices, literacy practices, participation structures, and assessments.

Step 2: *Characterization of Students' Opportunities to Learn*; the focus was on students' opportunities to learn the science concepts and practices of the unit based on the structure of the content and how it supported learning.

Step 3: *Characterization of Student Learning Outcomes*; the student work was analyzed using two specific lenses: science concepts and scientific practices, with the intent to determine actual learning within the context of specific curriculum units.

Davis et al. (2014) used design and development research methods to create educational materials for an elementary science class. Their overarching goals were to develop a curriculum that would advance students' understanding of big ideas of science and the practices needed to determine those big ideas. They also wanted teachers to be able to capture the nature of their

practice and determine how this practice can be enhanced with the use of tools that are readily available and in place for them to use. The authors conducted research based on a real-world context working in schools with teachers and students and drew from a broad range of information sources as evidence to guide their design and refinement processes. The abundance of data they collected was used to develop the design process, which guided the development of educational materials to infuse into the science curriculum and to be used by teachers in an elementary school. Davis et al. (2014) used the findings to develop a theoretical framework that described how they think about educative curriculum materials as support for teacher learning, and further described the empirical elements of their design process to guide the development of their framework.

Summary

The literature review confirmed that persistence in online courses in higher education setting is a problem and research is needed to understand how technologies such as mobile devices can be used to engage this population and encourage student persistence in college courses. Issues related to infrastructure capacity; technology limitations; and instructional design elements associated with mobile devices have evolved significantly over the last decade making it an ideal tool for expanding the reach of education via these devices. Mobile technology adoption issues become even more crucial in relation to impacting interactivity and interactions among members of working groups within educational environments. Part of the challenge is to harness mobile technology's potential for teaching and learning purposes, while concurrently enabling students to integrate their instructional and non-instructional activities with their everyday life experiences in the virtual environment, supported by mobile devices.

However, a review of the literature revealed existing frameworks offer limited guidelines on what administrative, communication, and instructional elements need to be considered when integrating m-learning technologies to support adult community college students. In addition, the willingness of the faculty to adopt and implement mobile learning is also a major barrier. There are many small projects where researchers and educators have infused mobile learning in some functions of their study or instruction, but they do not represent a replicable framework that could be used for other areas outside of the classroom. A major challenge in the research is the rapid pace in which mobile and wireless technologies are changing. While much of the research that exists reports positive outcomes, technology is advancing so quickly that it is very difficult to pinpoint the educational possibilities of advanced mobile devices like smartphones; the use of personal mobile devices for education; informal learning that currently exists in the classroom; and the results of full-scale initiatives or longitudinal studies. Finally, the literature review confirmed design and development research methods are appropriate to investigate and develop an m-learning framework and address the research questions.

Chapter 3

Methodology

Richey and Klein (2007) explained the need for scholars and researchers to implement field-based research to strengthen the knowledge base in the field of instructional design and technology. More specifically, they suggested systematic procedures for constructing and validating theories and models that guide decisions about the use of technology in teaching and learning. They recommended that in addition to model construction, a systematic process should be used to validate the model. The authors distinguished between internal validation and external validation. Internal validation focuses on the components and processes that comprise the model and how they might be used by the target audience and external validation focuses on the impact of the model once it is being used. This study was guided by design and development research methods, including a combination of quantitative and qualitative data collection to develop and validate a mobile learning framework. The study was carried out in three phases: (1) needs assessment, (2) framework construction, and (3) framework validation. These three phases are described in the following sections. Specific research methods, setting and participants, proposed sample, instrument development and validation and resources that were required are also presented.

Phase 1: Needs Assessment

Within the context of instructional design and development, a needs assessment is conducted within an organization to identify gaps in knowledge and skill. Once these gaps are identified, a decision can be made as to whether an intervention is required to address them

(Morrison, Ross, Kalman, & Kemp, 2011). The needs assessment is a systematic process that serves as input to the development of goals (Richey & Klein, 2007). In this case, a needs assessment was conducted to understand what type of support community college students, faculty, and administrators require in order to adapt mobile learning technologies into their teaching and learning process. These identified needs, along with the literature review, served as input to the construction of the m-learning framework that was designed to achieve certain goals reflected by the needs of the stakeholders (i.e., students, faculty, and administrators).

The needs assessment was developed using the following four-phase process (Morrison et al., 2011). Details for each phase are provided in subsequent sections.

1. The first phase was *planning*. In this phase, the target audience of the needs assessment was identified, which included a sub-set of participants from the previously identified stakeholder groups.

2. The second phase was *collecting data*. Data were collected from a needs assessment survey with a sub-set of the target audience and follow-up focus groups from the same sub-set of participants.

3. Phase three was the *data analysis*. The survey data were analyzed using appropriate statistics using appropriate statistical software packages. The qualitative focus group data were organized and formatted and coded by themes.

4. Phase four was the *needs assessment report*. While Morrison et al. (2011) recommended developing a final report from the needs assessment data, for purposes of this study, a summary of the results along with a description of how the data were used to guide the design of the m-learning framework is provided in chapters four and five.

Setting and Participants

The study was conducted at a four-year state college located in the central Florida area. The institution is a full-service non-profit education provider, which offers two-year college-credit degrees: Associate of Arts (A.A.), Associate of Science (A.S.) and Associate in Applied Science (A.A.S.); five bachelor's degrees awarding Bachelor of Science (BS) and Bachelor of Applied Science (BAS); and an array of specialized career certificates and continuing adult education programs. The college serves over 30,000 students of which, in 2013, 95% were enrolled in the two-year associate programs of study or at the community college level. The college employs over 1,500 people in five distinct geographical locations within its service region. Its combined annual budget is over $100 million with funds coming primarily from four sources: State of Florida appropriations; student tuition and fee revenue; federal, state and local grants and contracts; and auxiliary enterprises (SSC Fast Facts, 2013).

Sample

According to Groves, Fowler, Couper, Lepkowski, Singer and Tourangeau (2004), probability sample designs can be made better with identifying specific characteristics to make sure that proper representation exists within the population of subgroups in the sample. This technique assumes that there is information that can be used to divide the population into groups or strata and it is referred as stratified sampling. "Strata are mutually exclusive groups of elements on a sampling frame" (p. 109). Participants were selected from the population of students and faculty who were enrolled or teaching in at least one blended or fully online course. For the purpose of the study, a blended course is one that is delivered at least 25% online and the balance in a face-to-face modality. In addition, a sample of administrators was also invited to participate. Most of the administrators were selected from the Student Affairs Division and

Business Services Division at the host institution. These administrators are the ones who have the most contact with students and are responsible for the enrollment management process from student inquiry to graduation. However, some administrators in the academic side of the college were also invited given that they are responsible for faculty loads and curriculum decisions and their insights into the use of mobile technologies to enhance their processes would also be helpful. Groves et al. (2004) stated that separate samples should be drawn from each group using the same selection procedures, in this case Simple Random Sampling (SRS), for all groups. A total of 9,473 students, 228 faculty and 36 administrators were randomly selected to participate in the study based on the established criteria. Three distinct, yet similar needs assessment surveys were administered to students, faculty, and administrators by the college's own Institutional Research (IR) department (See Appendices A, B, & C respectively). As part of responding to the survey students, faculty, and administrators were asked for their willingness to be part of a follow-up focus group. Three separate focus group sessions were conducted for each individual stakeholder group as part of the data collection process.

Instrument Development and Validation

The development of the survey instruments and focus group protocol was based on the research questions, relevant literature, the researcher's observations and prior experiences, and a survey instrument that was developed by Pollara (2011). Pollara used a survey instrument as part of her dissertation research on higher education's faculty and student perceptions about mobile learning. The researcher sought and received permission (see Appendix D) to use the survey questions for purposes of his study. Each survey consists of two Likert-type scale response anchors: Level of agreement in a scale of 1-5 ranging from Strongly Disagree to Strongly Agree; and three levels of consideration, and one open-ended question as follows: *How would you like*

to see mobile devices (mobile learning) incorporated at the college for classwork and administrative functions? Responses to this open-ended question were used to better understand participants' attitudes and perceptions of the potential for mobile device use that cannot be achieved through close-ended and Likert scale responses. A final question included on all three surveys asks participants if they would be interested in participating in a focus group.

The three survey instruments and three focus group protocols are categorized according to the research question (see Table 7). To validate the needs assessment survey and focus group protocols, the following process was followed:

1) *Review of Pollara's (2011) survey development process.* Pollara analyzed five instruments used in similar projects and classified them according to the research questions in her study. The outcome of the analysis and researcher's observation of mobile device use, prior experiences and exploration of mobile devices capabilities led to the development of a survey with 47 questions in six sections. This survey was then used to conduct a pilot study with 23 participants and modified according to the feedback and results. Then the modified instrument was piloted again with 120 students representative of the target population. In this second round, Pollara reported that responses from 15% of the participants were received and that the means were found to be statistically similar than the first pilot study. Further, this researcher also performed a measure of reliability on the new instrument based on three factors: participation and engagement, usefulness, and ease of use. The overall reliability of the instrument was calculated to be an alpha of .960, which is considered "excellent" according to George and Mallery (2003).

2) *Modification of instrument used for this proposal.* Pollara's (2011) survey and interview questions (Appendix E) were modified to meet the purposes of this study. The original

survey was developed to identify faculty and student perceptions of mobile technology. For this study the questions were categorized and modified to concentrate on participation and engagement. The questions were further developed based on the literature review and researcher's own observations and experiences with mobile technologies to identify use and needs of the stakeholders.

3) *Expert review by research analysts*. Once the new surveys for all stakeholders and focus group protocols were completed, the instruments were given to two professional research analysts with over 25 years of experience in research and survey development. One is the Associate V.P. for Institutional Effectiveness and Research and head of the Institutional Review Board for the college where the study was conducted. The second is a Senior Analyst/Decision Support Systems also employed at the same institution. Both professionals provided feedback and recommendations according to the type of study and research methodology. The changes were implemented and the instruments were given to the analysts once more for further review and refinement if needed. The experts stated no additional modifications were needed.

Data Collection Procedures

The researcher secured Institutional Review Board (IRB) approvals from the university where the researcher is a PhD candidate and from the host college where the study was conducted (Appendices F & G). The researcher collected quantitative data from a web-based needs assessment survey distributed via email to the random sample of stakeholders identified in the *Sample* section of this chapter.

The researcher worked with a research analyst employed by the host institution to identify the list of students, faculty and administrators and their contact information based on the

established criteria. With the appropriate institutional approvals, the researcher sent a targeted email (Appendix H) to each group of participants explaining the purpose of the study and a web link to the location of the survey, which was also hosted at the host institution's website. All participants were required to log in using their college ID and password. This step was necessary so demographic information was automatically collected. The faculty and administrators did not have any imposed or implied incentive to complete the survey. However, most faculty awarded extra-credit to students in their class for responding to the survey within the allotted time. To protect the anonymity of those students who participated and received extra credit, the Institutional Research office from the college worked directly with the faculty to share the names of those students so the proper extra-credit could be awarded. The researcher did not participate in that process at any point. After two weeks, the researcher sent a reminder email to the stakeholders, and a relevant message to the study was also posted on the main page of the college's LMS to promote student participation.

Qualitative data were collected through a single open-ended question on the survey instruments and through focus groups with selected students, faculty, and administrators who expressed interest in participating in the focus group on the needs assessment survey. Since all participants signed-on to the online survey tool connected to the college's systems, all surveys were coordinated and collected by the college's Institutional Research office in order to maintain anonymity of the participants and integrity of the data collected.

According to Krueger and Casey (2000) a focus group is typically composed of small number (between six and ten) of members of the target populations with homogeneous interests who will meet to discuss a specific topic with the help of a moderator or interviewer. To facilitate, guide and aid with the organization of the data collection process and discussions, an

interview protocol (Appendix I) was used. Moderator management took place according to a six

criteria suggested by Grooves et al. (2004):

(1) reading questions as worded;

(2) probing closed questions;

(3) probing open questions;

(4) recording closed questions; (non-electronic recording)

(5) recording open questions; (non-electronic recording) and

(6) maintaining nonbiased interpersonal behavior.

The researcher facilitated the focus group and took notes during each session. To aid with

the data collection process, one additional support staff was recruited to assist the researcher by

also taking notes during the focus group meetings. Having a second note taker ensured details of

the meeting were captured while the researcher focused on facilitation. Students, faculty, and

administrators were invited to meet at the College at a designated date, time and place. One focus

group was scheduled for each participant group (students, faculty, and administrators). The

college setting was selected since it provided a safe environment that is familiar to all

participants and at the same time provided the necessary technical resources (e.g., multimedia

technology) for explaining the process that was followed during the focus group according to the

protocol and discussions during each session. The researcher also posted key information related

to the study on flip charts to encourage further discussions and brainstorming ideas from the

participants. At the end of the focus group sessions, the researcher solicited additional

information from the focus group by providing a final opportunity to all participants to submit in

writing any specific items that may have not been publicly discussed (Groves et al., 2004). This

last opportunity allowed those individuals who may have not been able to express their ideas,

one last chance to submit their contributions. However, no participants provided any additional written feedback as they felt that the process and what was discussed provided enough information.

Data Analysis

Guided by a design and development research methodology (Richey & Klein, 2007), Table 6 summarizes the research questions and how they were addressed during the study. A detailed explanation of the data analysis process follows the table.

Table 4. *Research Questions, Data Collection and Analysis*

Research Question	Data collection methodologies	Data analysis
1) What are the benefits and limitations of m-learning technologies and how are these technologies being used to support teaching and learning in higher education?	1. Review of the research literature.	Collect work found in the research literature and evaluate its relevancy and impact on the development of an m-learning framework.
2) What are the stakeholder (i.e., students, faculty, and administrators) needs that must be considered when adopting m-learning technologies to support online and blended teaching and learning in higher education	1. Survey to gather needs assessment data from participants (i.e., students, faculty, and administrators) 2. Focus groups with a subset of students faculty, and administrators who complete the survey.	Morrison et al.'s (2011) guidelines for conducting a needs assessment will be used. Other effective tools found in the literature review from similar studies.
3) How can stakeholder needs inform the design of a framework for m-learning integration for delivery of online	1. Review of the research literature. 2. Review of needs assessment data.	Review and analysis of data collected within the context of the development for m-learning integration.

education in higher education		
1) What are stakeholder reactions to a proposed m-learning framework?	1. Presentation of framework derived from previous data collection using interviews, focus groups, and/or Delphi technique. 2. Recording of reactions of stakeholders.	Evaluation of reactions and feedback from stakeholders.
2) What modifications are needed to improve the researcher's proposed m-learning framework?	1. Evaluate reactions and feedback from stakeholders. 2. Further analysis if required.	Revision of framework based on feedback.

Results from the needs assessment surveys were organized, prioritized and analyzed based on economic value, impact, ranking, frequency of similar responses, and timeliness (Morrison et al., 2011). The surveys included five sections: (1) Demographics, (2) Prior Knowledge, (3) Participation/ Engagement, (4) Usefulness of the Technology, and (5) Self-efficacy. Each one of these sections was analyzed in the context of the research questions and how they would support answering them.

Descriptive statistics were collected for gender, age and other demographic related data in section 1 of the survey. As established earlier, these data were easily available to the researcher without requiring participants to submit it by requiring the sign-on process to complete the survey. The researcher kept all the results from each of the surveys separated by group (i.e., students, faculty, and administrators) to compile responses according to each stakeholder. This process was critical in determining where each participant's responses were to be grouped.

The first research question was answered by analyzing the frequency and positive responses to the sub-questions in the survey's sections 2 and 3. This analysis coupled with the literature review provided insights into the current use of mobile technologies by students, faculty and administrators to support teaching and learning.

The second research question was answered by calculating frequencies of the responses from the survey's sections 4 and 5 in order to identify if stakeholders were interested and motivated in using mobile devices for the purpose of learning. The frequency of survey responses selected as "agree" and "strongly agree" were combined to identify the percentage of agreement with each question. Combined frequencies higher than 60% were considered a positive response to using mobile technologies for instructional and non-instructional purposes. Additional frequencies and percentages were calculated for questions related to the population who felt that they could effectively incorporate and use mobile learning for their classroom use and administrative functions; those who felt that training will help; and for those who do not believe that they could incorporate mobile learning or that it would not be a benefit. Finally, the review of the open-ended question and the answers from the focus groups were compiled and analyzed to complete the identification of stakeholders' needs in order to implement mobile learning for teaching, learning and administrative functions in higher education.

The third question was answered by using the results of the literature review, the outcome of the analysis from the needs assessment surveys, and the analysis of the focus groups to develop an m-learning framework. This first draft of the framework was then submitted back to those who responded to the survey, participated in the focus groups and agreed to be part of a Delphi (expert) panel. The results of this review process were used as the basis for answering the fourth research question.

The fifth research question was answered based on the stakeholder input. The framework was modified to meet the recommendations and feedback provided by the stakeholders. Final recommendations for implementation are provided in the final chapter of this report.

Qualitative data collected from the open-ended survey question and the focus group questions were reviewed by the researcher and a research analyst (dual-coding) for validation and accuracy (Creswell, 2009). The researcher used a Coding Analysis Toolkit (CAT) software package hosted by the University Center for Social and Urban Research, at the University of Pittsburgh, and QDAP-UMass, in the College of Social and Behavioral Sciences, at the University of Massachusetts Amherst. This software allowed the researcher and analyst to code the data providing a reliability analysis to check the inter-coder reliability to strengthen the data from this analysis. For this process, both coders established themes (categories) according to the software requirements and then completed an in-depth analysis of specific patterns within the established themes in order to generate the necessary reports to be used for the development of the framework (Creswell, 2009).

Phase 2: Framework Construction

Once the needs assessment data, including the focus groups (qualitative and quantitative), were collected and analyzed, an m-learning framework was constructed based on the stakeholders input from the surveys, focus groups, data analysis and literature review. The mobile learning framework was presented using a relationship model. An entity relationship diagram is a graphical representation of a business system or process that shows all the components and how they are organized and related to each other (Dennis, Wixom, & Roth, 2008). A hierarchical relationship model was used to show groups of information built from top to bottom, and the hierarchies within each group. This layout does not contain connecting lines.

The framework was developed based on three components: (1) Major categories; (2) Needs within categories; and (3) Attributes of needs.

Phase 3: Framework Validation

The proposed framework was presented to the target stakeholders to empirically verify the components and processes. Internal validation strategies recommended by Richey and Klein (2007), which focus on the components and processes of the framework, were used to identify problems such as:

- Does the framework include all the necessary components?

- To what extent does the framework addresses relevant environmental factors?

- To what extent is the framework usable to a wide range of settings?

- Is the use of the framework cost effective?

Richey and Klein (2007) identified expert review, usability documentation and component investigation as three possible ways to conduct internal validation. The researcher selected expert review for this study and used Delphi techniques to accomplish the validation. The Delphi technique is a widely accepted method for gathering data from survey participants within a particular domain and expertise. This method is typically used for building consensus around a particular subject by using a series of questionnaires, surveys and other tools from a group of selected individuals (Hsu & Sanford, 2007).

The researcher sought and recruited volunteers from each of the focus groups to become part of a participants' panel. This panel was asked to review and evaluate the framework once it was developed, and to provide input for further development and refinement of the framework. For the purpose of the validation in this study, this panel was referred as the Delphi panel. Three

members from each one of the focus groups were recruited to participate based on the following criteria:

- Faculty members were currently delivering instruction online or in a blended course in any discipline.

- Students were currently enrolled in online or hybrid courses and are in good academic standing. Although preferred, is not necessary for them to have extensive familiarity with mobile technologies such as smartphones or tablets.

- The administrator panel included one member from each of the following major areas of the college; Student Services Division, Academic Affairs Division, and Distance Education department.

The researcher proposed three methods of communication with the Delphi panel: one option suggested a class template created within the college's LMS and accessible only by the panel; the second was a meeting in person for each round of reviews; and the third to be done entirely via email. The Delphi panel agreed to conduct all interactions between the panel and the researcher asynchronously via email only.   Theoretically, the Delphi process can be continuously iterated until consensus is determined to have been achieved. However, along with many researchers, Hsu and Sanford (2007) argued that small instances of iteration are often sufficient to collect the needed information and to reach consensus. In this study, two Delphi rounds were conducted until the panel reached consensus. The panel was presented with the following electronic revision tools: a portable document format (PDF) file depicting the original framework including a short description of each of the components of the framework and how they relate to each other; an editable Microsoft Word validation criteria document (Appendix J); a PDF file highlighting changes after each round of review, including the rationale for the

changes; and a final framework after applying all changes from the panel. The validation criteria were developed based on *Heuristic Evaluation* originally proposed by Nielsen (1994) as a cost-effective usability technique. "Heuristic evaluation is an inspection method in which a panel of experts formally assesses an interface design with respect to a set of heuristics or rules of thumb" (Nielsen, 1994, p 32). Lawand and Hvannberg (2002) suggested that the main strength of heuristic evaluation is speed and affordability. Because this study proposed the development of a mobile learning framework, based on a technology that is rapidly changing, it was appropriate to use heuristic evaluation techniques given the early stages of the design process for the use of mobile technologies in an educational setting. The evaluation criteria included three specific items: task support, learnability, and customization (Sigh & Wesson, 2006). The first criteria, *task support*, aimed to establish if there was an accurate relationship between the framework and the real world needs of those who would use it in order to ensure efficient task completion. Next, as described by Sigh and Wesson (2006) is *learnability*, which is the one that determines the degree of effort required to efficiently learn how to use the system or in this case, how to implement the framework. Last is the *Customization,* which should address the ability of the system or technology to be customized as required to meet the needs of those using the resource. The Delphi panel participants were asked to review the proposed framework once it was validated based on the three criteria elements discussed above (Appendix J). In addition, specific timelines that did not exceed a one-week period were requested in between reviews in order to keep the study on target and moving forward.

Formats for Presenting Results

This study was designed to identify the needs of students, faculty and administrators as they relate to the use of mobile technologies in order to develop a mobile learning framework to

enhance student engagement and persistence in online and hybrid courses in higher education. The data collected from surveys, open-ended questions and focus groups were analyzed and the results of the study are presented using multiple tables and detailed descriptive information base on the following sections: 1) descriptive characteristics of the students, faculty, and administrators; 2) analysis of the survey data for each of the participant groups; 3) analysis of the open-ended responses; 4) analysis of the data collected from the focus groups; 5) detailed description of the developed mobile learning framework including resources and recommendations for implementation, and a diagram depicting the framework and the relationship among all the components identified in the study as essential for supporting mobile technologies in an educational setting; and 6) summary of the data results, and the framework.

Resources

Given that the study was conducted in its entirety at the same institution, with participants and support staff also available through the college, most of the resources needed were readily available to the researcher to conduct the study. The following is a list of the most critical resources used and available:

- Researcher access to the college's faculty, administration and student email addresses and demographic information.

- Faculty, administrators, students and researcher time.

- Online survey-taking tools and software. The surveys were done through the same tools that the college currently uses for its institutional surveys.

- Mobile technologies with Internet access via wired or wireless networks as sample devices to share with participants as needed.

- Capabilities to send mass emails and text messages to all study participants.

- Facilities to conduct the interviews. These facilities were equipped with hardware and software for data recording of the interviews. These recordings were all typed on a laptop and no voice recording or transcripts were used during any of the focus group meetings.

- Robust computer loaded with SPSS or comparable statistical analysis software capable of storing and processing the collected data.

- Expenses and human resources beyond the participants to conduct surveys and interviews, such as: online survey hosting site, cost associated with editor and instrument validation expert and research analysts.

All participants had access to a computer with Internet connection via wired or wireless networks and were able to authenticate into the survey tool with their own user-id and password. The online survey was supported by all browsers (Google, IE, Mozilla, etc.) running on different operating system platforms such as Apple OS, Windows, Android, Linux, etc.

Summary

This study was guided by a design and development research methodology and included a combination of quantitative and qualitative data collection methods to develop and validate internally a mobile learning framework. The research questions were answered by a review of the literature and application of a design and development research approach. Guided by the literature on designed and development methods, the researcher constructed a mobile learning framework and validated it via an expert review panel using a Delphi technique to reach consensus.

This chapter included a detailed outline of the methodology and its relationship to the research questions including the setting; participants; instruments and validation; data collection and analysis procedures; and resources needed to conduct the study.

Chapter 4

Results

This study was designed to identify the needs of students, faculty and staff as they relate to the use of mobile technologies in order to develop and validate a mobile learning framework. The researcher captured the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support adult community college students participating in online and blended learning environments. First, quantitative and qualitative data were analyzed for all participating groups identifying specific population feedback and the impact their responses had in the development of the framework. An online survey instrument was used to collect the data. Each survey was tailored to address the appropriate target audience. The following five sections were consistent across all surveys: (1) Demographics, (2) Prior Knowledge, (3) Participation/ Engagement, (4) Usefulness of the Technology, and (5) Self-efficacy. Data from each of these sections were analyzed in the context of the research questions. Next, the framework was developed based on the literature review and the analysis of the data including the focus group input. Last, the framework was modified according to the feedback provided by a Delphi panel who participated in a review process that included two separate rounds. Consensus was reached in round two.

The results are reported in the following sections of this chapter: 1) descriptive characteristics and analysis of survey data collected from the faculty sample; 2) descriptive characteristics and analysis of survey data from the administrative employee sample; 3) descriptive characteristics and analysis of survey data collected from the freshman and

sophomore student sample; 4) analysis of open-ended responses and focus group data; 5)

description of the developed framework that resulted from data analysis and literature review;

and 6) results from the validation process carried out by the Delphi panel. The chapter concludes

with a summary of results.

Data Analysis

Descriptive Characteristics of the Faculty Sample and Survey Data Analysis

The number of faculty who were invited to respond to the web survey was 223. The total

respondents from this group was 37, which equates to a 16.59% overall response rate. Table 5

reports in detail the gender, ethnic background and age of the faculty respondents. It is important

to note that most of the respondents (75.7%) are age 45 and older, and the majority (70.3%) are

female, which is representative of the overall sample population invited to participate in the

study. See Appendix A for the faculty survey instrument.

Table 5. *Descriptive Characteristics of Faculty (n=37)*

Gender	Respondents	Percentage of Total
Female	26	70.3%
Male	11	29.7%
Number of Responses:	37	
Race/Ethnicity		
African American/Black	3	8.1%
American Indian/Alaskan Native	1	2.7%
Asian	1	2.7%
Two or more races	1	2.7%
White/Caucasian	31	83.8%
Number of Responses:	37	

Age		
25-34	1	2.7%
35-44	8	21.6%
45 or older	28	75.7%
Number of Responses:	37	

After the faculty logged in to access the survey instrument, which captured the demographic information of the respondents, faculty were asked to select those areas where they have had prior knowledge or knew how to perform several tasks using mobile technologies. This second section of the survey was designed to identify current experiences with mobile devices and included nine questions. Table 6 depicts the number of responses for each question and the percentage from the total of respondents.

Table 6. *Faculty Prior Knowledge*

Question	Faculty (n=37)	
I know how to . . .	**Number**	**Percent**
1. Connect to and access the internet from a mobile device.	36	97.3%
2. Download music and video files on a mobile device	27	73.0%
3. Download a mobile application (app) on a mobile device.	33	89.2%
4. Find the definition of a word I don't know on a mobile device.	35	94.6%
5. Interface or connect my calendar/alarm on a mobile device	31	83.8%
6. Translate a sentence into another language on a mobile device.	21	56.8%
7. Access a social networking site on a mobile device.	32	86.5%
8. Send and receive emails/text messages on a mobile device.	37	100.0%
9. Access college resources such as LMS, personal records, payroll, etc. on a mobile device.	23	62.2%

The results indicated that the majority of the faculty members (57%, and higher in most areas) are familiar with mobile technologies and are capable of performing basic and complex tasks for personal and professional purposes with these devices. In addition, 100% of the respondents (question 8) indicated that they can communicate via email and text messages with a mobile device.

The third section of the survey asked faculty how they felt the use of mobile technologies would impact participation and engagement inside and outside of the classroom. In this section, the survey solicited responses based on a 5-point Likert scale: 1-Strongly Disagree; 2-Disagree; 3-Neutral; 4-Agree; and 5-Strongly Agree. Each point on the scale was assigned a 20% weight. Frequencies were calculated for all questions and responses obtained for combined frequencies on scales 4 and 5 (Agree and Strongly Agree), which were greater than 60%, are considered a positive response in support of the tasks or questions asked. Table 7 represents the results for each question.

Table 7. *Faculty Views of Student Participation and Engagement with Mobile Devices*

Question	Faculty (n=37)	
Participation and engagement	**Number**	**% Agree or Strongly Agree**
1. My students would be more likely to ask for help if they could communicate through their mobile devices.	30	81.1%
2. It would be easy for students to engage in discussions (comment) using a mobile application or website in mobile format.	29	78.4%
3. Student should be able to participate in discussion forums from their mobile devices.	33	89.2%
4. Students would be more likely to participate in class if they can use their mobile devices.	30	81.1%
5. Mobile learning opportunities would allow students to learn and study in places they couldn't normally.	37	100.0%

6. It would be easier for students to complete classwork and assignments if they could use a mobile device.	26	70.3%
7. My students would be more likely to engage in class discussions inside of class if they could post their thoughts from their mobile devices.	23	62.2%
8. My students would be more likely to engage in class discussions outside of class if they could post their thoughts from their mobile devices.	25	67.6%
9. Students should be able to easily view course materials (syllabus, notes, assignments) on their mobile devices.	37	100.0%
10. Students should be able to download mobile applications that could help them study.	37	100.0%
11. Students should be able to access Educational Management Systems (e.g., Sakai) in a mobile format on their mobile devices.	35	94.6%
12. Students should be able to take quizzes on their mobile devices.	25	67.6%
13. It would not require a lot of effort for students to learn how to use a mobile application designed for my class.	23	62.2%
14. My students would spend more time on classwork if they could access materials anytime, anywhere on their mobile devices.	19	51.4%
15. My students would be more likely to participate in class activities outside of the class time if they could do so through their mobile devices	24	64.9%
16. Mobile learning could be incorporated into my classes.	28	75.7%

Results indicate that faculty strongly believe that the use of mobile devices inside and outside of the classroom will positively impact participation and engagement. Responses to questions 1-13 and 15-16, revealed that the majority (> 62% or higher) of the faculty felt that students will be more likely to participate in their classes if they were able to use mobile devices to enhance their educational process. Furthermore, 100% of the respondents felt that the students are capable of navigating and using their devices for learning purposes and in connection with their education

(questions 5, 9 and 10). However, only 51% (question 14) of the faculty felt that the students would spend more time on classwork if they could access their materials with a mobile device.

The fourth section of the survey addressed the usefulness of the technology in the classroom and how the faculty would use it for teaching purposes. This section solicited feedback on what specific tasks the faculty would ask the students to complete using mobile devices. Additionally, the survey solicited responses related to how faculty would use mobile learning based on a 5-point Likert scale: 1-Strongly Disagree; 2-Disagree; 3-Neutral; 4-Agree; and 5-Strongly Agree. Each point on the scale was assigned a 20% weight. Frequencies were calculated for all questions and responses obtained for combined frequencies on scales 4 and 5 (Agree and Strongly Agree), which were greater than 60%, are considered a positive response in support of the tasks or questions asked. This section also included a question on the faculty attitude toward incorporating mobile learning in the classroom. Tables 8, 9 and 10 outline the questions and responses for this section of the survey.

Table 8. *Faculty Use of Mobile Devices*

	Faculty (n=37)	
I would ask students to . . .	**Number**	**Percent**
1. download an application that helps them learn something new.	26	70.3%
2. use mobile devices to look up something that they didn't know or didn't understand during class.	28	75.7%
3. engage in social networking on their mobile device.	7	18.9%
4. write notes on their mobile device to remind them of an assignment.	27	73.0%
5. set an alarm or reminder on their mobile device to help them remember that an assignment was due or a test was coming up.	34	91.9%

6. text a classmate during class.	3	8.1%
7. text a classmate outside of class about class.	14	37.8%
8. text a classmate about the content of the class.	14	37.8%
9. text a classmate about the teacher's ability.	3	8.1%
10. text a classmate about the level of engagement in the class (e.g., I'm bored, this is cool).	2	5.4%
11. take pictures or video with their mobile device that they used for an assignment.	23	62.2%
12. access an Educational Management System (e.g., Sakai) on your mobile device.	34	91.9%
13. read an article or assignment on their mobile device.	33	89.2%
14. use their mobile device as a study tool.	28	75.7%
15. play an educational game (e.g., Words with Friends) on their mobile device.	10	27.0%
16. not use mobile devices inside of the classroom.	6	16.2%
17. Other	1	2.7%

Positive responses (>62.2% or higher) to questions that are only associated with academics (questions 1, 2, 4, 5, 11-14) indicate that faculty would strongly recommend and assign students activities that are strictly related to instruction and learning. In contrast, questions such as 6-10 and 15-17, which may not be directly connected with the coursework, show (< 37%) that the faculty would not use mobile devices to promote student communication or social media among themselves or with the faculty, outside or inside of the classroom, unless it is associated with an assignment or classwork.

However, additional results of the survey listed in Table 9 describe the faculty perception of how students can be taught to appropriately use mobile devices for learning. With the exception of question 20, where only 51% of the faculty felt that the use of mobile devices can further

motivate students to learn, more than 64% believe they can utilize mobile devices to positively

influence students to promote their learning and engagement (questions 18,19, 21, and 22). Most

of the respondents agreed or strongly agreed (75.7%) that they would like to learn more about

mobile learning so it can be incorporated in their classroom and a strong 64.9% are interested in

learning how to develop mobile applications for the purpose of implementing mobile learning in

their classroom.

Table 9. *Faculty Use of Mobile Learning in the Classroom*

Using mobile devices in your classroom	**Number**	**% Agree or Strongly Agree**
18. I believe students can be taught how to appropriately use mobile devices for learning.	30	81.1%
19. I believe using mobile applications for learning in my classroom would benefit students.	26	70.3%
20. I think students would be more motivated to learn if they could use mobile devices.	19	51.4%
21. Students would think is fun to use an interactive mobile device in my classroom.	25	67.6%
22. I would like my students to be able to use mobile devices to access course content and practice skills.	34	91.9%
23. I would like to learn more about mobile learning, so that I can incorporate it in my classroom.	28	75.7%
24. I would like to learn how to create mobile applications so that I can incorporate them into my lessons.	24	64.9%

The final question for the *Mobile Use* section of the faculty survey was designed to solicit

responses connected with faculty attitudes toward the use of mobile learning. Table 10 shows

that over 86% of the respondents would incorporate mobile learning to support students'

academic needs provided proper training is offered. Still, 13.5% of the respondents felt that they

would not be able to effectively use mobile devices for instructional purposes regardless of

training or availability of mobile learning resources.

Table 10. *Faculty Attitude Toward Using Mobile Learning*

Question	Faculty (n=37)	
Choose the statement that most resembles your attitude toward incorporating mobile learning in your classroom.	**Number**	**Percent**
25. I will be able to effectively use mobile devices to support students' needs.	12	32.4%
26. I will be able to effectively use mobile devices to support students' needs with training.	20	54.1%
27. I don't think I will be able to effectively use mobile devices to support students' needs.	5	13.5%

The fifth and last section of the survey elicited responses related to self-efficacy and within

that context, what would be needed to effectively use mobile learning tools. This section asked

respondents to select all items that apply from a pool of 13 statements. Frequencies were

calculated as a percentage of all respondents. Statements with frequencies higher than 50% are

considered a positive response and in support of the statement. Table 11 presents the results for

each statement.

Table 11. *Faculty Self-efficacy*

Question	Faculty (n=37)	
I am confident that I can . . .	**Number**	**Percent**
1. use the Internet on a mobile device to find information relevant to my class or duties.	33	89.2%
2. take photos or video with a mobile device to be used in my class.	29	78.4%
3. read and understand content on a mobile device.	33	89.2%
4. navigate a mobile application on a mobile device.	30	81.1%
5. participate in discussions using a mobile device.	28	75.7%
6. None of the above.	1	2.7%

Results indicate that most faculty (75% and higher) have a high degree of confidence that they can use mobile devices with ease and for teaching functions (questions 1-5). Only one of the respondents felt that he/she could not successfully operate a mobile device for any of the statements listed in the survey. Questions 1 and 3 drew out the highest percentage of acceptance (89.2%), which may indicate that faculty are willing, able and ready to incorporate mobile learning in their classes.

Further evidence of faculty readiness and support for mobile learning is found in Table 12. This table represents faculty understanding of what is needed from their point of view to successfully use mobile devices for teaching and learning.

Table 12. *Faculty Needs*

Question	Faculty (n=37)	
I will need to be able to . . .	**Number**	**Percent**
7. have easy and affordable access to acquiring mobile devices.	29	78.4%
8. navigate a mobile application on a mobile device.	32	86.5%
9. have training available on how to use mobile applications (texting, email, social networking).	28	75.7%
10. have access to the Internet inside of the classroom.	34	91.9%
11. have access to the Internet outside of the classroom and around all campuses.	34	91.9%
12. securely authenticate to the online instructional resources (i.e., LMS, faculty website, testing).	33	89.2%
13. Other	1	2.7%

The results of this section of the survey indicated that all respondents positively identified the most important elements needed for mobile learning to be used in their classroom. Over 75% of the repondents selected items related to access, usability, training and security as those elements

needed for them to use of mobile devices. But most importantly, the majority of the faculty (91.9%) selected access to the Internet, from inside and outside of the classrooms, as the primary element.

Descriptive Characteristics of the Administrators Sample and Survey Data Analysis

The administrative employee sample was selected based on specific duties and responsibilities primarily linked to student services and academic support services duties performed outside of the classroom. A total of 36 administrators were invited to participate and 21 completed the survey in its entirety, which equates to a 58.3% response rate. This is a high response rate and accurately represents the selected sample for administrators at the college. Table 13 shows the demographic characteristics of the administrators based on gender, ethnicity and age and represents the first section of the survey instrument.

Table 13. *Descriptive Characteristics of Administrators (n=21)*

Gender	Respondents	Percentage of Total
Female	11	52.4%
Male	10	47.6%
Number of Responses:	21	
Race/Ethnicity		
African American/Black	5	23.8%
American Indian/Alaskan Native	1	4.8%
Hispanic/Latino	1	4.8%
White/Caucasian	14	66.7%
Number of Responses:	21	
Age		
18-24	0	0.0%
25-34	0	0.0%
35-44	6	28.6%

45 or older	15	71.4%
Number of Responses:	21	

Like the faculty, the administrators were also asked to select those areas where they have

had prior knowledge using mobile technologies. The second section of the survey was designed

to identify current experiences with mobile devices and included nine questions. Table 14 depicts

the number of responses for each question and the percentage from the total of respondents. See

Appendix B for the administrator survey instrument.

Table 14. *Administrators - Prior Knowledge*

	Administrators (n=21)	
I know how to . . .	**Number**	**Percent**
1. access the Internet from a mobile device.	20	95.2%
2. download a mobile application (app) on a mobile device.	18	85.7%
3. find the definition of a word I don't know on a mobile device.	20	95.2%
4. translate a sentence into another language on a mobile device.	15	71.4%
5. access a social networking site on a mobile device.	15	71.4%
6. download music and video files on a mobile device.	19	90.5%
7. interface or connect my calendar/alarm on a mobile device.	20	95.2%
8. send and receive email/text messages on a mobile device.	21	100.0%
9. access college resources such as LMS, personal records, payroll, etc. on a mobile device.	16	76.2%

The results indicated that most administrators felt very comfortable and are familiar with

mobile technologies. Over 70% (questions 4, 5 and 9) of the administrators felt they were able to

accomplish some of the more complex tasks with mobile devices, while over 90% (questions 1,

3, 6, 7 and 8) felt they know how to perform basic tasks for personal and professional purposes

with these devices. Similar to the faculty respondents, 100% of the administrators (question 8) indicated that they can communicate via email and text messages with a mobile device.

The third section of the survey asked administrators how they felt the use of mobile technologies would impact participation and engagement outside of the classroom. In this section, the survey was modified from the one presented to the faculty by removing questions related to classroom use and replaced with specific questions related to administrative functions. Responses were solicited based on a 5-point Likert scale: 1-Strongly Disagree; 2-Disagree; 3-Neutral; 4-Agree; and 5-Strongly Agree. Each point on the scale was assigned a 20% weight. Frequencies were calculated for all questions and responses obtained for combined frequencies on scales 4 and 5 (Agree and Strongly Agree), which were greater than 60%, are considered a positive response in support of the tasks or questions asked. Table 15 shows the results for each question.

Table 15. *Administrators Views on Participation and Engagement*

	Administrators (n=21)	
Participation and Engagement	**Number of Respondents**	**% Agree or Strongly Agree**
1. My students would be more likely to ask for help if they could communicate through their mobile devices.	13	61.9%
2. It would be easy for students to engage in discussions (comment) using a mobile application or website in mobile format.	15	71.4%
3. Student should be able to participate in discussion forums from their mobile devices.	16	76.2%
4. Students would be more likely to complete their enrollment management functions if they could use their mobile devices (i.e. to register, complete add-drop, or pay fees).	17	81.0%

5. Students would contact their educational advisors if they could access them anytime, anywhere on their mobile devices.	18	85.7%
6. Students would be more likely to participate in extracurricular activities outside of the class time if they were made aware of them through their mobile devices.	12	57.1%
7. Students would be more likely to provide feedback to administrators on student services/facilities/financial functions if they could post their thoughts from their mobile devices.	18	85.7%
8. Mobile functions could be incorporated into activities not related to classroom work (i.e., student services, financial aid, and campus maps).	18	85.7%
9. Students should be able to download mobile applications that could help them meet their enrollment and financial aid management duties.	16	76.2%
10. Students should be able to access the Student Information System (e.g., PeopleSoft) in a mobile format on their mobile devices.	18	85.7%
11. Students should be able to take college surveys on their mobile devices.	18	85.7%
12. It would not require a lot of effort for students to learn how to use a mobile application designed for accessing the Student Information System (i.e., PeopleSoft).	11	52.4%
13. It would be easier for students to complete enrollment and financial requirements if they could use a mobile device.	12	57.1%
14. It would help students complete their program of study if they were able to review their educational plan and degree program requirements via a mobile device.	17	81.0%

Results indicate that an overwhelming majority of administrators (76.2% and higher) support the concept of using mobile devices to enhance students' abilities to complete administrative functions such as enrollment management, financial aid, grade review and support for advising (questions 1-5, 8-10 and 14). However, less than 57% felt that it will be easier to complete those tasks using a mobile device (questions 12 and 13), and only 57% felt that students would participate in extracurricular activities if they were to be informed of them via a mobile device

(question 6). These responses may indicate the assumption that adult learners have multiple competing obligations and extracurricular activities may not be a priority even if they are aware of them.

The fourth section of the survey solicited input on the usefulness of the technology outside the classroom and for administrative functions, and how the administrators would use it to communicate with students and encourage re-enrollment and completion rates. This section solicited feedback on what specific tasks the administrators would make available to students to complete using mobile devices. Additionally, the survey solicited responses related to how administrators would use mobile devices based on a 5-point Likert scale: 1-Strongly Disagree; 2-Disagree; 3-Neutral; 4-Agree; 5-Strongly Agree. Each point on the scale was assigned a 20% weight. Frequencies were calculated for all questions and responses obtained for combined frequencies on scales 4 and 5 (Agree and Strongly Agree), which were greater than 60%, are considered a positive response in support of the tasks or questions asked. This section also has a question related to administrators' attitudes toward incorporating mobile technologies for accessing administrative tasks outside the classroom. The tables 16, 17 and 18 show the questions and responses for this section of the survey.

Table 16. *Administrators - Use of Mobile Devices*

	Administrators (n=21)	
I would ask students to…	**Number**	**Percent**
1. download an application that helps them learn something new.	13	61.9%
2. use mobile devices to look up something that they didn't understand.	17	81.0%
3. engage in social networking on their mobile device.	12	57.1%

4. write notes on their mobile device to remind themselves of a process or duty.	19	90.5%
5. set an alarm or reminder on their mobile device to help them remember their due dates for enrollment or financial requirements.	17	81.0%
6. use mobile devices to communicate with advisors and administrators.	18	85.7%
7. access the Student Information System (e.g., MySeminoleState) on your mobile device.	15	71.4%
8. keep track of the academic progress by consistently reviewing their progress against your educational plan.	17	81.0%
9. not use mobile devices to manage their student records or extracurricular activities.	1	4.8%
10. Other	0	0.0%

The results indicated that more than 81% of the administrators would strongly recommend students to use their mobile devices to interact and complete administrative functions with their mobile devices (questions 4-6 and 8). In addition, 57% and higher of the respondents indicated that they would ask students to use their mobile devices for social networking and downloading new material and for general use not related to administrative tasks.

Furthermore, results from the survey revealed administrators' perceptions of how students can be taught to appropriately use mobile devices (see Table 17). The results showed that the majority (>80%) of administrators believe that students can be taught and would benefit from using mobile devices to interact and complete their administrative requirements via a mobile device (questions 1 and 2). There is also strong support (>66%) from the respondents to make students' academic records available and accessible through mobile applications. Last, the administrators (66.7%) would also like to learn how to create mobile apps to support their daily workload and to help students with their tasks..

Table 17. *Administrators' Perceptions of Mobile Use by Students*

Please answer the following questions about using mobile devices outside of the classroom.	Administrators (n=21)	
	Number	**% Agree or Strongly Agree**
10. I believe students can be taught how to appropriately use mobile devices for meeting administrative college deadlines.	17	81.0%
11. I believe using mobile applications for accessing college systems would benefit students.	17	81.0%
12. I think students would be more motivated to enroll if they could use mobile devices.	12	57.1%
13. I would like students to be able to use mobile devices to access their records and complete administrative requirements.	14	66.7%
14. I would like to learn how to create mobile applications, so that I can incorporate them into my workload.	14	66.7%

The final question for the *Mobile Use* section of the survey was designed to solicit responses connected with administrators' attitudes toward the use of mobile learning. Table 18 shows that the combined percentage of questions 15 and 16 indicated that over 94% of the respondents would incorporate mobile technologies to support students' needs. These results are consistent with the faculty's desire and motivation to use mobile learning to promote student engagement and participation using mobile devices.

Table 18. *Administrators Attitudes Toward Mobile Learning*

Choose the statement that most resembles your attitude toward incorporating mobile learning in your future classroom.	Administrators (n=21)	
	Number	**Percent**
15. I will be able to effectively use mobile devices to support students' needs.	10	47.6%
16. I will be able to effectively use mobile devices to support students' needs with training.	10	47.6%

17. I don't think I will be able to effectively use mobile devices to support students' needs.	1	4.8%

The last section of the survey elicited responses related to self-efficacy and within that context, what would be needed to effectively use mobile learning tools. In this section participants were asked to select all items that apply from a pool of 13 statements. Frequencies were calculated as a percentage of all respondents. Statements with frequencies higher than 50% are considered a positive response and in support of the statement. Table 19 presents the results for each statement.

Table 19. *Administrators Self-efficacy*

	Administrators (n=21)	
I am confident that I can . . .	**Number**	**Percent**
1. use the Internet on a mobile device to find information relevant to my duties.	20	95.2%
2. take photos or video with a mobile device to support students.	20	95.2%
3. read and understand content on a mobile device.	19	90.5%
4. navigate a mobile application on a mobile device.	18	85.7%
5. participate in discussions using a mobile device.	18	85.7%
6. none of the above.	0	0%

Results indicated that the majority of administrators (85% and higher) have a high degree of confidence that they can use mobile devices with ease and to support students (questions 1-5), and 100% of the respondents felt that they could successfully operate a mobile device according to the statements listed in the survey. Question 1 through 3 drew out the highest percentages of acceptance (> 90.5%), which may indicate that administrators are ready to incorporate mobile devices to enhance student support and for their own professional development.

Administrators were also asked to provide input on their understanding of what is needed from their point of view to successfully use mobile devices for administrative functions. Table 20 presents the results of their feedback.

Table 20. *Administrators Perception of Needs*

	Administrators (n=21)	
I will need to be able to . . .	Number	Percent
7. have easy and affordable access to acquiring mobile devices.	17	81.0%
8. navigate a mobile application on a mobile device.	18	85.7%
9. have training available on how to use mobile applications (texting, email, social networking).	21	100.0%
10. have access to the Internet outside of the college (i.e., home, restaurants).	19	90.5%
11. have access to the Internet inside of a college campus.	21	100.0%
12. securely authenticate to the online administrative resources (i.e., PeopleSoft, email, office computer).	19	90.5%
13. Other	1	4.8%

The results of this portion of the survey indicated that administrators appeared to have a clear understanding of what would be needed for them to implement a mobile strategy. Over 85% of the repondents selected items related to access, usability, training and security as those elements needed for them to use mobile devices. Most importantly, 100% selected training and access to the Internet as the primary element required to move forward with mobile devices in support of students at their institution.

Descriptive Characteristics of the Students and Survey Data Analysis

For the fall term of 2014, when the study was conducted, the college served 20,950 students in both two-year and baccalaureate degree programs. A total of 9,473 students who were taking freshman and sophomore level online or hybrid courses were invited to participate in the study, and 805 completed the survey in its entirety. This number equates to an overall response rate of

8.5%. The entire student population at the college for the fall term was composed of 11,711 females (56%) and 8,969 (44%) males, while the ratio of female respondents to the survey was 499 (62%) and males 295 (38%). Although the percentage of female respondents to the survey was higher than the overall student population ratios, the sample population closely mirrors the overall population for both genders. Further, the age groups of the respondents are also representative of the overall population. Table 21 describes in detail the demographics of the student sample population by gender, ethnicity and age.

Table 21. *Descriptive Characteristics of Student Respondents (n=805)*

Gender	Respondents	Percentage of Total
Female	499	62.0%
Male	295	36.6%
Unknown	11	1.4%
Number of Responses:	805	100%
Race/Ethnicity		
African American/Black	134	16.6%
American Indian/Alaskan Native	1	0.1%
Asian	30	3.7%
Latino/Hispanic	169	21.0%
White/Caucasian	444	55.2%
Two or more races	21	2.6%
Unknown	6	0.7%
Number of Responses:	805	100%
Age		
Under 18	7	0.9%
18-24	275	34.2%
25-34	239	29.7%
35-44	149	18.5%
45 or older	135	16.8%

Number of Responses:	805	100%

Students were also asked to select those areas where they have had prior knowledge using mobile technologies. The second section of the survey was designed to identify current experiences with mobile devices and included 10 statements, which students were asked to choose those statements that applied to them. Table 22 depicts the number of responses for each question and the percentage from the total of respondents. See Appendix C for the student survey instrument.

Table 22. *Student Prior Knowledge*

	Students (n=805)	
I know how to . . .	**Number**	**Percent**
1. access the Internet from a mobile device.	786	97.6%
2. download a mobile application (app) on a mobile device.	747	92.8%
3. find the definition of a word I don't know on a mobile device.	753	93.5%
4. translate a sentence into another language on a mobile device.	597	74.2%
5. access a social networking site on a mobile device.	754	93.7%
6. send an email or text on a mobile device.	766	95.2%
7. post a comment to a blog or respond to a post on a mobile device.	708	88.0%
8. download a podcast on a mobile device.	456	56.6%
9. use a mobile device as a calculator.	777	96.5%
10. set an alert/alarm for a due date on a mobile device.	745	92.5%

Without any exceptions the majority of the respondents reported that they were able to perform all the tasks associated with the statements. The lowest percentage of knowledge was associated with item 8 (56.6%), "I know how to download a podcast on a mobile device," but over 88% reported that they were able to accomplish 8 out of 10 tasks. The lower response for item 8 may be attributed to the fact that more broadcasting capabilities are now available online than ever before and the need to download podcasts is no longer necessary as they can just be listened to directly via a mobile device accessing the Internet.

For the student survey, the third section asked students how they felt the use of mobile technologies would impact participation and engagement outside of the classroom. In this section the survey solicited responses from the students related to the actual use of mobile devices in connection with their educational process. A list of 19 statements was presented to respondents who were asked to choose all that apply to them. Responses associated with a statement greater than 50% are considered a positive response and in support of such statement. Table 23 presents the results for this section.

Table 23. *Student Participation and Engagement*

	Students (n=805)	
Have you ever . . .	**Number**	**Percent**
1. downloaded an application that helps you learn something new?	647	80.4%
2. used mobile devices to look up something that you didn't know or didn't understand during class?	655	81.4%
3. engaged in social networking on you mobile device?	700	87.0%
4. written notes on your mobile device to remind you of an assignment?	631	78.4%
5. set an alarm or reminder on your mobile device to help you remember that an assignment was due or a test was coming up?	644	80.0%
6. texted a classmate during class?	254	31.6%
7. texted a classmate outside of class about class?	568	70.6%

8. texted a classmate about the content of the class?	471	58.5%
9. texted a classmate about the teacher's ability?	245	30.4%
10. texted a classmate about the level of engagement in the class (i.e., I'm bored, this is cool.)?	263	32.7%
11. taken pictures or video with your mobile device that you used for an assignment?	483	60.0%
12. accessed an Educational Management System (e.g., Sakai) on your mobile device?	614	76.3%
13. read an article or assignment on your mobile device?	686	85.2%
14. used your mobile device as a study tool?	590	73.3%
15. played an educational game (e.g., Words with Friends) on your mobile device.	559	69.4%
16. used mobile devices to communicate with advisors and administrators?	454	56.4%
17. accessed the Student Information System (e.g., MySeminoleState) on your mobile device?	624	77.5%
18. kept track of the academic progress by consistently reviewing your progress against your educational plan?	481	59.8%
19. Other	52	6.5%

Excluding questions 6, 9 and 10, the majority of the respondents (>50) reported using their mobile devices to accomplish the rest of the activities listed in this section of the survey. The questions with lower response rates (<35%) were related to the use of text messaging during class, which may indicate a reluctance to engage in the use of mobile devices while the class is in session if the faculty is not supportive or in favor of using the devices. The highest response (87%) was for question 3, which pertained to social media, but 8 other tasks associated with instructional and educational functions drew a response greater than 76%.

The fourth section of the survey solicited input on the usefulness of mobile technology in support of students' academic and non-academic activities. This sections presented 20 statements on specific tasks that students would like to be able to complete using mobile devices. The statements are presented using a 5-point Likert scale: 1-Strongly Disagree; 2-Disagree; 3-

Neutral; 4-Agree; and 5-Strongly Agree. Each point on the scale was assigned a 20% weight.

Frequencies were calculated for all questions and responses obtained for combined frequencies

on scales 4 and 5 (Agree and Strongly Agree), which were greater than 60%, are considered a

positive response in support of the tasks or questions asked. Table 24 outlines the questions and

responses for this section of the survey.

Table 24. *Student Use of Mobile Devices*

	Students (n=805)	
	Number	**% Agree or Strongly Agree**
1. Students would be more likely to ask for help if they could communicate through their mobile devices.	457	56.8%
2. It would be easy for students to engage in discussions (comment) using a mobile application or website in mobile format.	447	55.5%
3. Student should be able to participate in discussion forums from their mobile devices.	527	65.5%
4. I would be more likely to participate in class if I could use my mobile devices.	299	37.1%
5. Mobile learning opportunities would allow students to learn and study in places they couldn't normally.	567	70.4%
6. It would be easier for students to complete classwork and assignments if they could use mobile devices.	434	53.9%
7. Students would be more likely to engage in class discussions inside of class if they could post their thoughts from their mobile devices.	305	37.9%
8. Students would be more likely to engage in class discussions outside of class if they could post their thoughts from their mobile devices.	391	48.6%
9. Students should be able to easily view course materials (syllabus, notes, assignments) on their mobile devices.	660	82.0%
10. Students should be able to download mobile applications that could help them study.	646	80.2%

11. Students should be able to access Educational Management Systems (e.g., Sakai) in a mobile format on their mobile devices.	653	81.1%
12. Students should be able to take quizzes on their mobile devices.	489	60.7%
13. It would not require a lot of effort for students to learn how to use a mobile application designed for my class.	576	71.6%
14. Students would spend more time on classwork if they could access materials anytime, anywhere on mobile devices.	517	64.2%
15. I would be more likely to participate in class activities outside of the class time if I could do so through my mobile device.	452	56.1%
16. I would like to see mobile learning incorporated into my classes.	436	54.2%
17. Learning on my personal mobile device would be easy because I am already familiar with all of its functions.	559	69.4%
18. I believe that having access using mobile applications to college systems would be a great benefit to students.	591	73.4%
19. I think students would be more motivated to enroll if they could use mobile devices.	414	51.4%
20. I would like to be able to use mobile devices to complete administrative requirements.	510	63.4%

The results of this section of the student survey revealed that respondents overall are not as receptive to use mobile devices for academic purposes inside of the classroom. Particularly, question 4 and 7, where 37.1% and 37.9% respectively, students reported very low interest in participating and engaging while in class. However, a large majority (>70.4%) reported that having access to mobile apps and activities outside of the classroom would be a motivating factor for higher participation and engagement (questions 3, 5, 9-11, 14 and 18). In addition, the majority of respondents (>71%) felt that it would not be difficult for students to learn how to use mobile applications designed for classwork or to meet administrative requirements. The respondents further supported mobile learning by their positive response (69.4%) to the use of

mobile devices because students already know how these devices work and they are familiar with their operation.

The last section of the survey asked students to select all items that apply to them from a list of seven statements. Frequencies were calculated as a percentage of all respondents. Statements with percentages higher than 50% are considered a positive response. Table 25 presents the results for each statement.

Table 25. *Student Self-efficacy*

	Students (n=805)	
I am confident that I can . . .	**Number**	**Percent**
1. use the Internet on a mobile device to find information relevant to my class or duties.	744	92.4%
2. use the Internet from a mobile device to find information relevant to administrative functions (i.e., register for classes, check financial aid, and pay fees).	690	85.7%
3. take photos or video with a mobile device to be used in my class.	704	87.5%
4. read and understand content on a mobile device.	735	91.3%
5. navigate a mobile application on a mobile device.	718	89.2%
6. participate in discussions using a mobile device.	668	83.0%
7. none of the above.	31	3.9%

Results indicated that the majority of students (>83%) felt confident that they can use mobile devices to accomplish activities relevant to their coursework or for administrative functions (questions 1-6). Questions 1 through 4 drew out the highest percentages of acceptance (> 90%), which may indicate that students are very familiar with the use of mobile devices and feel comfortable using them for learning. However, a very small number of students (31 or 3.9%) selected "none of the above," which may provide evidence that a small, but yet present, sector of the population have not had the opportunity to use mobile devices for personal or school related activities.

In this self-efficacy section of the survey, students were also asked to select the statement that best represented their needs to successfully use mobile devices for academic and administrative functions. Table 26 presents the results of their responses.

Table 26. *Student Perceptions of Needs*

	Students (n=805)	
I will need to be able to . . .	**Number**	**Percent**
8. have easy and affordable access to acquiring mobile devices.	691	85.8%
9. navigate a mobile application on a mobile device.	734	91.2%
10. have training available on how to use mobile applications (texting, email, social networking).	614	76.3%
11. have access to the Internet inside of the classroom.	740	91.9%
12. have access to the Internet outside of the classroom and around all campuses.	772	95.9%
13. securely authenticate to the online instructional resources (i.e., LMS, faculty website, testing).	690	85.7%
14. have access to the Internet outside of the college (i.e., home, restaurants).	733	91.1%
15. Other	18	2.2%

The results of questions 8-15 showed that students clearly (>91%) identify access to the Internet from inside and outside of the classroom as the most critical element to be able to use mobile devices, followed by a close 85.8% affordability and 85.7% security needs respectively. Seventy-six percent of the respondents identified training as a need (question 10), which also represented the lowest percentage of interest of all statements from the students. However, this response is consistent with prior responses where students expressed high level of familiarity and comfort with mobile devices. Training may be viewed as something that may be needed, but not essential.

Analysis of Open-ended Responses and Focus Group Data

As part of the online survey, all stakeholders were also asked an identical open-ended question: *How would you like to see mobile devices (mobile learning) incorporated at the college for classwork and administrative functions?* Unlike the rest of the survey quesitons, this question

did not require a response. The repondents who chose to complete this question included: 304 students out of 805; 22 faculty out of 37; and 10 administrators out of 21.

Qualitative data were first compiled in a Word document and then organized according to the software requirements for open coding. The researcher used a Coding Analyst Toolkit (CAT) hosted by the University Center for Social and Urban Research, at the University of Pittsburgh, and QDAP-UMass, in the College of Social and Behavioral Sciences, at the University of Massachusetts Amherst. The software required the data to be converted to text mode for upload and a potential list of codes (themes) to be uploaded for comparison. Table 27 shows the outcome of the evaluation of the qualitative data by category.

Table 27. *Qualitative Data Analysis*

Theme/Category	Students	Faculty	Administrators
Security	5	0	0
Reliability	0	0	0
Access	148	9	6
Connectivity	10	4	1
Training	5	1	0
Effectiveness	7	0	0
Mobile Applications	7	0	0
Video or Pictures	16	2	0
Social Networks	2	1	0
Engagement	10	4	2
Content	15	1	0
Policies	1	0	0
Assessment	1	0	0
Time or Flexible Schedule	74	0	1
Cost	3	0	0

The results of the analysis showed that 14 themes emerged. Clearly for all stakeholders who chose to respond to the open-ended question, 48% of students, 41% of faculty and 60% of administrators, "access" was the most important element needed to implement a mobile learning strategy. The second element was "flexible schedule/time." To clarify, "time" in this context

refers primarily to the fact that respondents, in particular students, felt that using mobile devices would provide greater flexibility and would allow them more time for participation and completion of tasks from where they are and when they can, as opposed to in person at a predefined place and time. Appendix K shows a list of sample comments for each of the categories.

In addition to the open-ended question, the researcher also asked those who completed the survey if they were interested in participating in a focus group. From all the groups, 19 respondents expressed interest in participating in the focus groups: six students, seven administrators and six faculty. A total of 13 participants representing the stakeholder groups who expressed interest were randomly selected and participated in the focus groups: four students, five faculty and four administrators. The researcher used an interview protocol (Appendix I) to moderate and elicit responses of the participants. Before the beginning of all focus group sessions the study was explained to participants and all were required to sign a consent form (Appendix L), which also explained the purpose of the study and any risks and benefits associated with their participation. All participants agreed and signed the form. Each focus group session was scheduled for one hour at a predefined location and time located at the college itself for the convenience of all participants. There were no voice or video recordings taken, just hand written notes taken by the researcher and a research analyst who assisted with the study and who was previously pre-approved via the IRB process at the College and the University where the researcher is completing the PhD program.

Since the number of participants was a smaller sample (13), all responses were dual coded in a Microsoft Word document for comparison and for analysis of potential themes. The following three themes emerged from the data analysis: training, potential use, and institutional

adoption/implementation. Each one of these themes is discussed in detail in the following section.

Theme 1: Training. In general, all stakeholders felt that in order for the institution to successfully implement a mobile learning strategy, they would have to have access to targeted training opportunities for all involved. However, students felt that the training was more important to be provided to the faculty than themselves. For example, students expressed the following:

- "It is really important to train faculty on improvements and on how to use mobile learning."
- "Encourage professors to have activities that students can complete on their phones."
- "Encourage professors to use e-texts."

Similarly, faculty felt that mobile learning would have a significant impact on their ability to teach, but the resources and training should be present. Examples of faculty input are:

- "Yes, [training] has to be hands on. All levels, people who are not comfortable with technology."
- "Faculty are at different levels. Be sure you make the training at all levels and use classroom examples/take-a-ways."
- "Creating an online orientation for students taking online classes because not all students are on the same level."
- "Switching the mindset for students to see their devices as more of an educational device."

For the administrators, the issue of training was identified as a requirement and not an option. Most felt that mobile learning and the use of mobile technologies for academic and non-academic functions is here and would only grow as time goes by and learning applications become more prevalent and accessible via these devices. The statements below are examples of their opinions:

- "Videos incorporated into new student orientation. Roll out in multiple ways."
- "This [mobile learning] should become part of the culture. Lead in each area to incorporate into institution/office culture."
- "There will not be a choice in the future."

Theme 2: Potential Use. Potential use is the second theme that emerged from the focus group interviews. All stakeholders presented a variety of ways in which they could use mobile learning inside and outside of the classroom. They all agreed that incorporating mobile devices as a tool would certainly have a significant positive impact in their ability to conduct their duties as students or employees. However, they also had some concerns that would limit the use of the technology if it is not used properly to support their needs. The following are examples of the students' feedback:

- "I use my tablet for a lot of school related activities."
- "All students have used their device to learn something academic."
- "Make an app for all school functions in one place: LMS, Student Portal, and email."
- "Being able to do online classes in a mobile learning environment. Integration with all other applications."
- Encourage professors to have activities that students can complete on their phones.
- Students who take online classes can watch lectures on their devices.

Concerns:

- Some people would not use them the right way.
- About 50/50 would use it correctly. It is the middle group that could go either way that you want to encourage.
- Social media: raise awareness about things at the college. The problem is that people would be checking that and not email.
- Some instructors are excited about the idea, but they cannot control the actions of students so there is some uneasiness.

Faculty had more specific ideas on the use of mobile learning for academic purposes. Their recommendations revolved around resources and applications available to be used with mobile

devices. Their responses concentrated on subject matter tools that the publishers and the college would have to make available for faculty to use. The faculty also expressed concerns with implementing mobile learning and those pertained to how to encourage participation for academic purposes and not social or personal reasons. The following are examples of their suggestions and concerns:

- "Mobile apps for everything."
- "Math is hard to do mobile. The publishers would have to develop something that is mobile friendly."
- "I think text alerts would help the bottom 20%."
- "For faculty to buy into mobile learning we have to show that the LMS would help them and not be in their way. Technology is important and we need an update.
- We can jump on, but the publishers have to be on the same page."

Concerns:

- "A lot has to do with maturity. A lot of students do not see how different online courses are compared to face-to-face."
- "The issue I grapple with is the following question: Do we want to encourage people to get more addicted to devices? All my students have smartphones, but not necessarily used for learning."
- "Students are glued to their devices, but they do not check their email."
- "They are using it [mobile phones] for both education and socially. Usually it is social, not educational."

Administrators also supported the use of mobile learning and provided far more recommendations than the previous two groups. Their feedback revolved around tools that would make their job easier by helping and connecting with students at their own location and time. Their concerns were mostly related to affordability for all students, so no student would be placed at a disadvantage over the rest by implementing something that only a few could benefit from it. Examples of their recommendations and concerns include:

- "Students check email on mobile devices. Exploring ways to encourage students to use mobile devices for college activities."
- "Students want immediacy and they use their mobile devices. Meeting expectations: smooth and immediate. Trying to meet our student's needs."
- "As we sign students up for email and text notification we can improve recruitment and notification."
- "Could be great to notify students of process related activities. Letting students know the important information by date/time in a matter that is not overwhelming."
- "Bring the operation to where the students are at. What do I need to know and do now? "
- "Anything we do we must be sure we are making the lives of our students easier, and it makes our jobs easier."

Concerns:

- "We expect students to have a device. The problem is that we have students who do not have the money. We need to be creative and inclusive and provide students with low cost options."

Theme 3: Adoption and Implementation. The third theme that emerged from the focus group was overall college adoption and implementation. As part of this theme the issue of access surfaced as well. Access was a major concern for all stakeholders and it was very evident in the open-ended responses from the survey. However, during the focus groups, access was mentioned as part of the overall strategy for implementing mobile learning. Students felt that it was the institution's responsibility to move forward with mobile learning. They were complementary of the technology available, but felt that the faculty were not fully on board and actually discourage the use of mobile devices at all. The focus group participants felt that adoption for the technology must start in the academic side to support online and face-to-face education. Examples of the students' feedback include the following:

- Professors assume you are not paying attention. There are policies in classes where professors will take points off if they see you with your device.

- Application to do in class quizzes. And to encourage more faculty members to do flipped classes.
- Promote the advancements the college has made already. The LMS mobile application, etc.
- Encourage professors to use e-texts.
- A couple of instructors have used devices but most do not. It must be a college-wide adoption, not a few.

Faculty believed that in order for the college to fully implement a mobile learning strategy, the college needed to provide discipline specific support with applications and tools. They were also very concerned with the ability of students to access the Internet outside and inside the college. The following are examples of their recommendations:

- "Make sure the Wi-Fi is working."
- "We have a course retention specialists for online courses that get students engaged. This is important in online success. They would be the first to use mobile devices for communicating with students."
- "I teach speech, and they have to be in class. Need the tools to be able to do the same via mobile learning techniques."
- "Switching the mindset for students to see their devices as more of an educational device."
- "Important for everything to be able to be used across platforms."
- "Connecting the fact that students can do their work on any mobile device."
- "Reliable access to the Internet from cell phone carriers."

Last, the administrators pointed out that the implementation of a mobile learning strategy must be a cohesive college-wide effort, which also includes third party partners who currently do business with the college. These partners include LMS software providers, Enterprise Resource Planning (ERP) software for admin features, college-wide Wi-Fi infrastructure, and cost effective resources for students to afford. Examples of the suggestions offered by administrators include:

- "For my area it has to be the right fit (student life). We do a lot of activities; it would be nice for events to pop up and for surveys on the students' mobile devices."
- "If we create something it should be personalized."
- "Something interactive and engaging."
- "Engage students at all levels."
- "Provide high level of support – high touch to use devices to encourage students to be successful."
- "My advice would be that it encompasses the entire college; including a student life component. All areas including safety and security."

Findings

Coupled with the information found in the literature review regarding the development of mobile learning frameworks and the results of the quantitative and qualitative data, the researcher developed a mobile learning framework that took into consideration the needs of three stakeholder groups: students, faculty and administrators. The framework covers several areas identified by the stakeholders and also attempts to address limitations of other mobile learning frameworks discussed in Chapter 2.

Development of the Framework from Data Analysis and Literature Review

The review of the literature revealed that existing frameworks offer limited guidelines on what administrative, communication, and instructional elements need to be considered when integrating m-learning technologies to support adult community college students. Most existing research around mobile learning concentrates on some specific activities around academics and do not address other needs that were uncovered by the analysis of the data acquired in this study.

The results of the data analysis provided several key elements, which need to be available in order for an m-learning strategy to be implemented. These elements are, however, interrelated and cannot be implemented in isolation. Therefore, the proposed m-learning framework was

developed using a relationship diagram that connects all the necessary elements in the order in which they would need to be implemented. In order to be able to distinguish each of the needs and their attributes, the framework is based on three components:

1. Major categories

2. Needs within categories

3. Attributes of the needs

The framework relationship model is divided into three sections, which also suggests that this is the order in which the framework should be implemented:

1) The first section is composed of the *Access* and the *Security* categories. These two categories represent the foundation for the successful implementation of a mobile learning strategy within an educational institution. They represent the physical layer and the management/authorization layer of the framework.

2) The second section is composed of the *Applications* and *Instructional Materials* categories. This section relates directly to development, deployment, use and integration of mobile devices into the educational process and the non-academic functions.

3) The third section is made up of the *Control/Monitoring Systems* category. This section provides the ability to assess, monitor and analyze the effectiveness of the mobile learning strategy once is has been implemented. It also provides the necessary tools to the faculty and administrators to review and manage the use of the technology by students for instructional and administrative tasks.

Combined, all three sections account for five major categories. The following is the description of each of the five major categories in the Mobile Learning Framework:

Access. As identified by all stakeholders, *Access* is one the framework's foundational pillars for a college-wide mobile learning strategy as it determines which users and to what extent mobile devices will be allowed into the network infrastructure. Educational institutions should define policies and procedures that restrict or allow users access to their network infrastructure via campus Wi-Fi or through the user's cellular service providers. This access permission also includes standards for type of devices that will be allowed to interact with the systems and applications designed or capable, to be used via the Internet and mobile devices. However, expanding Wi-Fi access or telecommunications providers' signal into the infrastructure for reliability and performance, could become extremely expensive and in some cases cost prohibited.

Security. *Security* is the second major pillar of the framework's foundation. It is the area where an institution will take direct control for protecting the infrastructure and the electronic environment in which the mobile learning strategy will be implemented. In the security category all the necessary measures for managing users, secure delivery of mobile applications, device restrictions and all the network security intelligence take place. From the cost point of view, the advantage of this category is that most of the existing security policies and measures, such as user ID's and password requirements that are already in place at an institution, can be relatively easy and inexpensive to incorporate into a mobile learning strategy. All stakeholders identified cyber security as an important issue, but primarily the students were the ones who expressed the most concerns. Appendix K shows an example of specific suggestions from a student related to security.

Applications. The *Applications* category concentrates on the actual development and deployment of those instructional and administrative tools, which are accessible via a mobile

device. Once a device has been granted the necessary permissions to access resources that meet

the user's authorization levels, the applications that are available become the conduit for users to

be able to interact with faculty and other students, and to learn on the go. These mobile

applications also become effective tools for interacting with the college to accomplish critical

administrative functions such as registration, grade reporting, fee payment and other student

records needs. In addition, the training for development, usability and integration into the core

educational process is also part of this category, along with the ability to control output resources

such as web printing and electronic storage of documents on the Internet or the handheld devices.

Instructional Materials. The *Instructional Materials* category is where all the resources

made available by the applications are actually delivered and fully integrated for teaching and

learning. Collaboration tools to enhance learning by increasing student engagement are the

primary attributes that characterized this category in the framework. In addition, the

infrastructure for supporting student, faculty and staff takes place here as well. Further, all other

electronic tools such as e-books, video, assessment materials and social learning complement the

delivery and management of the classroom assignments.

Control/Monitoring Systems. *The Control/Monitoring Systems* category provides the

necessary tools for faculty and administrators to control and monitor the use of mobile

technologies both in the classroom and outside. Basic and sophisticated analytics can be used to

improve the mobile strategy and to monitor progress as it occurs in real-time or historically.

However, one of the major issues with acquiring and implementing these tools is the typical high

cost and the more complex nature of the software and hardware required to integrate this

category into the mobile strategy. Software packages for analytics and for monitoring student

access, participation and engagement in a course, are not easy to integrate nor are they inexpensive.

Description of Validation Process from Delphi Panel

The final step in the development of the m-learning framework was the validation. The proposed framework was presented to the target stakeholders to empirically verify the components and processes. The researcher sought and recruited volunteers from each of the focus groups (representing the three stakeholder groups) to become part of a participants' panel. This panel was asked to review and evaluate the framework once it was developed and to provide input for further development and refinement of the framework. For the purpose of the validation in this study, this panel was referred as the Delphi panel. Three participants from each of the focus groups accepted to be part of the Delphi panel. The group decided that they would prefer to have all interactions with the researcher via email only. Once a first draft of the framework was developed, the Delphi panel received an email with two file attachments:

- Email with a short explanation of the Delphi process and a follow up email with deadlines and attachments for those agreeing to participate.
- Draft of framework with short description of all categories and sections.
- Evaluation criteria document (Appendix I).

All participants responded with their suggestions for improvement and recommendations within one week. Following are representative comments received based on the evaluation criteria:

1. Task Support: Do you think that the framework as presented accurately addresses your needs for using mobile devices for instructional and non-instructional tasks? Yes/No.

a. "Yes. This framework shows good access and security as well as the ability to use applications easily" (Student).

b. "Yes: The framework accurately addresses my needs for mobile devices pertaining to instructional and non-instructional tasks. It is clearly articulated and easy to understand" (Administrator).

c. "The framework refers to cell phone carriers, but that is not the only mobile device that uses carrier signals. It needs to expand to cover all mobile devices, not just smart phones" (Faculty).

2. Learnability: If the college were to implement the framework as designed, what level of effort do you think it will require for you to adapt it or use it in your environment (i.e. classroom, administration or both)? High/Low.

   a. "Classroom = low. The framework is student/teacher-centered, thus the effort to implement it is low" (Student).

   b. "This is a difficult question. I think it would depend on the Learning Management System in use. If the LMS is mobile device compatible, implementation would be seamless" (Faculty).

   c. "With the ease of use of technology and mobile apps, I believe that the level of effort will be relatively low. Through training and utilization, the framework in easy to understand" (Administrator).

3. Customization: Do you think that the framework can be implemented and customized to support your individual needs as a member of this institution (i.e. faculty, student or administrator)? Yes/No.

   a. "Yes" (Student)

b. "Yes. I would implement as is and then adapt or customize if needed" (Faculty).

c. "Yes. The framework established could be readily implemented to serve the needs of staff within the Student Affairs division as well as with our students" (Administrator).

4. Additional input: Please provide any additional input and recommendations that you may have to for improving the framework in the context of task support, learnability and customization. What suggestions do you have for improving the framework in general?

a. "Needs some further explanation on the description of the Applications category for clarification purposes" (Student).

b. "Under the Security->Physical Security, I don't understand the bullet "Private". Otherwise, the framework seems complete and comprehensive" (Faculty).

c. "The framework presented is well organized, easy to understand, and logical to follow. I especially like the Applications pertaining to Financial Aid/Fee Payment/Registration" (Administrator).

After all reviews from the Delphi panel were received the researcher modified the framework to include all the feedback and recommendations from the panel. This was referred as Round 2 of the reviews. An email (Appendix M) was sent to the Delphi panel with two documents attached: one was the summary of changes from Round 1; and the second the modified M-learning framework. The email also requested additional feedback from the Delphi panel if needed or to respond in support of the Framework if deemed complete by the reviewer.

.

The following is the summary of changes as presented to the Delphi panel:

1) On the Relationship Chart under the *Applications* category, the **LMS** *need* has been replaced with **Learning Resources** need and the LMS is now an *attribute* of that need.

2) Under the same *Applications* category, the attribute **Private** has been removed and instead the **Online tutoring resources** *attribute* has been added.

3) The description of the *Applications* category has been updated to better explain its purpose and to correct two typos.

4) On the *Access* category, the word **Cell Phone** has been replaced by **Signal Carrier**.

All other areas of the framework were left as previously presented as there were no comments or suggestions for change.

After two days, the researcher received all the replies from the e-mail with the statement: "Final framework is complete as presented" indicating that 100% of the participants in the Delphi panel had reached consensus and the framework was completed. Figure 4 shows the final framework as presented and validated internally by the Delphi panel.
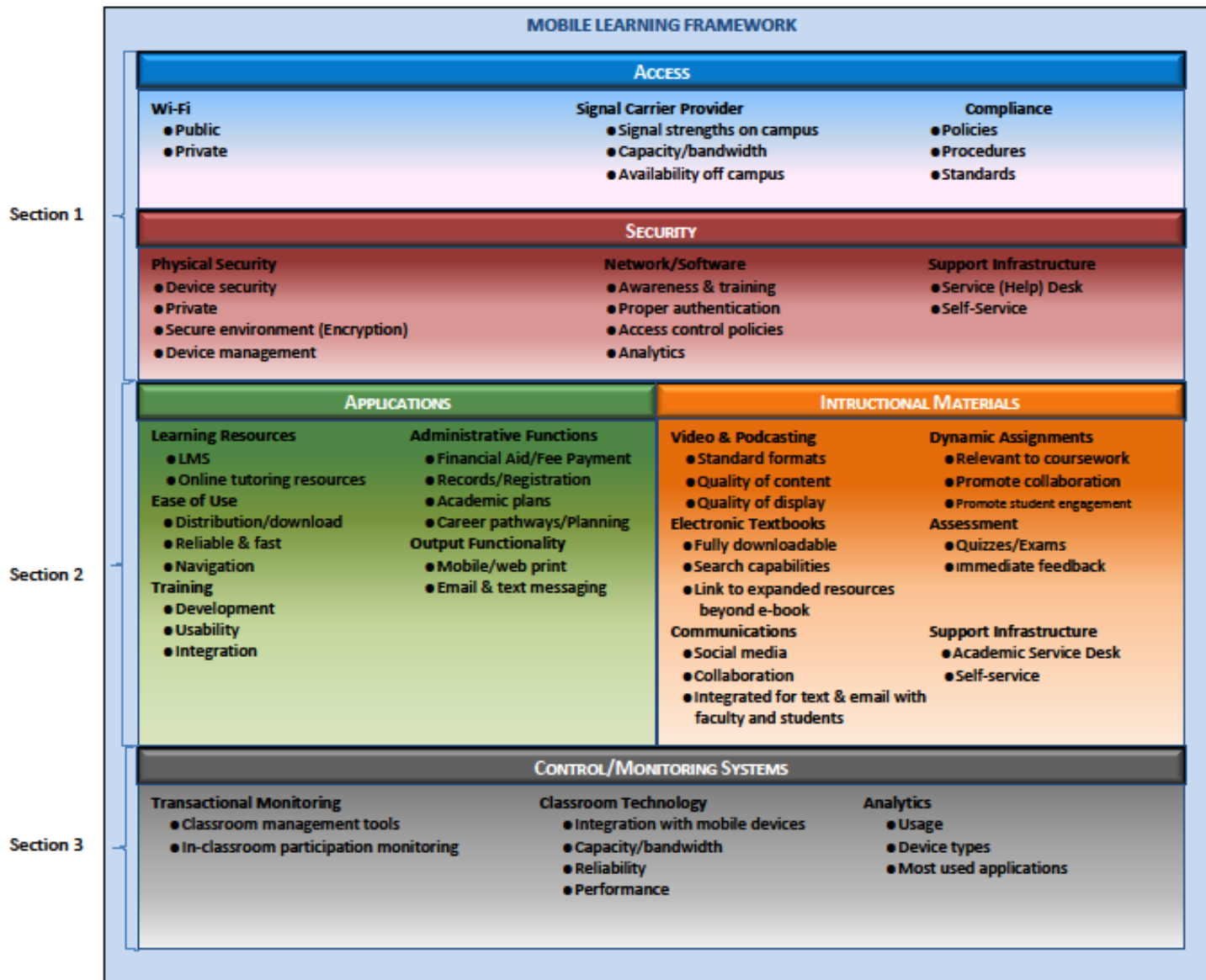
Figure 4. Mobile Learning Framework.

Summary of Results

This study was designed to identify the needs of students, faculty and staff as they relate to the use of mobile technologies in order to develop and validate a mobile learning framework capturing the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support adult community college students participating in online and blended learning environments.

One online survey was designed and administered to three distinctive stakeholders: students, faculty and administrators. Each survey was modified to meet the appropriate target audience, and included five sections: (1) Demographics, (2) Prior Knowledge, (3) Participation/ Engagement, (4) Usefulness of the Technology, and (5) Self-efficacy. Each of these five sections were analyzed in the context of the research questions and how the data would support answering them.

Next, a framework was developed based on the literature review and the analysis of the quantitative data provided by the results of the survey. Also, the analysis of qualitative data drawn from the responses to an open-ended question in the survey and from focus group input were included to provide additional depth and breadth of detail into the development of the framework. Last, the framework was presented to a Delphi panel and modified according to the feedback provided by the panel who participated in a review process that included two separate rounds of review until consensus was reached.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Guided by design and development research methods, the purpose of this study was to develop and validate a mobile learning framework that captured the administrative, communications, and instructional elements that would need to be considered when integrating mobile technologies to support freshman and sophomore adult students participating in online and blended learning environments at a higher education institution. This study included a comprehensive review of the literature on online student retention and engagement, and recent mobile learning frameworks and how they have been developed. The study also included the application of quantitative and quantitative methods to identify the needs of three stakeholder groups as they related to mobile devices and their use for learning purposes.

The literature review and the results of the data analysis enabled the researcher to draw specific conclusions and guided the development of the m-learning framework. This framework was also reviewed and validated internally by a subset of the participants in the study, providing a final framework that could be replicated and use at other institutions. Chapter 5 presents conclusions, implications, and recommendations for future research and application. The chapter concludes with a summary of the research study.

Conclusions

The following conclusions are organized by each of the research questions and the appropriate results from the review of the literature and data analysis.

Research question 1: *What are the benefits and limitations of m-learning technologies and how are these technologies being used to support teaching and learning in higher education?*

A literature review was conducted to identify relevant information that informed the initial preliminary framework design. Based on the literature, it was determined that mobile devices offer significant benefits to users and those benefits could be used for teaching and learning. First, most mobile devices can connect to the Internet via a commercially available wireless telecommunications carrier or to an institution's local wireless or wired infrastructure. These technologies already have full connectivity embedded to social networks, email, text messaging and others. Second, the popularity of mobile handheld devices have increased dramatically in recent years, which allow them to be more affordable and easily transported to different locations. Third, they provide users access to a large resource pool, regardless of physical location. Finally, improved and more powerful mobile devices are rapidly entering the market and are becoming readily available and more robust telecommunications networks, which have widespread consumer adoption. There are, however, limitations. First, smaller screen sizes make it difficult to spend considerable amounts of time working on particular task or activity. Second, mobile devices have relatively low battery life. Third, memory available for execution of applications and storage capacities are limited by the size of the device. Finally, despite the advances in carrier wireless network to support data, the performance and data rates transfers still require further development.

Looking at how mobile technologies are being used for teaching and learning in higher education, the review of the literature revealed that existing frameworks offer limited guidelines on what administrative, communication, and instructional elements need to be considered when integrating mobile devices to support teaching and learning. However, it was identified that

issues related to infrastructure capacity; technology limitations; and instructional design elements associated with mobile devices have evolved significantly over the last decade making it an ideal tool for expanding the reach of education via these devices.

Although there have been many small projects where researchers and educators have infused mobile learning in some functions of their study or instruction, they do not represent a replicable framework that could be used for other areas outside of the classroom. The literature review also confirmed that there is limited empirical evidence pertaining to the use of m-learning frameworks that support freshman and sophomore students in online and blended learning environments, and also considers the needs of administrators, faculty, and students in the adoption of mobile technologies for teaching and learning.

Research question 2: *What are the stakeholder (i.e., students, faculty, and administrators) needs that must be considered when adopting m-learning technologies to support online and blended teaching and learning in higher education?*

A needs assessment was conducted to identify stakeholder needs. A survey tool and focus group process were used to collect applicable data. Survey results in combination with the input provided by the focus groups and the responses to an open-ended question in the survey indicated that students, faculty and administrators are willing and ready to embrace mobile technologies to support the teaching and learning process. This acceptance is evident by the overwhelming majority of all participants (>75%) who expressed a high level of confidence that they could infuse mobile technologies into their daily activities for the purpose of supporting academic and non-academic functions. Based on the results of the data analysis, is also clear that all stakeholders are familiar with mobile technologies and are capable of using them for professional, educational and personal use.

The analysis of the results indicated that all stakeholders identified several key elements which needed to be present in order for a mobile learning strategy to be successful. Although more than a dozen needs emerged from the data analysis, there were four in particular that had the greater percentages of frequency and support.

Without a doubt and unanimously from all respondents, access to the Internet is the primary and most important need. It is evident that without proper access to the technology and applications, any opportunities of successfully implementing an m-learning strategy would not be feasible. This access is suggested as one that must be available at both, on college premises via local Wi-Fi and off-campus via private Internet providers.

The second most important need revolved around training. Stakeholders not only wanted training on the use of the device but more importantly on proper design and deployment of applications and activities that could be accessible via a mobile device. As part of training, it was also identified that support mechanisms to all constituencies must be in place to address questions and issues resulting from the use of mobile devices.

The third need identified by the participants was usability. Just because something is available and accessible via the Internet in a mobile device, it does not mean that it is usable. Students, in particular, placed a significant emphasis on the fact that faculty needed to be willing supporters of any m-learning strategy, and that any activities which would need to be accomplished as part of the coursework, had to be properly developed in coordination with all systems available. For instance, the LMS must be mobile-ready so all assignments can be performed remotely via a mobile device. Likewise, any third party products, such as e-text books and other online materials, must also work in concert with the other systems to be used.

The fourth and final need that emerged as a priority was security. This need was mentioned in specific detail in the responses to the open-ended question. Several stakeholders made references to data encryption and data protection as something that must be part of any m-learning framework. Even though the number of students, faculty and administrators who made reference to security was relatively low compared to the other three needs, it was discussed during the focus groups and participants made it clear that security is a requirement and function of the institution. It is the responsibility of the institution to protect stakeholders' records and identity in the best possible and effective manner.

Research question 3: *How can stakeholder needs inform the design of a framework for m-learning integration for delivery of online education in higher education?*

Both the literature review and the needs assessment were used to develop the m-learning framework. Existing frameworks were used as a starting point in the development of the m-learning framework for this study. Frameworks reported in the literature concentrated on the pedagogical aspects of the technology and its applications for learning, and did not address the ability to integrate other functions outside of the classroom connected with the promotion of interaction between students and administrators as well.

The needs assessment from the three stakeholder groups helped close that gap by identifying specific needs that were included in the framework. The results of the review of the literature and data analysis provided the necessary information to develop a comprehensive m-learning framework that included the concepts previously identified in the literature review and the needs identified in this study. In reviewing all the data from the study, the researcher realized that as part of the needs there were two very important aspects, which demanded considerable attention. Besides the obvious support from all stakeholders for access and usable applications, the issue of

security became very important given that any institution planning to implement an m-learning strategy must invest significant resources and time to make sure that all data going across the Internet via any device, mobile or otherwise, need to be protected from cyber-attacks, and that stakeholders trust that their identities and interaction with the institution are safe from malicious and illegal activities. The other element, which was more prevalent with the faculty and administrators, was the issue of control and monitoring systems. These two groups expressed the need for proper transactional monitoring systems that would identify student participation with mobile devices from places outside of the classroom. These tools would provide important analytics for further use and for development of other applications in support of student engagement and retention. These types of needs were primarily discussed during the focus groups and partially identified in the open-ended question.

The framework took into consideration all the feedback and became the reason for the access, security, and monitoring systems to be the overarching structure that wraps the use of mobile devices in the m-learning framework (see figure 4).

Research question 4: *What are stakeholder reactions to a proposed m-learning framework?*

Input regarding the design, content, and use of the framework was obtained from the three stakeholder groups. A significant amount of time was invested by the researcher in the process of developing a comprehensive framework that was student centric and that properly met the needs of all stakeholders. As a result, there were more positive comments and approval than requests for modifications and updates. This is validated by the comments from the Delphi panel such as:

> "The framework is well-thought out and concise. It is student-centered and takes into consideration the needs of those who support our students (faculty, staff, and administration)."

> "The framework presented is well organized, easy to understand, and logical to follow."

"The framework accurately addresses my needs for mobile devices pertaining to instructional and non-instructional tasks. It is clearly articulated and easy to understand."

These were just a few examples of the feedback received from the stakeholders, which indicated that for the most part, the m-learning framework met their needs and supported their recommendations and responses from the survey, open-ended question and the focus groups. The stakeholders who participated in the Delphi panel had all been part of every single data collection process and were the most familiar with the study.

Research question 5: *What modifications are needed to improve the researcher's proposed m-learning framework?*

The majority of stakeholders felt that the framework was comprehensive and mostly complete. There were only a small number of suggestions, which were easily incorporated into the framework. Based on the feedback the modifications were limited to the following three changes:

1. On the Relationship Chart under the *Applications* category, the **LMS** *need* has been replaced with **Learning Resources** need and the LMS became an *attribute* of that need.

2. Under the same *Applications* category, the attribute **Private** has been removed and instead the **Online tutoring resources** *attribute* has been added.

3. A reference to "**Promote student engagement**" was added in the *Instructional Materials* category.

After all changes were applied, the framework was sent one more time to all the stakeholders for review as the second round of reviews. Responses from 100% of the participants in the group indicated that the updated framework was complete and accepted it as presented. Figure 4 represents the final framework followed by a short description of the major categories.
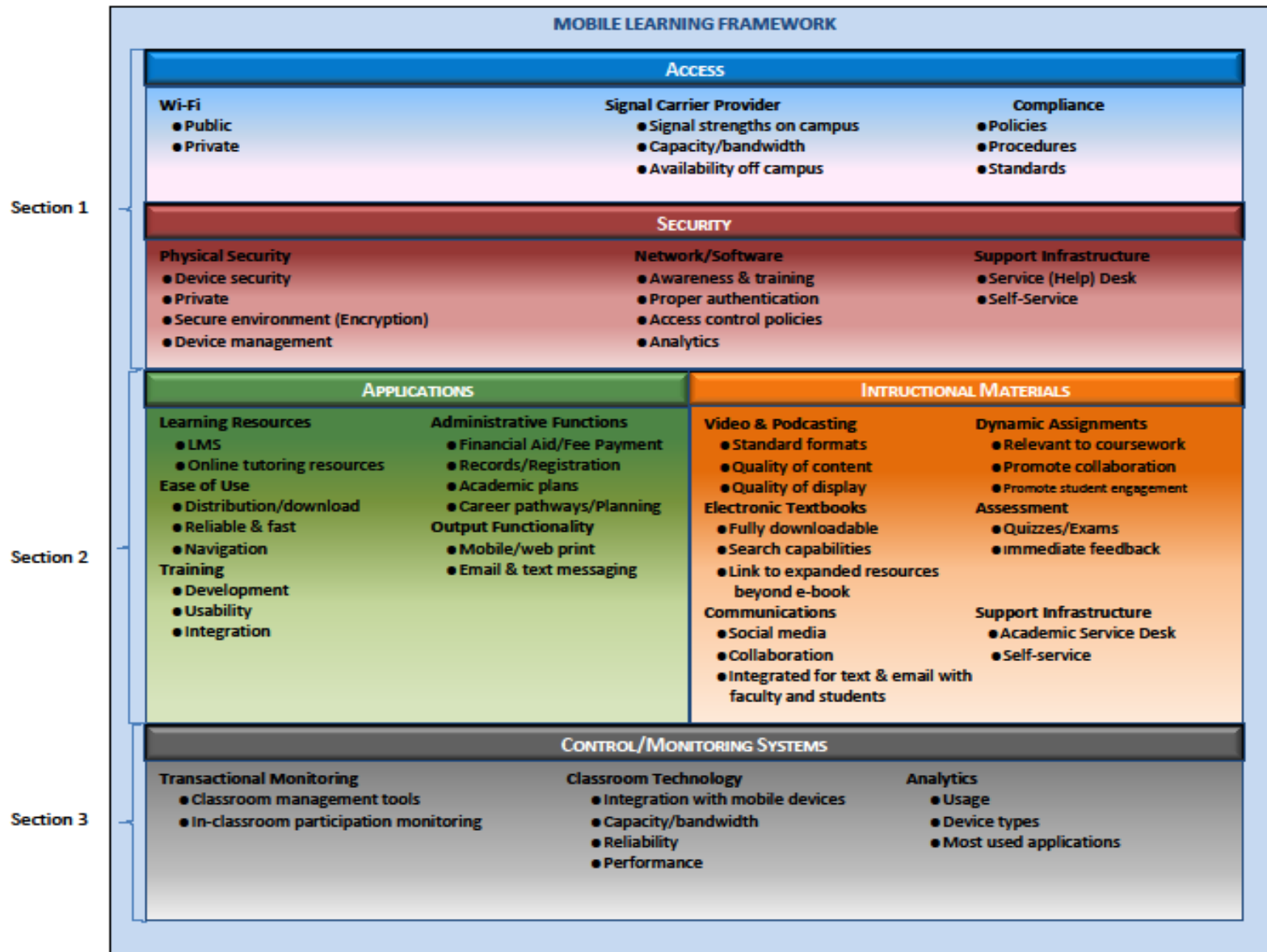
Figure 4. Mobile Learning Framework.

Descriptions of the Five Main Categories of the Mobile Learning Framework

Access. Access determines which users and to what extent mobile devices will be allowed into the network infrastructure. This category also includes standards for type of devices that will be allowed to interact with the systems and applications designed or capable to be used via the Internet and mobile devices. Expanding Wi-Fi access and telecommunications providers' signal into the infrastructure for reliability and performance, could become extremely expensive and in some cases cost prohibited.

Security. Security is the second major pillar of the framework's foundation. It allows direct control for protecting the infrastructure and the electronic environment in which the mobile learning strategy will be implemented. In this category all the necessary measures for managing users, secure delivery of mobile applications, device restrictions and all the network security intelligence takes place

Applications. The Applications category concentrates on the actual development and deployment of those instructional and administrative tools, which are accessible via a mobile device. Once a device has been granted the necessary permissions to access resources that meet the user's authorization levels, the applications that are available become the conduit for users to be able to interact with faculty and other students, and to learn on the go. These mobile applications also become effective tools for interacting with the college to accomplish critical administrative functions such as registration, grade reporting, fee payment and other student records needs.

Instructional Materials. The Instructional Materials category is where all the resources made available by the applications are actually delivered and fully integrated for teaching and learning. Collaboration tools to enhance learning by increasing student engagement are the

primary attributes that characterized this category in the framework. In addition, the infrastructure for supporting student, faculty and staff takes place here as well. Further, all other electronic tools such as e-books, video, assessment materials and social learning complement the delivery and management of the classroom assignments.

Control/Monitoring Systems. The Control/Monitoring Systems category provides the necessary tools for faculty and administrators to control and monitor the use of mobile technologies both in the classroom and outside. Basic and sophisticated analytics can be used to improve the mobile strategy and to monitor progress as it occurs in real-time or historically.

Although the researcher used extensive information from the review of the literature and collected significant amount of data from the stakeholders to construct the m-learning framework, the study is limited in the fact that the student participants only included freshman and sophomores who at the time of the study were taking online or blended courses, and faculty who were teaching freshman and sophomores in this modality. This sampling did not include input from students and faculty who do not participate in online and blended courses, but who could benefit from mobile technologies or are already using them for instructional purposes despite not taking blended or online courses. Additionally, the framework was validated by a subset of stakeholders who had participated in all phases of the study, which may have contributed to the quick turnaround responses from the Delphi panel and low number of recommendations. Finally, the study is localized to a single institution and the attitudes toward mobile technologies (or technologies in general) and their applications at this institution may deviate completely from others.

However, the development of the framework took into consideration what had been done in the past at other higher education institutions, and it is worth mentioning that the majority of

those were at universities and colleges that offered an extensive array of educational programs from four-year to graduate level and even doctoral programs. Also, the response rates achieved for this study were significantly higher than what most other studies had achieved. Particularly in the student and faculty populations, which indicates that population samples were properly sized and add validity to the results of the data collected and the outcome of the study.

Implications

This study helped identify the needs of students, faculty and administrators when a mobile learning strategy is to be implemented at an institution to support online and hybrid courses. The results of the study and the review of the literature on mobile learning frameworks guided the design of a comprehensive m-learning framework that meets the needs of the stakeholders and represents a specific set of categories that are required to be taken into consideration, and in proper order of implementation, in order for an institution to use mobile devices for academic and non-academic activities.

This study also contributed to the body of knowledge of design and development research. The researcher utilized design and development research methods, as identified in the literature, to address a research problem in the field of learning technology. The researcher focused on emerging and innovative technologies that could benefit a large population and that could also have a positive impact in the way instructional delivery methods can be modified to accommodate mobile devices as mainstream educational tools. Given the growth and accessibility of mobile technology and services, the opportunities for students, faculty, and staff to use technology for teaching, learning, and student services support is more feasible today than ever before.

Last, this study required a great deal of coordination between, students, faculty, administrators, research analysts, facilities, online survey and analysis tools, dissertation committee members, and the researcher. The overall study could serve as a template for future researchers embarking in a similar study using design and development research methods. Richey and Klein (2007) stated "research design is a process of anticipating everything that will happen during a study" (p.38). The researcher would not have been able to conduct the study if the institution where the study took place was not on board. This study was planned, designed, built and conducted based on partnerships with each on every one of the participants.

Recommendations

Recommendations are presented in two parts. First are the recommendations for future research, Second, the researcher presents recommendations for professional practice related to the implementation of the framework.

Future Research

The implementation of the m-learning framework from this study is in itself a research project that could be further expanded to include external validation. Using the m-learning framework from this study, researchers can actually work with an institution of higher education to implement the framework and focus on its efficiency, feasibility and cost (Richey & Klein, 2007).

Future research could also be conducted on specific results after the framework is implemented. For instance, what impact would use of the framework to guide an m-learning initiative have in the overall engagement and persistence of students attending college via online or blended learning environments? The literature review identified small targeted studies, which have been conducted with regard to specific mobile learning activities in the classroom;

however, they do not provide sufficient evidence of the effectiveness and efficiency of m-learning as an instructional tool.

Additional research can also be undertaken associated with the development of mobile learning theories that include the compilation of current uses to determine best practices in the field, thus possibly giving m-learning environments the same prominence as e-learning and face-to-face educational delivery methods, and to determine how the use of m-learning could affect the teaching and learning process.

Recommendations for Practice

Based on the resulting m-learning framework and the results of the study, which identified the needs of the stakeholders, the following list represents the recommendations for practice:

1. Implementation of the m-learning framework. The framework was purposely designed in three sections composed of five major categories. The implementation of the framework must be done sequentially by each section in order to properly support the use of mobile devices for teaching and learning. The framework can be implemented using a phase approach based on each section, but making sure that the proper order is followed. Figure 5 lists each section, the categories, the order of implementation (from top to bottom), and their relationship.
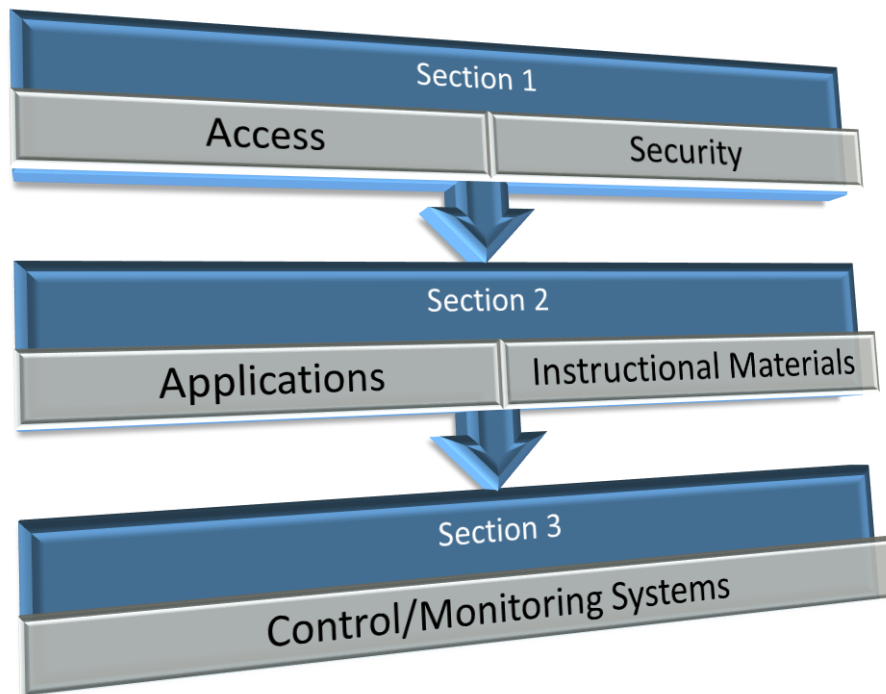
Figure 5. *Framework Sections and Relationship*

2. Develop comprehensive training for faculty that will include guidelines for using mobile devices in their teaching, including the integration of e-text books and communications protocols that can be accessed via mobile devices.

3. Develop institutional policies and procedures in support of the use of mobile devices. These policies should include proper and ethical use for students, faculty and staff as well as procedures for properly safe-guarding data and confidentiality of resources while being accessed and stored in mobile devices.

4. Invest in a support infrastructure for students and faculty using m-learning, which would include self-service capabilities and service desk support.

5. Partner with one or more private network providers (primarily cellphone companies) to develop cost effective data and communications plans that improve affordability of devices and service to the students and employees.

Summary

Over the last few years, several researchers have proposed m-learning frameworks derived from different perspectives. For instance, Danaher et al. (2009) proposed a framework based on three key principles: engagement, presence, and flexibility. Other researchers, such as Kearney et al. (2012), proposed a framework to capture central pedagogical features of m-learning environments. Their framework was designed using four dimensions: "place, connection, immediacy and activity" (p. 5).

Frameworks such as those proposed by Kearney et al. (2012) and Danaher et al. (2009) identified several common themes embedded in most m-learning frameworks: m-learning device portability and learner mobility, interactivity, control, and communication. However, these frameworks focus mainly on the learners' abilities to consume, produce, and exchange content to achieve subject-matter learning. There is limited empirical evidence on the use of m-learning frameworks that support adult students in online and blended learning environments and consider the needs of administrators, faculty, and students in the adoption of mobile technologies for teaching and learning.

The goal of this design and development study was to develop and validate internally an m-learning framework capturing the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support adult community college students. This research focused on the construction of an m-learning framework followed

by internal validation. External validation was not performed as it was determined to be beyond this scope of this study.

The following research questions guided the investigation:

1. What are the benefits and limitations of m-learning technologies and how are these technologies being used to support teaching and learning in higher education?

2. What are the stakeholder needs (i.e., students, faculty, and administrators) that must be considered when integrating m-learning technologies to support online and blended teaching and learning in higher education?

3. How can the needs of stakeholders inform the design of a framework for m-learning integration for delivery of online education in higher education?

4. What are the reactions of stakeholders (i.e., students, faculty, and administrators) to a proposed m-learning framework?

5. What modifications are needed to improve the researcher's proposed m-learning framework?

Guided by a design and development research methodology (Richey & Klein, 2007) the researcher carried out the study in three phases:

Phase 1: Literature Review

First, a review of the research literature guided the researcher in identifying the benefits and limitations of m-learning as well as existing frameworks that can be used to inform the design and development of the proposed m-learning framework.

Phase 2: Needs Assessment

Second, a needs assessment was conducted to understand what type of support freshman and sophomore students, faculty, and administrators require in order to adopt mobile learning technologies into their teaching and learning process. The needs assessment was developed using the following guidelines from Morrison, Ross, Kalman, and Kemp (2011):

Planning – First, the target audience to participate in the needs assessment was identified. Second, a strategy was developed for collecting the needs data and determining what types of needs will be identified (e.g., normative, comparative, felt, expressed, anticipated, future and critical incident). Third, while the target audience had been identified, it was also necessary to identify the participants from the target audience, which included students and faculty participating in online and blended instruction. Also, a selected group of administrators who have constant contact with student support functions outside of the classroom participated in the study.

Collecting Data – At this stage, the investigator for this study, after receiving proper permission from the researcher of a similar study, collected data with a modified and adopted online survey instrument along with focus group(s) from a subset of the participants. Specific questions and broad open-ended questions were posted to allow participants to fully express their views on the subject. The focus groups followed an interview protocol to guide the interviewing process and aid with the organization of the data collection process. Notes were taken when interacting with participants for further review and classification.

Analyzing Data – Results from the needs assessment were analyzed and prioritized. Considerations such as economic value, impact, ranking, frequency of similar responses, and timeliness were used to prioritize and organize the data.

Compiling a Final Report – While Morrison et al. (2011) recommend developing a final report from the needs assessment data, for purposes of this study, a detailed description of the results (chapter 4) along with a description of how the data was used to guide the design of the m-learning framework was provided.

Phase 3. Framework Construction and Validation

Once the needs assessment data was collected and analyzed and the review of the literature completed, an m-learning framework was developed and validated internally. The proposed framework was presented to the target stakeholders via a Delphi panel (students, faculty, and community college administrators) to empirically verify the components and processes of the proposed framework. After two rounds of review the Delphi panel reached consensus and deemed the framework complete.

Internal validation strategies recommended by Richey and Klein (2007), which focus on the components and processes of the framework, was used to identify problems such as:

- Does the framework include all the necessary components?

- To what extent does the framework addresses relevant environmental factors?

- To what extent is the framework usable to a wide range of settings?

- Is the use of the framework cost effective?

In order to be able to distinguish each of the needs and their attributes the researcher developed the framework based on three components: 1) Major categories; 2) Needs within categories; and 3) Attributes of the needs. Further, the researcher designed the framework in such a way that it could be implemented in three separate sections by following a sequential order based on each section: section 1 composed of the *Access* and *Security* categories; section 2 composed of the *Applications* and *Instructional Materials* categories; and section 3 composed

the *Control and Monitoring Systems* category. Combined, all three sections account for five major categories. The final m-learning framework was design to include specific guidelines to help administrators and faculty make decisions about the adoption of m-learning technologies to support teaching and learning in online and blended learning environments. The final m-learning framework was presented using a hierarchical relationship model with no connecting lines, followed by a short description of its components.

Appendix A

Faculty Survey

Mobile Learning Needs Survey (Faculty)

This survey is divided into four sections and it should take approximately 15-20 minutes to complete.

This survey has been developed to identify the needs of faculty as they relate to mobile technologies and how they can be used to promote student engagement inside and outside of the classroom.

For the purpose of this survey, "mobile device" includes any handheld device capable of multiple functions, including but not limited to accessing the internet, running applications locally and on the web, listening to music and watching videos, etc. Example include smartphones, Android devices, iPhone, iPods, tablets or similar devices.

*Required field
Prior Knowlege

1) I know how to… *
Check all that apply

❑ connect to and access the internet from a mobile device

❑ download music and video files on a mobile device

❑ download a mobile application on a mobile device

❑ find the definition of a word or concept on a mobile device

❑ interface or connect my calendar/alarm on a mobile device

❑ translate a sentence into another language on a mobile device

❑ access and participate in a social network site on a mobile device

❑ send and receive emails/text messages on a mobile device

❑ access college resources such as LMS, personal records, payroll, etc on a mobile device

Participation/Engagement

*Required field
Please answer the following questions using the scale below
1-Strongly Disagree

2-Disagree

3-Neutral

4-Agree

5-Strongly Agree

2) My students would be more likely to participate in class if they could use their mobile device*

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

3) Mobile learning opportunities would allow students to learn and study in places they couldn't normally *

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

4) It would be easier for students to complete classwork and assignments if they could use a mobile device

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

5) My students would spend more time on classwork if they could access materials anytime, anywhere on their mobile devices.*

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

6) My students would be more likely to participate in class activities outside of the class time if they could do so through their mobile device*

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

7) My students would be more likely to engage in class discussions inside of class if they could post their thoughts from their mobile device*

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

8) My students would be more likely to engage in class discussions outside of class if they could post their thoughts from their mobile device*

                      1   2   3   4   5

Strongly Disagree   O   O   O   O   O Strongly Agree

9) My students would be more likely to ask for help if they could communicate through their mobile device*

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

10) Mobile learning could be incorporated into classes*

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

11) Students should be able to easily view course materials (syllabus, notes, assignments) on their mobile device *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

12) Students should be able to download mobile applications that could help them study *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

13) Students should be able to access Educational Management Systems (e.g. Sakai) in a mobile format on their mobile device *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

14) Students should be able to take quizzes on their mobile device *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

15) Student should be able to participate in discussion forums from their mobile device *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

16) It would not require a lot of effort for students to learn how to use a mobile application designed for my class *

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

17) It would be easy for students to engage in discussions (comment) using a mobile application or website in mobile format *

	1	2	3	4	5	
Strongly Disagree	❍	❍	❍	❍	❍	Strongly Agree

Use of Mobile Devices

18) How would you use mobile devices in your class?
Which, if any, of the following educational tasks would you use inside or outside of your class using mobile devices?

*Required field
Please check all that apply

I would ask students to …*

❑ download applications that help them learn new material

❑ use mobile devices to look up something that they didn't know or didn't understand during class

❑ engage in social networking on their mobile devices

❑ write notes on their mobile device to remind themselves of an assignment

❑ set alarms or reminders on their mobile device to help them remember that an assignment was due or a test was coming up

❑ text a classmate during class

❑ text a classmate about the content of the class – inside and outside of the class

❑ text a classmate about the teacher's ability

❑ text a classmate about the level of engagement in the class (i.e. I'm bored, this is cool, etc.)

❑ take pictures or video with their mobile device that they use for an assignment

❑ access an Educational Management System (e.g. Sakai) on their mobile device

❑ read an article or assignment on their mobile device

❑ use their mobile device as a study tool

❑ play an educational game (e.g. Words with Friends) on their mobile device

❑ none of the above

❑ not use mobile devices inside of the classroom

❑ Other: [   ]

Mobile use in the classroom

Please answer the following questions about using mobile devices in your classroom using the scale below:

1-Strongly Disagree

2-Disagree

3-Neutral

4-Agree

5-Strongly Agree

19) I believe students can be taught how to appropriately use mobile devices for learning *

	1	2	3	4	5
Strongly Disagree	O	O	O	O	O Strongly Agree

20) I believe using mobile applications for learning in my classroom would benefit students *

	1	2	3	4	5
Strongly Disagree	O	O	O	O	O Strongly Agree

21) I think students would be more motivated to learn if they could use mobile devices *

	1	2	3	4	5
Strongly Disagree	O	O	O	O	O Strongly Agree

22) Students would think is fun to use an interactive mobile device in my classroom *

	1	2	3	4	5
Strongly Disagree	O	O	O	O	O Strongly Agree

23) I would like my students to be able to use mobile devices to access course content and practice skills *

	1	2	3	4	5
Strongly Disagree	O	O	O	O	O Strongly Agree

24) I would like to learn more about mobile learning, so that I can incorporate it in my classroom *

	1	2	3	4	5	
Strongly Disagree	❍	❍	❍	❍	❍ Strongly Agree

25) I would like to learn how to create mobile applications, so that I can incorporate them into my lessons *

	1	2	3	4	5	
Strongly Disagree	❍	❍	❍	❍	❍ Strongly Agree

26) Choose the statement that most resembles your attitude toward incorporating mobile learning in your future classroom *

❍ I will be able to effectively incorporate mobile learning into my classroom

❍ I will be able to effectively incorporate mobile learning into my classroom with training

❍ I don't think I will be able to effectively incorporate mobile learning into my classroom

27) How would you like to see mobile devices (mobile learning) incorporated at the college for classwork and administrative functions?

Self-efficcacy

Please check all that apply

28) I am confident that I can… * (Check all that you think you are able to do)

❑ use the Internet on a mobile device to find information relevant to my class

❑ take photos or video with a mobile device to be used in my class

❑ read and understand content on a mobile device

❑ navigate a mobile application on a mobile device

❑ participate in discussions using a mobile device

❑ NONE OF THE ABOVE

29) What are the most important elements needed for mobile learning to be used in your classroom?

Which, if any, of the following technical and pedagical elements would you believe are required for using mobile devices in your classroom?

Please check all that apply

30) Faculty will need to be able to .... *

❑ have access to the Internet inside of the classroom

❑ have access to the Internet outside of the classroom

❑ securely authenticate to the online instructional resources (i.e. LMS, faculty website, testing)

❑ easy and affordable access to acquiring mobile devices

❑ navigate a mobile application on a mobile device

❑ have professional development opportunities on how to use mobile applications (texting, email, social networking)

❑ Other:

31) Focus Group Interest

I am interested in participating in a focus group   ◯ Yes   ◯ No

Please note that if you agree to participate in the focus group the researcher will use the email of record associated with the account used to login to complete this survey.

Appendix B

Administrator Survey

Mobile Learning/Services Needs Survey (Administrators)

This survey is divided into four sections and it should take approximately 15-20 minutes to complete. This survey has been developed to identify the needs of administrators as they relate to mobile technologies and how they can be used to promote student engagement and completion of services outside of the classroom.

For the purpose of this survey, "mobile device" includes any handheld device capable of multiple functions, including but not limited to accessing the internet, running applications locally and on the web, listening to music and watching videos, etc. Example include smartphones, Android devices, iPhone, iPods, tablets or similar devices.

*Required field

Prior Knowlege

1) I know how to… *
Check all that apply

❑ connect to and access the internet from a mobile device

❑ download music and video files on a mobile device

❑ download a mobile application on a mobile device

❑ find the definition of a word or concept on a mobile device

❑ interface or connect my calendar/alarm on a mobile device

❑ translate a sentence into another language on a mobile device

❑ access and participate in a social network site on a mobile device

❑ send and receive emails/text messages on a mobile device

❑ access college resources such as LMS, personal records, payroll, etc on a mobile device

Please answer the following questions using the scale below

      1-Strongly Disagree

      2-Disagree

      3-Neutral

      4-Agree

      5-Strongly Agree

2) Students would be more likely to complete their enrollment management functions if they could use their mobile device (i.e. registration, add-drop, pay fees, etc.)*

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

3) Students would contact their educational advisors if they could access them anytime, anywhere on their mobile devices.*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

4) Students would be more likely to participate in extra curricular activities outside of the class time if they were made aware of them through their mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

5) Students would be more likely to provide feedback to administrators on student services /facilities/financial functions if they they could post their thoughts from their mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

6) Students would be more likely to ask for help if they could communicate through their mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

7) Mobile functions could be incorporated into activities not related to classroom work (i.e. student services, financial aid, campus maps, etc.)*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

8) Students should be able to download mobile applications that could help them meet their enrollment and financial aid management duties *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

9) Students should be able to access the Student Information System (e.g. PeopleSoft) in a mobile format on their mobile device *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

10) Students should be able to take college surveys on their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

11) Students should be able to participate in discussion forums from their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

12) It would not require a lot of effort for students to learn how to use a mobile application designed for accesing the Student Information System (i.e. PeopleSoft) *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

13) It would be easy for students to engage in discussions (comment) using a mobile application or website in mobile format *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

14) It would be easier for students to complete enrollment and financial requirements if they could use a mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

15) It would help students complete their program of study if they were able to review their educational plan and degree program requirements via a mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

Use of Mobile Devices

16) How would you use mobile devices to provide access to student services, financial and other mobile applications?

Please check all that apply

I would ask students to …*

❏ download applications that help them learn new materials

❏ use mobile devices to look up something that they didn't know or didn't understand

❏ engage in social networking on their mobile devices

❏ write notes on their mobile device to remind themselves of a process or dutie

❏ set alarms or reminders on their mobile device to help them remember their due dates for enrollment or financial requirements

❏ use mobile devices to communicate with advisors and administrators

❏ access a Student Information System (e.g. PeopleSoft) on their mobile device

❏ keep track of their progress by consistently reviewing their progress against their educational plan

❏ none of the above

❏ not use mobile devices to manage their student records or extracurricular activities

❏ Other: [   ]

Mobile Devices outside of the Classroom

Please answer the following questions about using mobile devices outside of the classroom using the scale below:

> 1-Strongly Disagree
>
> 2-Disagree
>
> 3-Neutral
>
> 4-Agree
>
> 5-Strongly Agree

17) I believe students can be taught how to appropriately use mobile devices for meeting adminstrative college deadlines *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

18) I believe using mobile applications for accessing college systems would benefit students *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

19) I think students would be more motivated to enroll if they could use mobile devices *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

20) I would like students to be able to use mobile devices to access students records and complete administrative requirements *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

21) I would like to learn how to create mobile applications, so that I can incorporate them into my workload *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

22) Choose the statement that most resembles your attitude toward incorporating mobile learning in your future classroom *

O I will be able to effectively use mobile devices to support students needs

O I will be able to effectively use mobile devices to support students needs with training

O I don't think I will be able to effectively use mobile devices to support students needs

23) How would you like to see mobile devices (mobile learning) incorporated at the college for classwork and administrative functions?

24) I am confident that I can… * (Check all that you think you are able to do)

❑ use the Internet on a mobile device to find information relevant to my duties

❑ take photos or video with a mobile device to be used to support students

❑ read and understand content on a mobile device

❑ navigate a mobile application on a mobile device

❑ participate in discussions using a mobile device

❑ NONE OF THE ABOVE

What are the most important elements needed for mobile learning to be used at your institution?
Which, if any, of the following technical and non-pedagical elements would you believe are required for using mobile devices in your work environment?

*Required field
Please check all that apply

25) Administrators will need to be able to .... *

❑ have access to the Internet inside of a college campus

❑ have access to the Internet outside of a college campus

❑ securely authenticate to the online administrative resources (i.e. PeopleSoft, email, office computer)

❑ easy and affordable access to acquiring mobile devices

❑ navigate an application on a mobile device

❑ have professional development opportunities on how to use mobile applications (texting, email, social networking)

❑ ALL OF THE ABOVE

❑ Other: [   ]

26) Focus Group Interest

I am interested in participating in a focus group   ○ Yes   ○ No

Please note that if you agree to participate in the focus group the researcher will use the email of record associated with the account used to login to complete this survey.

Appendix C

Student Survey

Mobile Learning Survey (Students)

Please fill out this survey to the best of your ability. This survey is divided into five sections and it should take approximately 15-20 minutes to complete.

This survey has been developed to identify the needs of students as they relate to mobile technologies and how they can be used to promote their instructional engagement with class work and completion of services inside and outside of the classroom and the college.

For the purpose of this survey, "mobile device" includes any handheld device capable of multiple functions, including but not limited to accessing the internet, running applications locally and on the web, listening to music and watching videos, etc. Example include smartphones, Android devices, iPhone, iPods, tablets or similar devices.

*Required field
Prior Knowlege

1) I know how to… *
Check all that apply

❑ access the internet from a mobile device

❑ download a podcast on a mobile device

❑ download a mobile application (app) on a mobile device

❑ find the definition of a word I don't know on a mobile device

❑ use a mobile device as a calculator

❑ set an alert/alarm for a due date on a mobile device

❑ translate a sentence into another language on a mobile device

❑ access a social networking site on a mobile device

❑ send an email on a mobile device

❑ post a comment to a blog or respond to a post on a mobile device

Participation/Engagement

2) Have you ever …*

Check all that apply

❑ downloaded an application that help them learn something new?

❑ used your mobile device to look up something that they didn't know or didn't understand during class?

❑ engaged in social networking on your mobile device?

❑ wrote notes on your mobile device to remind yourselves of an assignment?

❑ set an alarm or reminder on your mobile device to help you remember that an assignment was due or a test was coming up?

❑ texted a classmate during class?

❑ texted a classmate outside of class about class?

❑ texted a classmate about the content of the class?

❑ texted a classmate about the teacher's ability?

❑ texted a classmate about the level of engagement in the class (i.e. I'm bored, this is cool, etc.)?

❑ taken pictures or video with your mobile device that you used for an assignment?

❑ accessed an Educational Management System (e.g. Sakai) on your mobile device?

❑ read an article or assignment on your mobile device?

❑ used your mobile device as a study tool?

❑ played an educational game (e.g. Words with Friends) on your mobile device?

❑ used mobile devices to communicate with advisors and administrators

❑ accessed the Student Information System (e.g. MySeminoleState) on your mobile device

❑ kept track of the academic progress by consistently reviewing your progress against your educational plan

❑ Other: [   ]

Use of Mobile Devices

Please answer the following questions using the scale below

1-Strongly Disagree

2-Disagree

3-Neutral

4-Agree

5-Strongly Agree

3) I would be more likely to participate in class if I could use my mobile device*

	1	2	3	4	5
Strongly Disagree	○	○	○	○	○ Strongly Agree

4) I would spend more time on classwork if I could access materials anytime, anywhere on my mobile device *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

5) I would be more likely to participate in class activities outside of the class time if I could do so through my mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

6) I would be more likely to engage in class discussions inside of class if I could post my thoughts from my mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

7) I would be more likely to engage in class discussions outside of class if I could post my thoughts from my mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

8) I would be more likely to ask for help if I could communicate through my mobile device*

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

9) I would like to see mobile learning incorporated into my classes *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

10) I would like to be able to easily view course materials (syllabus, notes, assignments) on my mobile device *

	1	2	3	4	5

Strongly Disagree   O   O   O   O   O Strongly Agree

11) I would like to be able to download mobile applications that could help me study *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

12) I would like to be able to access Educational Management Systems (e.g. Sakai) in a mobile format on my mobile device *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

13) I would like to be able to take quizzes on my mobile device *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

14) I would like to be able to participate in discussion forums from my mobile device *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

15) It would not require a lot of effort to learn how to use a mobile application designed for my class *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

16) Learning on my personal mobile device would be easy because I am already familiar with all of its functions *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

17) It is easy to engage in discussions (comment) using a mobile application or website in mobile format *

| | 1 | 2 | 3 | 4 | 5 | |
| Strongly Disagree | O | O | O | O | O Strongly Agree |

18) Mobile learning opportunities would allow me to learn and study in places I couldn't normally learn or study in *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

19) It would be easier to complete classwork and assignments if I could use a mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

20) I believe that having access using mobile applications to college systems would be a great benefit to students *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

21) I think students would be more motivated to enroll if they could use mobile devices *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

22) I would like to be able to use mobile devices to complete administrative requirements *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

23) I am confident that I can… *
Check all that apply

❑ use the internet from a mobile device to find information relevant to my class

❑ use the internet from a mobile device to find information relevant to administrative functions (i.e. registration, financial aid, fee payment, etc.)

❑ take photos or video with a mobile device to be used in my class

❑ read and understand content on a mobile device

❑ navigate a mobile application on a mobile device

❑ participate in discussions using a mobile device

❑ NONE OF THE ABOVE

24) How would you like to see mobile devices (mobile learning) incorporated at the college for classwork and administrative functions?

```



```

Which, if any, of the following technical and practical elements would you believe are required for using mobile devices in your classroom and for administrative functions?

*Required field
Please check all that apply

25) Students will need to be able to .... *

❑ have access to the Internet inside of the classroom

❑ have access to the Internet outside of the classroom and around all campuses

❑ have access to the Internet outside of the college (i.e. home, restaurants, etc.)

❑ securely authenticate to the online instructional resources (i.e. LMS, faculty website, testing)

❑ easy and affordable access to acquiring mobile devices

❑ navigate a mobile application on a mobile device

❑ have training availble on how to use mobile applications (texting, email, social networking)

❑ ALL OF THE ABOVE

❑ Other: `_____`

26) Focus Group Interest

I am interested in participating in a focus group   ❍ Yes   ❍ No

Please note that if you agree to participate in the focus group the researcher will use the email of record associated with the account used to login to complete this survey.

Appendix D

Permission to Use Pollara's (2011) Survey Instrument

From: Pamela Pollara <pamela_pollara@hotmail.com> **Date:** April 30, 2014 at 1:20:55 PM EDT
To: "resmannb@seminolestate.edu" <resmannb@seminolestate.edu>

Subject: Re: Pamela Pollara - Contact Information

Ms. Resmann,

Thank you for reaching out. Seminole State College has my permission to replicate the study and use my survey instrument. Please let me know if you have any questions or if I may be of any further assistance. You may contact me at any time.

Very Respectfully,

Pam

Pamela Pollara, Ph.D. 973.493.5473
pamela_pollara@hotmail.com

From: ylou@usf.edu To: pamela_pollara@hotmail.com Date: Wed, 30 Apr 2014 12:54:46 -0400
Subject: FW: Pamela Pollara - Contact Information

Hi Pam,

How are you doing? See the email below.

Yiping

Yiping Lou, Ph.D. Associate Professor, Instructional Technology Department of Secondary Education University of South Florida 4202 E. Fowler Ave., EDU 105

1

Tampa, FL 33620-5650 Office: EDU 302K; Phone: (813) 974-7886 Email: ylou@usf.edu

From: Brittany L Resmann <resmannb@seminolestate.edu> **Date:** Monday, April 28, 2014 11:28 AM **To:** Yiping Lou <ylou@usf.edu> **Subject:** Pamela Pollara -Contact Information

Dr. Lou –

I am contacting you to see if you had updated contact information for Pamela Pollara. I am working with one of our Vice Presidents at Seminole State College on a research project on mobile learning. He had read her research and would like to replicate it in a community college setting. He is looking for her permission to use the survey instrument at our institution.

I am sure this is a strange request. I have been searching for her contact information, but it seems out of date. I appreciate your assistance.

Thank you, Brittany

Brittany L. Resmann

Senior Analyst/Decision Support Systems Institutional Effectiveness and Research Seminole State

College 100 Weldon Blvd Sanford, FL 32773 407.708.2708

Appendix E

Pollara's (2011) Survey Instrument

Mobile Learning Survey

Please fill out this survey to the best of your ability. The survey is divided into six sections. It should take approximately 15-20 minutes to complete the survey.
For the purpose of this survey, "mobile device" includes any handheld device capable of multiple functions, including but not limited to accessing the Internet, running applications, listening to music, etc. Examples include smartphones, iPod touch or similar devices.
Thank you for your participation.

* Required

Age *

[   ]

Gender *
○ Male
○ Female
○ No Response

School/College Affiliation *
○ Agriculture
○ Art & Design
○ Business
○ Coast and Environment
○ Education
○ Engineering
○ Humanities & Social Sciences
○ Mass Communication
○ Music & Dramatic Arts
○ Science

(Continue »)

Mobile Learning Survey

How do you think your students using their mobile devices?

Which, if any, of the following educational tasks do you think your students are using their mobile devices for inside and outside of the classroom?

Please check all that apply

I think my students are... *

☐ downloading applications that help them learn something new

☐ using mobile devices to look up something that they didn't know or didn't understand during class

☐ engaging in social networking on their mobile devices

☐ writing notes on their mobile device to remind themselves of an assignment

☐ setting alarms or reminders on their mobile device to help them remember that an assignment was due or a test was coming up

☐ texting a classmate during class

☐ texting a classmate about the content of the class

☐ texting a classmate about the teacher's ability

☐ texting a classmate about the level of engagement in the class (i.e. I'm bored, this is cool, etc.)

☐ taking pictures or video with their mobile device that they use for an assignment

☐ accessing an Educational Management System (e.g. Moodle) on their mobile device

☐ reading an article or assignment on their mobile device

☐ using their mobile device as a study tool

☐ playing an educational game (e.g. Words with Friends) on their mobile device

☐ none of the above

☐ I don't have a clue

☐ Other: [_____]

(« Back) (Continue »)

Mobile Learning Survey

Perception
Please answer the following questions using the scale below.

1-Strongly Disgree
2-Disagree
3-Neutral
4-Agree
5-Strongly Agree

My students would be more likely to participate in class if they could use their mobile device
*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

My students would spend more time on classwork if they could access materials anytime, anywhere on their mobile device *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

My students would be more likely to participate in class activities outside of class time if they could do so through their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

My students would be more likely to engage in class discussions inside of class if they could post their thoughts from their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

My students would be more likely to engage in class discussions outside of class if they could post their thoughts from their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

My students would be more likely to ask for help if they could communicate through their mobile device *

	1	2	3	4	5	
Strongly Disagree	O	O	O	O	O	Strongly Agree

Mobile learning should be incorporated into classes *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students should be able to easily view course materials (syllabus, notes, assignments) on their mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students should be able to download mobile applications that could help them study *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students should be able to access Educational Management Systems (e.g. Moodle) in a mobile format on their mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students should be able to take quizzes on their mobile devices *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students should be able to participate is discussion forums from their mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

It would not require a lot of effort for students to learn how to use a mobile application designed for my class *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Learning on a personal mobile device would be easy for students because they are already familiar with all of its functions *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

It would be easy for students to engage in discussions(comment) using a mobile application or website in mobile format *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Mobile learning opportunities would allow students to learn and study in places they couldn't normally *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

It would be easier for students to complete classwork and assignments if they could use their mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Mobile Devices in the Classroom

Please answer the following questions about using mobile devices in your classroom using the scale below.

1-Strongly Disagree
2-Disagree
3-Neutral
4-Agree
5-Strongly Agree

I believe students can be taught how to appropriately use mobile devices for learning *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I believe students should be able to use mobile devices as learning tools in my classroom *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I believe using mobile applications for learning in my classroom would benefit students *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I think students would be more motivated to learn if they could use mobile devices *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Students would think its fun to use an interactive mobile device in my classroom *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would like my students to be able to use mobile devices to access course content and practice skills *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would like to learn more about mobile learning, so that can incorporate it in my classroom *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would like to learn how to create mobile applications, so that I can incorporate them into my lessons *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Choose the statement the most resembles your attitude toward incorporating mobile learning in your future classroom. *

☐ I will be able to effectively incorporate mobile learning into my classroom

☐ I will be able to effectively incorporate mobile learning into my classroom with training

☐ I don't think I will be able to effectively incorporate mobile learning into my classroom

How would you like to see mobile learning incorporated into your classes?

(« Back) (Continue »)

I am confident that I can... *
check all that you think you are able to do

☐ use the Internet on a mobile device to find information relevant to my class

☐ take photos or video with a mobile device to be used in my class

☐ read and understand content on a mobile device

☐ navigate a mobile application on a mobile device

☐ participate in discussions using a mobile device

☐ NONE OF THE ABOVE

Thank you for participating in this survey. To qualify for the $50 gift card drawing, please enter your email address below. If you enter your email address, I may contact you for a short interview. If selected, the interview will take no longer than 10-15 minutes.

Please enter your email address below if you would like to be considered for the drawing (You may submit without entering your email address)

Mobile Learning Survey

Please fill out this survey to the best of your ability. The survey is divided into six sections. It should take approximately 15-20 minutes to complete the survey.
For the purpose of this survey, "mobile device" includes any handheld device capable of multiple functions, including but not limited to accessing the Internet, running applications, listening to music, etc. Examples include smartphones, iPod touch or similar devices.
Thank you for your participation.

* Required

Age *

Gender *
- Male
- Female
- No Response

School/College Affiliation *
- Agriculture
- Art & Design
- Business
- Coast and Environment
- Education
- Engineering
- Humanities & Social Sciences
- Mass Communication
- Music & Dramatic Arts
- Science

Continue »

Have you ever...

Have you ever... *
check all that apply

☐ downloaded an application that helped you learn something new?

☐ used your mobile device to look up something that you didn't know or didn't understand during class?

☐ engaged in social networking on your mobile device?

☐ wrote notes on your mobile device to remind yourself of an assignment?

☐ set an alarm or reminder on your mobile device to help you remember that an assignment was due or a test was coming up?

☐ texted a classmate during class?

☐ texted a classmate about the content of the class?

☐ texted a classmate about the teacher's ability?

☐ texted a classmate about the level of engagement in the class (i.e. I'm bored, this is cool, etc.)

☐ taken pictures or video with your mobile device that you used for an assignment?

☐ accessed an Educational Management System (e.g. Moodle) on your mobile device?

☐ read an article or assignment on your mobile device?

☐ used your mobile device as a study tool?

☐ played an educational game (e.g. Words with Friends) on your mobile device?

☐ Other: _____

Perception

Please answer the following questions using the scale below.

1- Strongly Disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly Agree

I would be more likely to participate in class if I could use my mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would spend more time on classwork if I could access materials anytime, anywhere on my mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would be more likely to participate in class activities outside of class time if I could do so through my mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would be more likely to engage in class discussions inside class if I could post my thoughts from my mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I would be more likely to ask for help if I could communicate through my mobile device *

1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

(« Back) (Continue »)

I would like to see mobile learning incorporated into my classes *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

I would like to be able to easily view course materials (syllabus, notes, assignments) on my mobile device *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

I would like to be able to download mobile applications that could help me study *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

I would like to be able to access Educational Management Systems (e.g. Moodle) in a mobile format on my mobile device *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

I would like to be able to take quizzes on my mobile device *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

I would like to be able to participate in discussion forums from my mobile device *

              1   2   3   4   5

Strongly Disagree   ○   ○   ○   ○   ○   Strongly Agree

It would not require a lot of effort to learn how to use a mobile application designed for my class *

       1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Learning on my personal mobile device would be easy because I am already familiar with all of its functions *

       1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

It is easy to engage in discussions (comment) using a mobile application or website in a mobile format *

       1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

Mobile learning opportunities would allow me to learn and study in places I couldn't normally learn or study in *

       1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

It would be easier to complete classwork and assignments if I could use my mobile device *

       1 2 3 4 5

Strongly Disagree ○ ○ ○ ○ ○ Strongly Agree

I am confident that I can... *
check all that you think you are able to do

☐ use the Internet on a mobile device to find information relevant to my class

☐ take photos or video with a mobile device to be used in my class

☐ read and understand content on a mobile device

☐ navigate a mobile application on a mobile device

☐ participate in discussions using a mobile device

☐ NONE OF THE ABOVE

Limitations

Which of the following (if any) would deter you from using a mobile device as a learning tool? *
check all that apply, fill in your own answer, or choose None of the Above

☐ I do not own a mobile device

☐ I do not own a mobile device that has access to the Internet

☐ I can not download applications (apps) on my mobile device

☐ I do not have a data plan on my phone that would enable me to access course and study materials and I would not purchase one

☐ I would have trouble learning on my mobile device because of its connection speed

☐ I would have difficulty learning on my mobile device because of its screen size

☐ I prefer only to learn in the classroom

☐ I don't think I could learn as much on my mobile device as I could using traditional methods

☐ None of the Above

☐ Other: _____

How would you like to see mobile devices (mobile learning) incorporated into your classes?

Thank you for participating in this survey. To qualify for the $50 gift card drawing, please enter your email address below. If you enter your email address, I may contact you for a short interview. If selected, the interview will take no longer than 10-15 minutes.
Please enter your email address below if you would like to be considered for the drawing (You may submit without entering your email address)

Appendix F

IRB Approval from Nova Southeastern University

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

NSU

MEMORANDUM

To: Dick Hamann

From: Ling Wang, Ph.D.
Institutional Review Board

Date: Oct. 27, 2014

Re: *The Construction and Validation of an M-Learning Framework for Online and Blended Learning Environments*

IRB Approval Number: wang10151406

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1)   CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2)   ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3)   AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

Appendix G

IRB Approval from Seminole State College

SEMINOLE STATE COLLEGE
OF FLORIDA

100 Weldon Boulevard | Sanford, FL 32773-6199 | 407 708.4722 | seminolestate.edu

October 13, 2014

Nova Southeastern University
3301 College Ave
Fort Lauderdale, FL 33314

Dear IRB Committee:

As Associate Vice President of Institutional Effectiveness at Seminole State College of Florida, I also serve as Chair of the College's Institutional Review Board (IRB). Dick Hamann requested approval from our College's IRB for his dissertation study on the construction and validation of an M-learning framework for online and blended learning environments.

I am pleased to support Dick with his proposed study, acknowledging that he satisfied all requirements to conduct research with human subjects and received approval from Seminole State College's IRB. Consistent with FERPA and IRB standards, Dick has provided assurances to safeguard the data, respect the rights of subjects, and ensure that interviewees voluntary participate.

Please contact me if you need additional information regarding Dick Hamann's study; the College and I are happy to support him with his endeavors.

Sincerely,

Dr. Mark W. Morgan
Associate Vice President, Institutional Effectiveness

Appendix H

Sample Email Sent to All Target Audiences

A message from Institutional Research

Dear Colleagues,

Seminole State College is conducting a study to develop a mobile learning (m-learning) framework as it relates to the administrative, communication and instructional needs of administrators in the adoption of mobile technologies for teaching and learning.

The researcher conducting the study is a Ph.D. candidate from the Ph.D. program in Information Systems at Nova Southeastern University (NSU). In this study, you will be asked to complete a survey and, if interested, participate in a later focus group. Your participation in the survey will take approximately 15-20 minutes, and the focus groups should take about 60 minutes.

There are minimal risks to you. All information will be handled in a strictly confidential manner by the College's Institutional Effectiveness and Research Department. However, some information will be extracted solely for the purpose of identifying demographics of the participants (i.e. age and gender).

Your participation in this survey is strictly voluntary. By clicking on the link below and completing the survey you indicate your consent to participate. You may withdraw from this survey at any time by exiting the survey. There is no penalty for refusing to participate in the survey.

You will need to use your MySeminoleState login information to complete the Mobile Learning Survey. The deadline to complete the survey is Tuesday, Nov. 11.

 Thank you,
Dick Hamann

Appendix I

Interview Protocol for Faculty, Administrators, and Students

All interviews with all focus groups will be semi-structured and probing questions will be asked. The questions listed below are designed to entice discussion and as follow-up questions.

Faculty Interview Protocol

1. Do you see students using mobile devices in your class?

2. What do you know about "mobile learning?" Have you ever explored any mobile learning activities?

3. How would you define, "mobile device?" Have you ever personally used your mobile device or smartphone for learning? How? Are you aware of the applications that may be applicable to your profession?

4. Given your discipline/subject matter, do you think mobile learning could effectively fit into your curriculum? Why or Why Not? Do you have any ideas for incorporating mobile learning in the classroom?

5. How would you feel if the college starts a mobile learning initiative? Would you be interested in participating?

6. Would you attend mobile learning trainings or watch online videos of training for support? What kind of professional development activities would be necessary in order for you to be able to incorporate mobile learning in the classroom?

7. What other recommendations would you provide in relation to incorporating mobile technologies in the classroom that have not already been covered?

Administrator Interview Protocol

1. Do you see students using mobile devices around your work area?

2. What do you know about "mobile learning?" Have you ever explored any mobile technologies activities in your work environment?

3. How would you define, "mobile device?" Have you ever personally used your mobile device or smartphone for learning or conducting college business? How? Are you aware of the applications that may be applicable to your profession?

4. Given your discipline/subject matter, do you think that the use of mobile devices could effectively fit into your area of support for students? Why or Why Not? Do you have any ideas for incorporating mobile devices into your work responsibilities to support students?

5. How would you feel if the college starts a mobile support initiative? Would you be interested in participating?

6. Would you attend mobile technology trainings or watch online videos of training for support? What kind of training would be necessary in order for you to be able to incorporate mobile learning at the college?

7. What other recommendations would you provide in relation to incorporating mobile technologies to support students that have not already been covered?

Student Interview Protocol

1. How would you define "mobile device?"

2. Where do you put your mobile device when you are in class? Do you ever use it in class? If so, for what?

3. How do you think your professors view student use of mobile devices in class? Are there are policies in place? Do any professors encourage the use of mobile devices for learning?

4. Have you used your mobile device to learn something new? How?

5. In what ways might mobile devices be able to be used as part of the classroom or for administrative functions?

6. Do you think if students were able to use their mobile devices in class that they would use them inappropriately?

7. Do you think this college has kept up with advancements in technology? What do you think could be improved?

8. What other recommendations would you provide in relation to incorporating mobile technologies in and outside of the classroom?

Appendix J

Criteria for Evaluation of the Framework

Mobile Learning Framework Validation

Recently you participated in an online *Mobile Learning Survey* and a focus group to identify the needs of students, faculty and administrators around mobile device use. The result of that survey and discussions have been utilized to develop a framework for mobile learning that could be implemented at your instituion where you attend classes or are employed.

This documents dipicts the framework as developed and to validate it as a member of the Delphi panel you are invited to provide feed back based on the following criteria:

Questions:

1) <u>Task Support</u>: Do you think that the framework as presented accurately addresses your needs for using mobile devices for instructional and non-instructional tasks? Yes/No. If no, please explain.

2) <u>Learnability</u>: If the college were to implement the framework as designed, what level of effort do you think it will require for you to adapt it or use it in your environment (i.e. classroom, administration or both)? High/Low. Please explain your answer for either choice.

3) <u>Customization</u>: Do you think that the framework can be implemented and customized to support your individual needs as a member of this institution (i.e. faculty, student or administrator)? Yes/No. If no, please explain.

4) <u>Additional input</u>: Please provide any additional input and recommendations that you may have to for improving the framework in the context of task support, learnability and customization. What suggestions do you have for improving the framework in general?

Appendix K

Open-ended Sample of Responses

Theme/Category	Students	Faculty	Administrators
Security	The mobile site should incorporate mobile security encryption when parsing data across the mobile/Wi-Fi

Developing an app for the purpose of being able to register for classes, check tuition, and more would be good--so long as its security and privacy details were handled responsibly

have web browser within the security of SAKAI to see surf from free Wi-Fi locations like a Starbucks

While learning on mobile devices would be a phenomenal boon, it is important that appropriate security technologies are used to keep user information safe and secure, and that these technologies are frequently monitored and updated to respond to new threats | None | None |
| Access | Be able to use my cell to access anything that has to do with my classes.

Being able to access email and courses through an app.

Being able to access forums easily or to | All aspects of Learning Management systems must be fully accessible via mobile devices.

Access of classroom materials outside of class isn't an | Review and access information via mobile device.

Have as much as possible available for access by those students who are technologically literate but not so that those without |

Theme/Category	Students	Faculty	Administrators
	check on classes for enrollment easily. Being able to access programs used in college to do homework, etc. By being able to have access to the book online thru a mobile site/device so that I always have it with me esp. during my commute time By being able to have classwork and access not complicated.	issue. They can already do that. if the college could incorporate a platform that was more accessible on mobile devices it would greatly open up students opportunities for working on materials outside of class Would make the class more accessible!	similar skills are penalized or left out. I'd also like to see them have the ability to access financial literacy modules so they can do them when it's most convenient for them.
Connectivity	Better, easier wireless connectivity options on campus I would like if the connect modules would open correctly on an iPad. I would like to be able to do just about anything school related from my mobile device so I don't have to rely on there being an immediate, reliable internet connection nearby Mobile classwork would be really handy but it could get complicated when mobile internet connection is either slow or unreliable A consistent & strong Wi-Fi connection on campus is essential.	I would love to incorporate technology without eliminating group activities in my classroom in order to allow students to 'connect' in person (face to face) with their peers, instead of just connecting to their devices which is all they do these days If we find a way to control or know who is connected to the class and who's not, then the idea of incorporating mobile devices is great.	Our smartclassrooms would need to have the ability to communicate to the students' mobile devices to make it truly collaborative learning.

Theme/Category	Students	Faculty	Administrators
Training	I have a smart phone and I don't know how to use many of the functions that are already on the phone so training would be especially helpful. I would imagine that most students will already have a mobile device and will already know how to use it. Those that don't would be more traditional students that prefer paper books. For these students training and device availability won't make any difference. Smart phones and the development of any other hand held devices are the wave of the future. There can never be too much training in this area training for teachers on how to effectively use mobile functionalities for the purpose of teaching distance learning and hybrid courses	Provide a faculty development course to teach faculty an effective use of mobile devices in the classroom and out of the classroom.	None
Effectiveness	I feel that if they were used to communicate and to study they would be effective, but for more advanced processes such as assignments they might prove to be too unwieldy The online class is okay, but being able to see the	None	None

Theme/Category	Students	Faculty	Administrators
	professors and the interaction would be more effective Mobile devices are utilized more and more with great effectiveness. I see the capability for increased use in academic environments		
Mobile applications	Having access to Sakai and MySeminoleState would be a great help as a student using mobile applications and platforms! A mobile application would be presented in the correct format for mobile use. I think that over-reliance on mobile applications for learning purposes ultimately detracts from time that could have spend one-on-one with a professor I would love for an mobile application to exist for both My Seminole State and Sakai, whether combined or two separate applications	None	None
Video or pictures	Video Lessons that I could watch from my mobile device Videos on class content. Ability to integrate live streaming video chat on mobile devices for	This includes: having an iOS/Android app, being able to send out SMS alerts, using cross-platform media (HTML5,MP4 video, etc.)	None

Theme/Category	Students	Faculty	Administrators
	online classes that have online sessions. i do believe that using is outside of classroom to watch video, answer questions for a class assignment could be handy to use. I would like to be able to more access to my teacher. Video conference.	class polling (to take place of clickers) both in the classroom and while using webex. more study activities - flash cards, games, et.c student created content - video - for assignments and presentations.	
Social Networks	Social Network, I think is old fashion and annoying, eventually will go totally away. complete our group assignments through social networking apps.	the majority of the students will feel tempted to switch and engage in activities related to their personal emails and social networks and not classroom activities	None
Engagement	with mobile devices professors can ask students to look up a definition or other content on the subject in order to keep students attention as well as help engage the students. I currently engage in several online classes and feel that the use of mobile devices would be beneficial. I think that colleges should utilize mobile educational games so that the students can get more engaged.	I would like to see mobile devices incorporated at the college to extend classroom learning as well as engage students in active learning. Know (in a clear and easy way) what students are engage in the class and what students have switched to a different site or page. It would be even better if the entire class could see who is	To promote student engagement, as well as a reminder app of important dates or deadlines. I would like mobile devices to be used in the classroom to increase student participation and engagement while in the classroom.

Theme/Category	Students	Faculty	Administrators
	These apps should be designed in a way that makes the student MORE engaged with their school	engaged and who is not.	
Content	Simplest applications where you can insert content of any class Use mobile device search engine to find content for a class All content should be able to be utilized on multiple platforms I am also concerned the content will be decreased or removed to make them more mobile friendly. it is important to prioritize making all content available from anywhere	more study activities - flash cards, games, et.c student created content - video - for assignments and presentations.	None
Policies	college policy about use of mobile devices might change in order that students may be able to use their mobile devices	None	None
Procedures	None	None	None
Assessment	students would be more likely to complete online learning assignments or assessments as assigned by the instructor WITHOUT having to come to campus to use a computer.	None	None
Time or schedule	the mobile learning has made it possible for me to achieve much greater	None	User friendly and fast response times to allow for ease of reading and

Theme/Category	Students	Faculty	Administrators
	success in class and to manager my time better Better/quicker response time from teachers, able to take quizzes, and read PowerPoints from phone. I'm always on the go and don't really have much time to sit and reread things on my computer. It would be a lot easier to be able to use my phone as I always have it with me.		responding to emails and accessing people soft appications.
Cost	The key here is cost. I know that in my situation, I have a very limited about of data on my satellite internet at home and on my phone, so I am limited in what I can access; to reduce or eliminate data costs for students with a valid college ID could greatly benefit students would that raise tuition costs?	None	None

Appendix L

Focus Group Consent Form

SEMINOLE STATE COLLEGE
OF FLORIDA

100 Weldon Boulevard . Sanford, FL 32773-6199. 407-708-2156

Consent Form for Participation in the Research Study Entitled: *The Construction and Validation of an M-Learning Framework for Online and Blended Learning Environments*

Funding Source: None.

IRB protocol #:

Principal investigator(s)	Co-investigator(s)
Dick Hamann, MBA	Dr. Marti Snyder
809 Vista Cove	3301 College Avenue, Fort Lauderdale- Chuluota, FL
32766	Davie, Florida 33314-7796
407-448-2641	954-262-2074

For questions/concerns about your research rights, contact:
Human Research Oversight Board (Institutional Review Board or IRB)
Nova Southeastern University
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

Site Information:
Seminole State College of Florida
100 Weldon Blvd, Sanford, FL 32773-6199
407-708-4722

Using design and development research methods, the researcher of this study will construct and validate internally a framework by seeking input from multiple individuals who meet specific criteria. The purpose of this study is to develop and validate an m-learning framework capturing the administrative, communication, and instructional elements that must be considered when integrating m-learning technologies to support adult community college students.

You are being asked to participate because you are a faculty member who teaches at least 25% of a class online; or a student enrolled in the same type of class; or an administrator who provides direct support to students outside of the classroom. In addition, after completing the survey you have also expressed interest in participating in a *focus group*.

The focus group will include at least three members of each of the selected groups who participated in the survey (students, faculty and administrators). If you agree to participate in the focus group, the researcher will coordinate a meeting with all those participants who expressed interest in the focus group. At the meeting, the researcher will present you with a list of questions for open discussion related to your personal views and opinions about using mobile devices to enhance the educational process. No specific restrictions will be in place for the discussions. At the end of the focus group session, all participants will have the opportunity to submit any additional comments that they feel should be included, but not

SEMINOLE STATE COLLEGE
OF FLORIDA

discussed. The focus group sessions <u>will not</u> be video or voice recorded. The focus group session should last approximately 60 minutes.

There is minimal risk to you for participating, and you may elect to remove yourself from the focus group at any time without any danger of retaliation from the researcher or the college.

There are no direct benefits to you for taking part of this research study. However, the college may elect to use the final mobile learning framework as the basis for implementing support of instructional and non-instructional activities using mobile devices.

There are no costs to you or payments made for participating in this study.

Data collection will be strictly conducted in confidence by the college's institutional research office. Any faculty who offer extra credit to the students for completing the surveys will communicate directly with this office to obtain the student information and to award the credits. The researcher will not have access to any identifiable personal data. After the completion of the study, all data collected will be kept for a minimum of 36 months as required by NSU. Records will be kept by the researcher and the Institutional Research Department in locked cabinets or encrypted and password protected electronic devices. All information obtained in this study is strictly confidential unless disclosure is required by law. However, NSU IRB or the dissertation chair/thesis adviser to the researcher may review research records as needed.

You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive. If you choose to withdraw, any information collected about you **before** the date you leave the study will be kept in the research records for 36 months from the conclusion of the study but you may request that it not be used.

If significant new information relating to the study becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by the investigators.

SEMINOLE STATE COLLEGE
OF FLORIDA

100 Weldon Boulevard . Sanford, FL 32773-6199. 407-708-2156

Voluntary Consent by Participant:
By signing below, you indicate that

- this study has been explained to you
- you have read this document or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researchers any study related questions in the future or contact them in the event of a research-related injury
- you have been told that you may ask Institutional Review Board (IRB) personnel questions about your study rights
- you are entitled to a copy of this form after you have read and signed it
- you voluntarily agree to participate in the study entitled: *The Construction and Validation of an M-Learning Framework for Online and Blended Learning Environments*

Participant's Signature: _____ Date: _____

Participant's Name: _____ Date: _____

Signature of Person Obtaining Consent: _____

Date: _____

Appendix M

Email Sent to the Delphi Panel

Dick T Hamann

From:	Dick T Hamann
Sent:	Sunday, February 15, 2015 4:21 PM
To:	Dick T Hamann
Subject:	Updated Framework after review
Attachments:	Feedback from review.pdf; M-learning Framework-Final.pdf

Dear Delphi Panel,

Thank you for you feedback and for taking the time to review the Mobile Learning Framework.

There were very few changes needed, but I am required to send it back to you for your review once more.

I have attached two documents:
1) Summary of changes (Feedback from review file)
2) Final M-learning Framework

All you have to do is reply to this note with additional input if you feel is needed, or just simply reply with **"Final framework complete as presented"**

Dick Hamann
V.P. Information Technology & Resources/ CIO
Interim V.P. Student Affairs
Seminole State College of Florida
407-708-2156
hamannd@seminolestate.edu

References

Alexander, B. (2004, September/October). Going nomadic: Mobile learning in higher education. *EDUCAUSE Review, 39*(5), 28–35.

Ally, M. (Ed.). (2009). *Mobile learning: Transforming the delivery of education and training.* Athabasca University Press.

Allen, I. E., & Seaman, J. (2013, January). *Changing course: Ten years of tracking online education in the United States*. Babson Park, MA: Babson Survey Research Group and Quanhog Research Group.

Bonvillian, W. B., & Singer, S. R. (2013). The online challenge to higher education. *Issues in Science and Technology*, *29*(4), 23-30.

Boston, W., Ice, P., & Gibson, A. (2011). Comprehensive assessment of student retention in online learning environments. *Online Journal of Distance Learning Administration, 14*(4), 1-15.

Carr, S. (2000, February 11). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education, 46*(23), p. A39–A 41.

Center for Community College Student Engagement. (2013). *A Matter of Degrees: Engaging Practices, Engaging Students (High-Impact Practices for Community College Student Engagement).* Austin, TX: The University of Texas at Austin, Community College Leadership Program.

Cochrane, T., & Bateman, R. (2013). A mobile Web 2.0 framework: reconceptualising teaching and learning. In G. Trentin, & M. Repetto , *Using network and mobile technology to bridge formal and informal learning* (pp. 57-86). New Delhi, India: Woodhead Publishing.

Coyner, S. C., & McCann, P. L. (2004). Advantages and challenges of teaching in an electronic environment: The accommodate model. *International Journal of Instructional Media, 31*(3), 223–228.

Corbeil, J.E. & Corbeil, M.E. (2011). Are we ready for mobile learning now? 2007 mobile learning predictions revisited. *Issues in Information Systems, XII*(2), 142---152.

Creswell, J.W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: Sage.

Crompton, H. (2013). A historical overview of m-learning: Toward learner-centered education. In Berge, Z.L. & Muilenburg, L.Y. (Eds.), *Handbook of mobile learning* (pp. 3-13). New York, NY: Routledge.

Dalkey, N. C. (1972). The Delphi method: An experimental study of group opinion. In N. C. Dalkey, D. L. Rourke, R. Lewis, & D. Snyder (Eds.). *Studies in the quality of life: Delphi and decision-making* (pp. 13-54). Lexington, MA: Lexington Books.

Danaher, P., Gururajan, R., & Hafeez-Baig, A. (2009). Transforming the practice of mobile learning: Promoting pedagogical innovation through educational principles and strategies that work. In R. Hokyoung & D. Parsons (Eds.), *Innovative mobile learning: Techniques and technologies* (pp. 21–46). Hershey, PA: Information Science Reference (IGI Global).

Davis, E., Palincsar, A., Arias, A., Bismack, A., Marulis, L., & Iwashyna, S. (2014). Designing educative curriculum materials: A theoretically and empirically driven process. *Harvard Educational Review, 84*(1), 24-136.

Dennis, A., Wixom, B. H., & Roth, R. M. (2008). *Systems analysis and design*. John Wiley & Sons.

Doneva, R., Nikolaj, K., & Totkov, G. Towards mobile university campuses. International Conference on Computer Systems and Technologies (CompSysTech'2006).

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

Fardoun, H. M., Villanueva, P. G., Garrido, J. E., Rivera, G. S., & López, S. R. (2010). Instructional m-learning system design based on learners: MPrince Tool. In *2010 Fifth International Multi-conference on Computing in Global Information Technology* (pp. 220–225). Valencia, Spain: Institute of Electrical and Electronics Engineers (IEEE).

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *Internet and Higher Education, 19*, 18-26.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th ed.). Boston, MA: Allyn & Bacon.

Greenfield, S. (2011, February). Podcasting: A new tool for student retention? *Journal of Nursing Education, 50*(2), 112–114. doi: 10.3928/01484834-20101230-06

Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2004). *Survey Methodology*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hachey, A. C., Wladis, C. W., & Conway, K. M. (2012). Is the second time the charm? Investigating trends in online re-enrollment, retention and success. *The Journal of Educators Online, 9*(1), 1-24.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey

technique. *Journal of Advanced Nursing, 32*(4), 1008-1015.

Havice, P. A., Davis, T. T., Foxx, K. W., & Havice, W. L. (2010). The impact of rich media presentations on a distributed learning environment: Engagement and satisfaction of undergraduate students. *The Quaterly Review of Distance Education,11*(1), 53-58.

Heyman, E. (2010). Overcoming student retention issues in higher education online programs. *Online Journal of Distance Learning Administration*, *13*(4).

Hidden Curriculum (2014, August 26). In S. Abbott (Ed.), *The Glossary of Education Reform*. Retrieved from http://edglossary.org/hidden-curriculum

Hsu, C.-C., & Sandford, B. (2007). The Delphi technique: Making sense of concensus. *Practical Assessment, Research & Evaluation, 12*(10), 1-8.

Hsu, T.-C., Lee-Hsieh, J., Turton, M. A., & Cheng, S.-F. (2014). Using ADDIE model to develop online continuing education courses on caring for nurses in Taiwan. *Journal of Continuing Education in Nursing, 45*(3), 124-131.

International Telecommunication Union (ITU). (2010, February 15). *ITU sees 5 billion mobile subscriptions globally in 2010*. Retrieved from http://www.itu.int/ newsroom/press_releases/2010/06.html

Jeng, Y.-L., Wu, T.-T., Huang, Y.-M., Tan, Q., & Yang, S. J. H. (2010). The add-on impact of mobile applications in learning strategies: A review study. *Educational Technology & Society*, *13*(3), 3–11.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012, February 3). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology, 20*(14406), 1–17. doi: 10.3402/rlt.v20i0.14406

Kukulsa-Hulme, A., Evans, D., & Traxler, J. (2005, May). *Landscape study in wireless and mobile learning in the post-16 sector.* Bristol, United Kingdom: Joint Information Services Committee (JISC).

Krueger, R., & Casey, M. (2000). *Focus groups: A practical guide for appplied research.* Beverly Hills, CA: Sage Publications.

Kruger, M., & Bester, R. (2014). Mobile learning: A kaleidoscope. *Electronic Journal of e-Learning*, *12*(1).

Lynch, D. J. (2010, September). Application of online discussion and cooperative learning strategies to online and blended college courses. *College Student Journal, 44*(3), 777–784.

Mahat, J., Ayub, A.F.M., & Wong, S.L. (2012). An assessment of students' mobile self--- efficacy, readiness and personal innovativeness towards mobile learning in higher education in Malaysia. *Procedia -- Social and Behavioral Sciences,64*(9), 284---290.

Means, B., Bakia, M. & Murphy, R. (2014). *Learning online: What research tells us about whether, when, and how*. New York, NY: Routledge.

Nielsen, J. (1994). Heuristics evaluation. In J. Nielsen & R. L. Mack (Eds.), *Usability inspection methods* (pp. 25–62). New York, NY: Wiley.

Nora, A. & Snyder, B. (2011). Technology and higher education: The impact of e-learning approaches on student academic achievement, perceptions and persistence. *Journal of College Student Retention. 10*(1). 3-19.

McCraken, H. (2008–2009). Best practices in supporting persistence of distance education students through integrated Web-based systems. *Journal of College Student Retention: Research, Theory & Practice, 10*(1), 65–91.

MobiThinking. (2013). *Global marketing statistics 2013 home: All the latest stats on mobile Web, apps, marketing, advertising, subscribers, and trends.* Retrieved from http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats

Morrison, G.R., Ross, S.M., Kalman, H. & Kemp, J.E. (2011). *Designing effective instruction* (6th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Park, C. L., Boman, J., Care, W. D., Edwards, M., & Perry, B. (2008–2009). Persistance and attrition: What is being measured? *Journal of College Student Retention: Research, Theory & Practice, 10*(2), 223–233.

Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *International Review of Research in Open and Distance Learning, 12*(2), 78-102.

Patton, M.Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications.

Pegrum, M., Oakley, G., & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology, 29*(1), 66-81.

Pittenger, A., & Doering, A. (2010, November). Influence of motivational design on completion rates in online self-study pharmacy-content courses. *Distance Education*, *31*(3), 275–293.

Pollara, P. (2011). *Mobile learning in higher education: A glimpse and a comparison of student and faculty readiness, attitudes and perception.* (Doctoral dissertation). Retrieved from http://etd.lsu.edu/docs/available/etd-11042011-105812/

Reeves, T.C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 52–66). London: Routledge.

Reeves, T.C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 96–115.

Richey, R. C. (1998). The pursuit of useable knowledge in instructional technology. *Technology Research and Development, 46*(4), 7–22.

Richey, R. C., & Klein, J. D. (2007). *Design and development research.* Mahwah, NJ: Lawrence Earbaum Associates, Inc.

Rollet, H., Lux, M., Strohmaier, M., Dosinger, G., & Tochtermann, K. (2007). The Web 2.0 way of learning with technologies. *International Journal of Learning Technology, 3*(1), 87-110.

Rovai, A. P. (2003, January–March). In search of higher persistence rates in distance education online programs. *The Internet and Higher Education, 6*(1), 1–16.

Rowland, G. (1993). Designing and instructional design. *Educational Technology Research & Development, 41*(1), 79–91.

Samak, M., & Impagliazzo, J. (2013). mLearn:Designing a Platform for Mobile Learning. In *Outlooks and Opportunities in Blended and Distance Learning* (pp. 108-114). IGI Global.New England, Australia.

Seminole State College, Intitutional Effectiveness and Research. (2014, July). *Instituional Research.* Retrieved July 2014, from Seminole State College: http://www.seminolestate.edu/media/ir/FastFactsJuly2014.pdf

Stevenson, T. (2013). Online student persistence: What matters is outside the classroom. *Journal of Applied Learning Technology, 3*(1), 21-25.

Sharples, M., Taylor, J., & Vavoula, G. (2007) A Theory of Learning for the Mobile Age. In R. Andrews and C. Haythornthwaite (Eds.). *The sage handbook of elearning research.* London: Sage, pp. 221-47.

Taleb, Z. & Sohrab, A. (2012). Learning on the move: the use of mobile technology to support learning for university students. *Procedia - Social and Behavioral Sciences,69*, 1102-1109.

Teddlie, C., & Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. *Research in the Schools*, *13*(1), 12-28.

Tello, S. F. (2007, July–September). An analysis of student persistence in online education. *International Journal of Information and Communication Technology Education, 3*(3), 47–62.

Terrell, S., Snyder, M., & Dringus, L. P. (2012). A grounded theory of connectivity and persistence in a limited residency doctoral program. *The Qualitative Report, 17*, 1-14.

Vavoula, G., & Sharples, M. (2009). Meeting the challenges in evaluating mobile learning: A 3-level evaluation framework. *International Journal of Mobile and Blended Learning, 1*(2), 54–75.

Vesisenaho, M., Valtonen, T., Kukkonen, J., Havu-Nuutinen, S., Hartikainen, A., & Karkkainen, S. (2010, December). Blended learning with everyday technologies to activate students' collaborative learning. *Science Education International, 21*(4), 272–283.

Wagner, E. D. (2008, November). Realizing the promises of mobile learning. *Journal of Computing in Higher Education, 20*(2), 4–14.

Wains, S. I., & Mahmood, W. (2008). Integrating m-learning with e-learning. In *Proceedings of the 9th ACM SIGITE Conference on Information Technology Education* (pp. 31–37). Cincinnati, OH: ACM Digital Library.