2015

The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments

Algernon B. Corbett
Nova Southeastern University, acorbett@nova.edu

The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments

by

Algernon B. Corbett

A dissertation submitted in partial fulfillment of the requirements
for the Degree of Doctor of Philosophy
in
Computing Technology in Education

College of Engineering and Computing
Nova Southeastern University

2016

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

_____ _____

Gertrude W. Abramson, Ed.D. Date
Chairperson of Dissertation Committee

_____ _____

Antonio Rincon, Ph.D. Date
Dissertation Committee Member

_____ _____

Ling Wang, Ph.D. Date
Dissertation Committee Member

Approved:

_____ _____

Yong X. Tao, Ph.D., P.E., FASME Date
Dean, College of Engineering and Computing

College of Engineering and Computing
Nova Southeastern University

2016

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

The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments

by
Algernon B. Corbett
09/15/2016

As mobile technologies have increasingly become a part of personal and work environments, mobile learning is emerging as a viable alternative for training and education needs. Faced with the need for innovative and cost-efficient ways for training government employees, agencies and departments are considering the use of mobile learning. The availability of a wide range of mobile technology provides many options. Other than the Department of Defense, little is known about implementing mobile learning in United States government cabinet level agencies and departments.

A concurrent, mixed methods case study was used to examine how organizations decide to use, implement and evaluate mobile learning efforts. The framework and context were established through a thorough review of recent, related research literature. A purposive sampling strategy was used with the goal of targeting participants that have the greatest potential of using or considering the use of mobile learning.

Three research questions guided the study and concentrated on the influences on the decision to implement mobile learning, the approaches organizations take and the methods used to evaluate implementations. A self-administered online questionnaire, using both structured and semi-structured questions and a review of publicly available documents were used to build a picture of the evidence that described the current state of mobile learning in cabinet-level agencies and departments. Quantitative and qualitative data were collected, integrated, interpreted and compared.

Connections and relationships were made between mobile technology use, mobile learning environments, mobile learning content, educators and trainers, mobile learners and mobile learning evaluations. The results revealed that cabinet-level agencies and departments have begun to make use of mobile technology to support the delivery of business service. To a lesser extent, perceptions are forming, and the role of mobile learning continues being defined, as organizations are cautiously adopting its use. Policies and guidelines are in the early stages of development. The results contribute to the growing body of work on the use of mobile learning.

Acknowledgments

The dissertation can never be exclusively about the individual conducting a study because there are many people that play a role in the journey. There were numbers of people that participated in the completion my dissertation and although I do not name each one individually, I sincerely thank each of you for your contributions.

This dissertation brings to closure a journey that I could never have completed without the belief, the inspiration, and the enduring love of my Mother Flossie Corbett. Her unwavering support and guidance fostered an environment that enabled my siblings and me to believe and pursue dreams that would make meaningful contributions to the world. I dedicate this report to my mother who was not here to see this journey, but whom I know watched approvingly from her home in heaven.

I owe a special thanks to my wife Lisa who, in addition to being my life partner and best friend, always let me know that she understood just how important this journey was. She was always there patiently providing the needed support, especially during times when the journey seemed the most challenging, frequently reviewing and providing clarity to my writings and offering her perspectives when topics did not seem to make sense.

I extend my gratitude to the experts who volunteered to review and validate my online questionnaire Dr. Mark C. Harris, Air Force Operational Test and Evaluation Center; Dr. Mark Givens, Naval Criminal Investigative Services; Dr. Dave Mylott, Applied Materials; and Dr. Antonio Rincon, General Dynamics, C4 Systems. I also thank the experts in the field of education and training from the Advanced Distributed Learning initiative Jason Haag and Peter Berking as well as members of cabinet level agencies and departments that include Randy Bergquist, Jody Hudson and Craig West whose reviews of the online questionnaire for usability led to improvements.

I thank Randy Bergquist, Chair of the Chief Learning Officers' Council and the members of the CLO Council for their willingness to participate in and support my dissertation. The success of my research effort was essentially the result of their assistance in encouraging and allowing study participants to provide data necessary for this dissertation.

Finally, I acknowledge and thank my Dissertation Chair, Dr. Gertrude Abramson, and my Dissertation Committee, Dr. Antonio Rincon and Dr. Ling Wang. I am, and will be eternally grateful to you Dr. Abramson for believing in me. Without your unwavering guidance, dedication and support I could not have gotten to this point. You not only agreed to take me under your wing after a change in my Committee Chair, you continued to show patience with me and offer encouragement throughout the process. You continually challenged me as I developed the skills required of a doctoral candidate. I also thank the members of my Dissertation Committee Dr. Antonio Rincon and Dr. Ling Wang. I am grateful to both of you for your willingness to support me on my journey, your words of encouragement that kept me inspired, and your critical appraisals that made my work so much better.

Table of Contents

List of Tables

Tables

List of Figures

Figures

Chapter 1

Introduction

Background

The past decade has seen mobile learning emerge as an area of interest that is predicted to have a major influence in education and training because the number of mobile devices are expected to become greater than the number of humans on earth (Martin & Ertzberger, 2013; Morrell & Lane, K., 2014; West & Vosloo, 2013). The abundant nature of mobile technologies will feed the interest in implementing the technologies for mobile learning purposes (Denham, Quick, & Atkinson, 2012; Iqbal & Qureshi, 2012). The use of smartphones, Personal Digital Assistants (PDAs), Podcasting, and tablets for learning purposes are quite extensive (Chang, Littman-Quinn Ketshogileng, Chandra, Rijken, Ghose, Kyer, Seymour & Kovarik, 2012; MacDonald, Foster, Divina, & Donnelly, 2011; Sung & Mayer, 2012). Growth in mobile technology is expected to continue, influenced by a collaborative effort between governments and commercial sectors (Adkins, 2011).

The purpose of the concurrent triangulation mixed methods case study was to examine approaches used by the United States government cabinet-level organizations in mobile learning implementation efforts by analyzing and converging quantitative and qualitative data. Cabinet-level agencies have become increasingly interested in using mobile learning to extend the delivery of training and development resources to their government workforce (Haag, 2011). The organizations studied are located within the executive branch of the United States government and include the Departments of State,

Justice (DOJ), Commerce (DOC), Health and Human Services (HHS), Nuclear Regulatory Commission (NRC), Transportation (DOT), Energy (DOE), and Veteran Affairs (VA). The identified organizations have shown an interest in or are currently piloting mobile learning efforts. Furthermore, they represent the typical sizes and structures of federal cabinet-level agencies or departments, and their actions are expected to influence how the community pursues future implementation efforts. Additionally, the Office of Personnel Management (OPM), which is an independent agency, was included because of its leadership role in formulating policy across federal agencies. The OPM is the federal agency with overall lead responsibility for overseeing policy relating to the training and development of federal employees. Federal agencies are encouraged to, and do collaborate with OPM to test and implement new approaches to learning and development.

The study investigated the approaches used by OPM and other cabinet-level agencies and departments in deciding to implement mobile learning. The effort examined organizations decisions and choices, organizations efforts in implementing mobile learning initiatives, and organizations techniques for evaluating mobile learning. The aim of the study was to increase the understanding of challenges encountered by cabinet-level agencies and departments in pursuing the use of mobile learning and in this way contribute to the research on mobile learning implementation.

The combination of a self-administered online questionnaire and publicly available documents were used to examine the research questions pertaining to the approaches used by cabinet-level government agencies in the design, development, implementation and evaluation of mobile learning. An analysis of the online

questionnaire and archived document results was performed (Koszalka & Ntloedibe-Kuswani, 2010; Terras & Ramsay, 2012; Traxler, 2010). In addition, process instruments used in the evaluation of mobile learning were examined.

Problem Statement

Although mobile learning is a recent technological advancement, it is considered to be a viable learning approach (Iqbal & Qureshi, 2012; Mileva, 2011; Saleem, 2011; Traxler, 2011). However, the increased availability of mobile technology does not guarantee the success of mobile learning implementation efforts (Attalla, El-Sherbiny, Mokbel, El-Moursy, & Abdel-Wahab, 2012; Kukulska-Hulme, Pettit, Bradley, Carvalho, Herrington, Kennedy, & Walker, 2011; Liu, Han, & Li, 2010; Lin, Ma, & Lin, 2011; Straub, 2009). Mobile learning is considered to be an effective means for augmenting existing learning efforts (Archibald, Brown, Haag, & Hahn, 2011; Berking, Haag, Archibald, & Birtwhistle, 2012). However, because the field is relatively new, there is a need for research on the approach for implementing mobile learning to accomplish training in government organizations (Haag, 2011).

Conde, García-Peñalvo, Alier, and Piguillem (2013) suggested that the attempts by organizations to use technology for learning have failed to achieve the expected level of success. They believe this is because these organizations (a) have resisted the change, (b) insisted on the use of technology in areas for which it is inappropriate, and (c) failed to properly consider the knowledge and skills required for students and teachers. Moreover, the failure to make adjustments for the connection between learning contexts and the designation of technologies for organization use with little if any consideration for students or teachers, have contributed to the lack of success. In a review of successful

and unsuccessful mobile learning project implementations, Cochrane (2012) observed that the first attempt at implementing mobile learning efforts frequently fails. He observed that a contributing cause to the lack of success or failure might be that mobile learning projects that fail tend to not be the subject of research reports, even though the publication of these studies could be of value in enlightening new initiatives.

Indeed, a number of decisions must be made before organizations can effectively leverage mobile technology for learning. For example, organizations need to decide if and how mobile learning will fit the overall training or learning strategy. Sallas, Lane, Mathews, Watkins, and Wiley-Patton (2006) found the successful implementation of technology requires that an assessment be conducted to determine its viability. In particular, decisions must be made on what is considered to be mobile learning, which approach is best for implementation, and how mobile learning initiatives are measured to know if they are achieving the intended outcomes (Ozdamli & Cavus, 2011; Passey, 2012; Pollara, & Broussard, 2011; Saleem, 2011).

If mobile learning is to be effective it will need to rely heavily on sound instructional design methodology (Glazatov, 2012; Matias & Wolf, 2013). The Analysis, Design, Development, Implementation and Evaluation (ADDIE) model has a long and proven record in instructional design (Allen, 2006; Chao, 2012). However, instructional design strategies other than ADDIE might have been used (Berking et al., 2012; Koszalka & Ntloedibe-Kuswani, 2010). The problem identified for study is how and in what way do the approaches that organizations choose for implementing mobile learning effect the program outcome (Passey, 2012).

Goal

The goal of the study was to explore and document the processes that cabinet-level government organizations used to choose, implement and evaluate mobile learning initiatives. A concurrent triangulation mixed methods case study approach was followed in the investigation (Creswell, 2009; Creswell & Plano-Clark, 2011; Onwuegbuzie & Leech, 2006). The case study has been found flexible and suited to investigate and explain present day events such as mobile learning (Santos & Ali, 2012; Wingkvist & Ericsson, 2011). The study focused on mobile learning initiatives in cabinet-level organizations and examined the decisions to use mobile learning, approaches used for implementation, and ~~the~~ methods used for evaluation.

Research Questions

The following research questions guided the investigation:

1. What are the influences that led to the decision to implement mobile learning?
2. What are the approaches taken in implementing mobile learning?
3. What are the methods used to evaluate mobile learning implementation efforts?

Assumptions, Limitations, and Delimitations

Investigating the use of mobile learning remains a challenge due in part to its recent emergence and the limited understanding of the linkages between learners, the technology, and the contexts in which learning takes place and is supported (Pandey & Singh, 2015). The use of an online questionnaire to investigate a population that is a protected class requires recognition that the study will have assumptions, limitations, and delimitations.

There is no single approach prescribed for conducting mixed method case study research. Without using proven strategies for combining quantitative and qualitative methods, mixed methods studies can be difficult to carry out. Before beginning, it was important to have a plan and strategy for how to gain access to study participants, how to address ethical issues and how to ensure the quality of data collection procedures (Teddlie & Tashakkori, 2009). The investigation used a self-administered online questionnaire to conduct a mixed methods concurrent triangulation case study that examined mobile learning use in government cabinet level agencies and departments.

Assumptions

Because the study used a self-administered online questionnaire which can be an effective and timely means of gathering data from a target population, but creates the potential for nonresponse error (Wingkvist & Ericsson, 2011). One assumption was that publishing the online questionnaire through an intermediary would result in a sample size sufficient to conduct a valid mixed methods case study. A second assumption was that there would be enough implementation efforts and the associated documentation to serve as cases to allow for a meaningful review. A third assumption was that agencies and departments participants would provide adequate levels of data from which to make interpretations and draw conclusions.

Limitations

Perhaps the chief limitation of the study was the lack of direct access to study participants. Research requiring access to some vulnerable populations such workers employed by government cabinet level agencies and departments can be limited (Lavrakas, 2008). Because the investigation pursued mobile learning efforts within a real

world context, the study was limited by the amount of participant access and control that might have influenced data collection efforts (Yin, 2009). Moreover, some organizations might not have been inclined to share information (Darke, Shanks & Broadbent, 1998). Another limitation was that members of the target population might choose not to participate or complete questionnaires once starting them, effectively reducing the sample size and creating a threat to validity (Fan & Yan, 2010; Lavrakas, 2008; Teddlie & Tashakkori, 2009; Tashakkori & Teddlie, 2010).

The study initiated and sustained participant communications through an intermediary to overcome the lack of direct access and improve data collection. Anticipating that response rates might be less than required for a valid study pre-notification, initial launch, and reminder notifications were sent via, an intermediary, who encouraged participants to log in and complete the online questionnaire (Fan & Yang, 2010). The strategy for participant contact notifications resulted in favorable response and completion rates for the survey research method. The strategy was especially favorable because of the use of an online survey (Fowler, 2002; Nulty, 2008).

Delimitations

Not having a representative sample of the population was a delimiting factor given purposively selecting participants. The use of a purposive sampling strategy provided the best access to study participants and the potential for including organizations with some degree of mobile learning experiences. However, it resulted in participants not being representative of the target population as a whole, and the results of the study may not be generalizable (Creswell, 2009; Fielding, 2012; Vogt, Gardner & Haeffele 2012).

Definition of Terms

Advanced Distributed Learning (ADL) - ADL is a component of the United States Department of Defense (DoD) that collaborates with government organizations and explores the use of learning technology for the purpose of innovating education and training activities (Fletcher, Tobias, & Wisher, 2007; Regan, Twitchell, Archibald, & Marvin, 2012).

Bring Your Own Device (BYOD) - An organizational mobile technology use strategy in which employees are allowed to use personally procured mobile devices for business activities (Ghosh, Gajar, & Rai, 2013).

Choose Your Own Device (CYOD) - An organizational mobile technology use strategy in which a single device or a range of devices are provided for employees to choose from, with full enterprise support and device control, and flexibility in the users ability to make limited software installations (Ghosh et al., 2013).

Concurrent Triangulation Mixed Methods Research - A research design for collecting and analyzing quantitative and qualitative data at the same time, but separately and merging data at the point of interpretation (Creswell & Plano-Clark, 2011).

Context - The setting or environment in which the programs and policies will be evaluated, including the needs of the learners, the learning environment, and the needed support (Gómez, & Fabregat, 2012; Greene, 2005).

Dedoose – A computer software application use for mixed methods data management and analysis (Tashakkori & Teddlie, 2010).

Design Framework - A means of describing and organizing a plan for conducting a research study, including relevant research questions and specific activities to be carried out in all of the phases (Tashakkori & Teddlie, 2010).

Elearning - The use of applications, programs, and websites to make learning opportunities available to individuals (Moore, Dickson-Deane, & Galyen, 2011; Schultz & Correia, 2015).

Framework - A description of the conventions and configurations of the plan that is developed to explore relevant research questions, with the intention of examining concepts and the relationships between them (Doorewaard, 2010).

Here's Your Own Device (HYOD) - A mobile technology use strategy in which an organization provides a mobile device, as well as support, and exercises complete control over the device and how it is used (Ghosh et al., 2013).

Mixed Methods Research - the collection and analysis of both qualitative and quantitative data, and the use of a unique design approach for understanding or corroborating data (Creswell, 2013).

Mobile App - A small software program that can be downloaded to a mobile device that allows users to access a wide variety of content and tools (Scolari, Aguado, & Feij, 2012).

Mobile Devices - A small hand-held multi-functional computing technology users can always have in their possession and use for interacting with other users and mobile systems (Woodill, 2011).

Mobile Learning - Using mobile technology to expand and support acquiring, reinforcing or applying concepts and skills for mobile learners at any place and time, throughout and across contexts (Berking et al., 2012).

Mobile Learning Technology - The use of wireless devices such as laptops, ipods, smartphones, e-readers, tablet personal computers, phablets, personal digital assistants, universal serial buss drives, to provide anytime anywhere learning opportunities (Martin & Ertzberger, 2013).

Mobile Learning Training Implementation Framework - A design and research-based approach used to examine the intersection of learning activities and theoretical designs as relates to mobile technology (Berking, Birtwhistle, Gallagher, & Haag, 2013).

Mobile Technology - Portable wireless devices that an individual can carry all the time such as cellphones, pagers, personal digital assistants, smartphones or tablets (El-Sofany, El-Seoud, Al-Turki, El-Howimel, & Al-Sadoon, 2013).

Own Your Own Device (OYOD) - A mobile technology use strategy in which individuals are allowed to bring any device that they own on the job, and use it as they choose for personal and work activities with the organization providing, no support or governance (Ghosh et al., 2013).

Performance Support – The on demand availability of support that might be needed to plan or guide the performance of a task, when and where it is needed, and that can be either before or during task performance (McKee Allen, & Tamez, 2014).

Phablets - A mobile device with features common to both smartphones and tablets, a typical screen size between 5.3 and 6.9 inches and enhanced operational characteristics (Chi & Lai, 2015).

Smartphone - A mobile telephone with computing capability that enables wireless accesses to the internet and integrates the use of camera, satellite other device centric operations (Chi & Lai, 2015).

Tablet - A feature rich portable, touch screen computing device, with a screen size smaller than a laptop computer but larger than a smartphone with functioning capabilities such as internet access, camera operation and satellite use (Chi & Lai, 2015).

Triangulation - Integrating quantitative or qualitative data, usually after the analysis stage in an interpretive effort to compare and contrast data for better understanding and for assessing data quality (Creswell, 2014).

List of Acronyms

ADDIE - Analysis Design Development Implementation and Evaluation

ADL - Advanced Distributed Learning

APP - Application

BYOB - Bring Your Own Device

CDC - Centers for Disease Control and Prevention

CFIR - Consolidated Framework for Implementation Research

CLO - Chief Learning Officer

CLOC - Chief Learning Officers Council

CYOD - Choose Your Own Device

DM - Data Management

DOC - Department of Commerce

DOD - United States Department of Defense

DOE - Department of Energy

DOJ - Department of Justice

DOT - Department of Transportation

FDA - Food and Drug Administration

GSA - General Services Administration

HHS - Health and Human Services

HYOD - Here's Your Own Device

IAM - Information and Access Management

ILDF - Integrated Learning Design Framework

IRB - Institution Review Board

LMS - Learning Management System

MAM - Mobile Application Management

MDM - Mobile Device Management

MoTIF - Mobile Training Implementation Framework

NRC – Nuclear Regulatory Commission

NTER - National Technical and Education Resource

OPM - Office of Personnel Management

OYOD - Own Your Own Device

PE - Prolonged Exposure

PTSD - Post Traumatic Stress Disorder

SPSS - Statistical Package for the Social Sciences

TRADOC - United States Army Training and Doctrine Command

VA - Veteran Affairs

QR - Quick Response

UNESCO - United Nations Organization for Education, Science and Culture

Summary

Chapter One introduced the study, established the context, the problem under examination, the goal, and research questions. In addition, the chapter included definitions and acronyms for important terms and phrases. Chapter Two presents a review of the literature considered relevant to the current study. The chapter also covers the current state of mobile learning and captures factors that impact its use. Chapter Three presents the research methodology chosen for the study and specifies the research design. The chapter describes steps taken to address the research questions. This includes the the data collection and the sampling strategy, instrument development and validation, analysis, the manner that the results are presented, and a summary of results. Chapter Four presents a narrative, a tabular description and analysis of the findings within the context of the research questions. Chapter Five present answers to the research questions, discuss the implications of the findings, propose recommendations for further research based upon the results and conclude with an overall summary of the report.

Chapter 2

Review of the Literature

Overview

Mobile learning is a relatively new approach to learning, and successful use is driven by factors such as the mobility of technology, the learner, and the learning process (Ferreira, Klein, Freitas, & Schlemmer, 2013; Hashemi, Azizinezhad, Nchaajafi, & Nesari, 2011). The literature review focused on research that (a) described mobile technology use, (b) examined descriptions of mobile learning, (c) studied the approaches that were used to guide the implementation of mobile learning, and (d) investigated measures that were used to evaluate mobile learning. The literature also examined (e) the agencies and departments use of mobile technologies, (f) measures reported to ensure the security of mobile technologies, and (g) how mobile learning has changed the landscape of training and learning. The studies reviewed in the investigation represented the most recent, influential and relevant in the field of mobile learning.

Mobile Technology Use

With advances in mobile technology capability, acceptance and use are on the rise (Hsu, Ching, & Snelson, 2014; Hung & Zhang, 2012). The perceived benefits and value associated with mobile technology has led to increased ownership of mobile devices and expanded development of mobile applications (apps) (Hashemi et al., 2011; Scolari et al., 2012; Ting, 2013). In 2012 among American adults, there was an 88% ownership rate for cellphones, 57% ownership rate for laptops, and 19% ownership rate of tablets and e-readers. Mobile technology owners were also found to have a preference for tablets

versus smartphones or e-readers (Zickuhr & Smith, 2012). At the same time, the use of laptops and desktops appears to have leveled off (Smith, 2012). Fast forward two years and the introduction of smartphones led to further increases in the rate of ownership of mobile technology competing with laptops use (VanRoekel, 2013b). In a January update to a 2012 study, Smith (2014) found interesting changes in mobile technology ownership. There was a modest increase in ownership for cellphones from 88% to of 90% and a significant increase from 10% to 32% for e-readers. In addition, users were beginning to demonstrate a preference for smartphones and tablets with ownership at 58% and 42% respectively.

Enabled by mobile apps, mobile devices are now used to send and receive text messages, gather news, perform banking activities, arrange travel, find directions, conduct internet searches, and access commercial services (Ally & Palalas, 2011; Smith, 2014; Traxler, & Wishart, 2011). Mobile apps are readily available via well-known apps stores such as the Apple and Google app stores (Seo, Gupta, Mohamed-Sallam, Bertino, & Yim, 2014). The General Services Administrations' (GSA) https://apps.usa.gov portal is a government source for mobile apps for federal agencies and departments (Eom & Kim, 2014; Foulonneau, Martin, & Turki, 2014).

The landscape of mobile technology continues to evolve, and the dynamic nature of the change offer challenges and opportunities when deciding to integrate technology into learning processes (Terras & Ramsey, 2012). There is a tendency to view the latest new technology as the next best solution that solves education and training problems. However, the decision must not be driven by the newness of technology, but must be based upon asking the right questions pertaining to how the tools can best achieve the

desired training and learning outcomes (Saccol, Barbosa, Schlemmer, & Reinhard, 2011; Sostak, 2012).

In a recent study, Bibby (2011) examined student preference for using mobile phones as opposed to using personal computers for taking mobile classes. He found that although screen size was somewhat problematic, students preferred using cellphones for mobile learning. Jones, Scanlon and Clough (2013) performed two case studies that investigated the use of mobile technology to support learning in formal and informal inquiries in natural science context. They concluded that learning had occurred and that students were successful in satisfying their objectives, although they were unable to determine exact levels.

In another study, Terras and Ramsey (2012) explored the psychological challenges of offering learning opportunities using mobile technology to understand the effect. They argued, the mobile learner face psychological challenges that can be disruptive and that will require consideration if mobile learning is to be successful. In addition, they contended that individuals responsible for providing mobile learning do not have extensive experience in the discipline, which could result in the underestimation of the challenges they face.

In yet another study, Martin and Ertzberger (2013) compared the effects of here and now mobile learning with ipads or ipods versus computer-based instruction on attitude and achievement. The results revealed a more positive impact on achievement for computer-based instruction and a more positive impact on attitude for mobile learning. However, they noted that while mobile learning can be viewed as positive, the potential is present for new technology to have the unintended effect of becoming a distraction.

The use of mobile technology for learning is a universal phenomenon (Liu, Han, & Li, 2010; Sung & Mayer, 2012). The anytime anywhere capability afforded by mobile technology coupled with the ubiquitous characteristics of mobile learning contribute to an increased interest and rapid rate of growth (Pereira & Rodrigues, 2013; Korucu & Alkan, 2011; Pollara & Broussard, 2011; Sølvberg, & Rismark, 2012). Expanded product features, and improved support infrastructure, suggest that mobile learning will continue the substantial growth (Adkins, 2011; Attalla et al., 2012; Denham, Gonzalez-Sanchez, Chavez-Echeagaray, & Atkinson, 2012). Because mobile technologies afford learners the ability to access information and communications across the contexts of space, time, and location, its use is driving change in teaching practices (Fritschi, Wolf, Nakashima, Galloway, Thulstrup, Castillo, Rubis, Isaacs, & Engida, 2012; Kukulska-Humes, 2010). Indeed, educators and trainers are prepared to acknowledge the impact that mobile technology might have in transforming mobile learning (Martin & Ertzberger, 2013). However, an awareness must be developed on how best to use mobile technology for delivering the optimum mobile learning experience and how best to evaluate the impact it has on teaching and learning (Ally & Palalas, 2011; Cruz, Schmunk, Durkins, Ewing, Shearer, Corley, Farlow, Korman, Walliser, Jackson, Adams, Lin, Bakken, Dao, Key, Moeller and Hooper, 2010; Haag, 2011; Tucker, 2010).

Mobile Learning Descriptions

The debate over how to define mobile learning is ongoing, with scholars and practitioners holding a number of views on the factors that define the field (Denham, Quick, & Atkinson, 2012; Elias, 2011; Ferreira et al., 2013; Macdonald & Chiu, 2011; Thinley, Geva, & Reye, 2014; Wu, Wu, Chen, Kao, Lin, & Huang, 2012;

Yadegaridehkordi & Iahad, 2012). Elias (2011) and Yadegaridehkordi and Iahad placed the focus on the technology, defining mobile learning as the use of handheld devices to support teaching and learning.

Haag (2011) initially offered a definition used by the DoD Advanced Distributed Learning (ADL) initiative as using handheld devices to access learning content and information. In a later study Berking et al. (2012) broadened the definition to make it more flexible, describing mobile learning as taking advantage of the anytime anywhere affordances of mobile technology, to either embrace or extend opportunities so as to enhance knowledge, behaviors and skills, via education, training or performance support across the context of time, space and location. Macdonald and Chiu (2011) referred to mobile learning as the use of portable technology to distribute education and training resources. Taking a somewhat different approach, Sølvberg and Rismark (2012) defined mobile learning as an extension of elearning. Using yet another approach Wu et al. (2012) explained mobile learning as using the latest wireless technology improvements to facilitate learning. On the other hand, Denham, Quick, and Atkinson, (2012) described mobile learning as acknowledging the user's mobility and focusing on the affordances of the technology that allow the learners to take actions that support their learning. Thinley et al. (2014) defined mobile learning as learning using mobile technology.

Ferreira et al. (2013) proposed a somewhat broad description of mobile learning. They argued the need to understand and describe how and to what extent mobile technologies are to be incorporated into the learning process. Also, they proposed that defining what constitutes mobile learning has to be driven by a constant critical assessment of the possibilities, benefits, and limitations situated in the context of intended

use. They suggested the attractive feature of mobile learning is that the technology allows people in a mobile capacity to have ubiquitous access to learning content and the ability to associate with others as desired. Mobility is a complex endeavor, comprised of more than just the mobility of the student. The mobility of the technology, the mobility of the conceptual space intended to foster learning, the mobility of the social interactive components, and the mobility associated with choice in adjusting the chronology of events are all contributors to the process of learning. Mobile learning includes processes that allow students that are either co-located or geographically dispersed from other students, teachers, institutions or workplaces in either fixed or mobile locations to use wireless information communications to access learning content or performance support.

Each of the previous definitions suggests that mobile learning involves a process in which mobile technology affords individuals on the move the opportunity to engage in learning activities in different contexts. Because the field is relatively new, the definition debate is likely to persist. The extended discussion is in part due to the speed of change in technological capabilities and the complexity of determining if the focus should be on mobility, the learner, the technology or all of these factors (Hashemi et al., 2011). It is clear that the student, the technology, and the various aspects of mobility are all intertwined with the appropriate pedagogy and must be included in the decisions for mobile learning use.

Mobile Learning Approaches

A sound approach is needed to successfully implement mobile learning (Park, 2011). Teall, Wang and Callaghan (2011) noted that frameworks and guidelines used in designing mobile learning must take into account both the learner and the learning

environment. Though educators and trainers have an active interest in using mobile technology for learning, there is still much that is not known about what is best (Kissinger, 2013). Finding a means for combining the vast array of new technologies with the appropriate theoretical approaches for instructional design, support for the learning process, and technology integration is a significant challenge (Glazatov-Sponsor, 2012). Martin, Pastore and Snyder (2012) contended that the current and ever changing nature of mobile technology requires a mobile learning design process that accommodates flexibility. Moreover, the deployment of mobile learning requires an in-depth knowledge of implementation frameworks and the use of the information to inform mobile learning strategies (Chao, 2012; Cochrane, 2012; Frohberg, Göth & Schwabe, 2009). Indeed Berking, et al. (2013), Park and Zarei, Mohd-Yusof, Daud, & Hamid, (2015) confirmed that having a framework that incorporates the appropriate learning theory and the capabilities of the technologies into the chosen instructional design strategies are essential to attaining desired outcomes for mobile learning initiatives.

Despite the considerable amount of recent research on mobile learning use, much of the reporting is from higher education and business (Attalla et al., 2012; Chong, Chong, Ooi, & Lin, 2011; Iqbal, & Qureshi, 2012; Kearney, Schuck, Burden, & Aubusson, 2012; Kukulska-Hulme, 2010; Liu, Han, & Li, 2010; Liu, Li, & Carlsson, 2010; Saccol et al., 2011; Traxler, 2011). As an example, Mileva (2011) investigated the use of mobile learning as performance support for engineering students in higher education settings. While Solvbert and Rismark (2012) examined higher education students in a mobile learning environment and explored the decisions of students as they negotiated the contexts of time, space, content, and technology. In addition, Park and

Jung (2013) investigated the use of mobile learning for university students in an informal setting, examining the actual experiences and the perceptions of what worked best.

An important observation by Berking et al., (2012) was that while some design frameworks exist for use in implementing educational technology, there are questions as to whether these guidelines are appropriate for the design of mobile learning in all cases. Berking et al. and Koszalka and Ntloedibe-Kuswani (2010) questioned the efficacy of existing instructional design strategies, suggesting that new approaches might be needed. For mobile learning to succeed, strategies that address pedagogical and technological concerns are required (Matias & Wolf, 2013). O'Hara, Pritchard, Huang, and Pella (2013) and Ng (2013) argued that those interested in integrating technology for learning purposes must understand and become proficient in its use. In a like manner, Ng and Wilkin, Rubino, Zell and Shelton (2013) maintain that it is important to recognize that the existence of organizational environmental factors, such as leadership participation and support, available resources and the skills of the instructional staff needed to integrate mobile learning into existing programs, will significantly influence success.

The examination of mobile learning use in government organizations remains relatively unexplored. Kissinger (2013) argued that research on mobile learning exploring the most challenging areas of the discipline, such as working memory capacity and student use of technology for learning, is insufficient. The literature also revealed that much of the existing investigations on mobile learning in government has focused on the existence and use of mobile devices for learning in the DoD (Archibald et al., 2011; Dabbagh, Nada, Clark, Dass, Al Waaili, Byrd, Conrad, Curran, Hampton, Koduah, Moore, & Turner, 2011; Morton, 2011; Tucker, 2010). One example of the type studies performed

in DoD was the Dabbagh et al. decision to use Bannan-Ritlands (2003) Integrated Learning Design Framework (ILDF) to investigate existing training programs to see if it was possible to improve efficiency and effectiveness. The ILDF framework is an iterative process that combines instructional design, technology development, and educational research in an effort to gain a better understanding of the factors that drive improvements in learning environments. They used the ILDF framework in designing the Learning Asset Technology Integration and Support Tool (LATIST) an electronic performance support system that allows a user to explore what research says about technology, chose the best technology based on user-defined criteria, and become proficient in the use and application of the chosen technology.

Although the studies of mobile learning in DOD are useful, their focus compels a wider investigation of government cabinet-level agencies and departments. It is important to recognize that government organizations are similar in many ways, but they are not identical. Even though they follow overall federal policy, each organization has its structure and approach to choosing and implementing learning technology. For instance, while government organizations are encouraged to collaborate, they are not required to do so. Individual approaches to implementation can result in loss of opportunities for efficiencies and lessons essential to the efficient and successful use of mobile learning (Campbell, McDonald, & Sethibe, 2010; Ward & Mitchell, 2004).

Mobile learning implementation efforts must use strategies that are well founded and that are representative of the context of their intended use (Ozdamli & Cavus, 2011; Saleem, 2011). A number of concerns have to be addressed to integrate mobile learning into the learning process (Chao, 2012). These challenges include technological,

organizational, cultural, support, and content considerations (Glahn & Specht, 2011; Hashemi et al., 2011; Sarrab, Elgamel, & Aldabbas, 2012). While it is important to recognize the benefits of using mobile learning, it is equally important to understand and learn from successful and unsuccessful implementation efforts (Cochrane, 2012).

Many of the government implementation strategies being used are of an experimental and discovery nature with limited documentation (Haag, 2011). It takes time for learners and organizations to adjust to new technological innovations and introducing mobile learning without an implementation strategy can present issues that inhibit the learning process (Cochrane, 2011). To be effective the implementation of mobile learning requires the use of an established conceptual frameworks and guidelines (Glazatov-Sponsor, 2012; Park, 2011; Passey, 2010; and Teall, Wang, Callaghan, & Ng, (2014).

Mobile Learning Evaluation

With mobile learning considered a means to provide education and training opportunities, evaluation methods are lagging (Terras & Ramsay, 2012). Evaluating the effectiveness of mobile learning is critical, yet there is not much known about which metrics are suitable for determining if mobile learning will achieve desired outcomes (Arrigo, Kukulska-Hulme, Arnedillo-Sánchez, & Kismihok, 2013; Koszalka & Ntloedibe-Kuswani, 2010; Terras & Ramsay; Traxler, 2010). Indeed, developing the appropriate evaluations strategies can be overwhelming and contribute to the challenge of implementing mobile learning. Nonetheless, educators and trainers must be able to understand how to effect measures that gauge the best use and benefit of mobile learning technology (Hargis, Cavanaugh, Kamali, & Soto, 2013).

Evaluating mobile learning efforts present a new set of challenges and require a new approach to evaluation (Cochrane, 2011). In fact, Thinley et al. (2014) insisted that evaluating mobile learning without an appropriate framework could be difficult and problematic. The relative newness of the discipline, the variety of mobile learning technology offerings, the contexts in which the learning can occur, can contribute to the challenge of evaluation and calls for a framework specifically tailored to mobile learning (Ting, 2012; Traxler, 2011). In the examination of technology used to support classroom learning and the use of personal mobile technologies to support the mobile learner, Sharples (2013) found that with mobile learning occuring across context evaluating it became a challenge. He cited the earlier work of Vavoula and Sharples (2009) who argued that difficulties in evaluating mobile learning can arise when activities occurs with changes in the contexts of time, location, and curriculum. He further suggested that the use of varied technologies and disruptive activities that occur in the learning environment could also make it difficult to evaluate mobile learning. Because the research on mobile learning is in its early stages, care must be exercised in how it is used. Sharples noted however, that journals, interviews and incident analysis emerging from early successes and failures of trialed efforts are beneficial and supportive of mobile technology use for learning, yet not widely considered.

In a report that sampled presentations by participants at the United Nations Educational, Scientific, and Cultural Organization Mobile (UNESCO) Mobile Learning Week event, Traxler and Vosloo (2014) examined contributions from the mobile learning field. They focused their review on the obstacles that organizations face in the attempts to measure success when the learning context changes to mobile states. Their conclusion

agrees with the findings of Traxler (2007) that failings in the theoretical basis and assessment methods associated with mobile learning contributed to the lack of meaningful evaluation. Traxler and Vosloo attributed these shortcomings to the difficulty organizations experienced in determining how to conduct a meaningful evaluation of the learning that occurs when the learner is in a mobile state, often using unrelated ad hoc measures as guides.

Vavoula and Sharples (2009) argued that evaluating mobile learning is challenging because of the difficulty in assessing how learning occurs as learners navigate the various contexts. They proposed an evaluation approach using three levels that evaluate individual usability aspects, the learner context, and the organization context. Their framework provided a sound and comprehensive means to measure the effectiveness of mobile learning efforts throughout the implementation process. Effective evaluation strategies require capturing and evaluating learning in the context of the student, measuring the usability of the technology, determining if the activities are transformative on the program, and evaluating the initiative during the entire life cycle. The success of mobile learning initiatives will require that mobile learning evaluation be comprehensive, practical and useful (Traxler, 2007).

Agencies and Departments Use of Mobile Technologies

Mobile technology use is becoming an integral part of the way that government organizations seek to interact with their employees and the general public (Mergel, 2013a; Mergel, 2013b; Luna-Reyes, Bertot, & Mellouli, 2014). In recognition of the need to share and benefit from other organizations technology implementation efforts, former President Bill Clinton issued Executive Order 13111 (1999) which directed the formation

of a task force to guide technology implementation efforts and to encourage government organizations to standardize and share new technology. Executive Order 13111 led to the establishment of the ADL initiative. More recently, President Barack Obama issued Executive Order 13571 (2011) which instructed federal agencies to develop ways to improve the use of technology and to share their experiences in the process. Because government organizations are relatively autonomous entities, it can be instructive to examine the mobile learning implementation efforts of others (Ting, 2012).

On May 23, 2012, United States President, Barack Obama, issued an executive memorandum requiring heads of cabinet-level agencies and departments to develop plans for operationalizing the administrations' strategy for making the best use of emerging technologies (Obama, 2012; Snead, 2013). As a result of the presidential memorandum, the Federal Chief Information Officer developed a digital strategy calling for agencies and departments to develop plans to use emerging technologies in the delivery of their services (VanRoekel, 2012a). Agencies and departments were charged with finding efficient and effective ways to use web-based and mobile technologies in their programs and processes for delivering services including the adoption of commercial mobile apps (VanRoekel, 2013a). In addition, agencies and departments were asked to find adequate and secure ways for managing the large amounts of government controlled data that are used in innovating and improving service delivery and performance (VanRoekel, 2012a). In response to President Obamas' call for action, a number of agencies and departments have developed and are implementing digital strategies to make use of mobile technologies (Snead, 2013; VanRoekel, 2012a). Consequently, agencies and departments are at various stages of completing inventories of mobile devices and procurement

vehicles. In addition, the federal government is publishing application program interfaces to share hundreds of datasets that can be used by all sectors of the American population (VanRoekel & Park, 2013).

In response to the call to making the best use of emerging technologies to provide mobile information and services, a number of agencies and departments have begun the process of developing customer-facing solutions. For instance, the HHS, Food and Drug Administration and the Centers for Disease Control and Prevention (CDC) are using smartphones apps to access regulations and perform inspection duties (Haag, 2011; Mulieri, 2013). The CDC is also using mobile technology to examine the effects of behavioral change and disease management interventions provided to medical service user (Free, Phillps, Galli, Watson, Felix, Edwards, Patel, & Haines, 2013; Haag, 2011). In a like way, the National Park Service and the Mobile Environment Information Service are using Quick Response (QR) codes to provide low-tech tour guide information services to individuals exploring environmental protected areas (Lorenzi, Vaidya, Chun, Shafiq, & Atluri, 2014; Luna-Reyes et al., 2014). Further, the VA is piloting the use of mobile technology to make health care services and information available to veterans and medical service providers in dealing with substance abuse (Chan, Torous, Hinton, & Yellowlees, 2014; Santa-Ana, Stallings, Rounsaville, & Martino, 2013). In addition, the VA and the DOD are collaborating on the use of mobile technologies to treat veterans diagnosed with a psychiatric illness identified as posttraumatic stress disorder. The VA and DOD are using smartphones apps to help patients diagnosed with the disorder and to supplement professional care. One of the apps, the Post Traumatic Stress Disorder (PTSD) coach is a self-help mobile app that support patients in learning about and

managing the symptoms related to the disorder (Kuhn, Greene, Hoffman, Nguyen, Wald, Schmidt, Ramsey, & Ruzek, 2014). Similarly, the Prolonged Exposure (PE) coach app, supports the administration of exposure therapy treatment to veterans and is used with the support of a medical professional (Reger, Hoffman, Riggs, Rothbaum, Ruzek, Holloway, & Kuhn, 2013).

Other federal agencies and departments have also begun to find ways to integrate mobile technologies into the way they conduct business through the use of mobile apps software (Luna-Reyes et al., 2014; VanRoekel, 2012b; Zavattaro & Sementelli, 2014). The GSA has established a portal that enables federal agencies and departments to make mobile apps available that are aligned with the services they offer (Eom & Kim, 2014; Foulonneau et al., 2014). A visit to the GSA portal, http://www.apps.usa, reveals hundreds of apps that provide information and support for a number of agencies and departments. For instance, HHS has developed disaster relief tools for use by first responders and resources for citizens that provide detailed guidance on what to do during emergencies such as earthquakes and tornadoes. Some of the HHS tools are in the form of mobile apps designed for use on mobile devices (West & Valentini, 2013). In a similar way, the DoT is using an app that enables the general public to evaluate the safety and operating performance of commercial buses (Scott, Collins, & Wicks, 2013). Similarly, the OPM is using mobile technology for advertising and allowing potential applicants to apply for federal job opportunities. OPM is also using mobile technology to communicate the operating status of the federal government prior to and during times of inclimate weather or other contingencies in the Washington, DC area (Eom & Kim; Snead, 2013).

Measures Reported to Ensure the Security of Mobile Technologies.

The decision by agencies and departments to use mobile technologies comes with increased security concerns and present greater risks in protecting personal and organizational information (Bhattacharya, Yang, Guo, Qian, & Yang, 2014; Boyles, Smith, & Madden, 2012; Keengwe & Bhargava, 2013; Lin, Huang, Wright, & Kambourakis, 2014; Martin & Ertzberger, 2013; Pereira & Rodrigues, 2013; VanRoekel, 2012b; VanRoekel, 2013b). Just as with the earlier technology, the capabilities in mobile devices make them vulnerable to being targeted for the privacy and security information they contain (Thaanum, 2013). As early as 2008 mobile technologies, such as personal digital assistants, laptops, and cellphones, were identified as soft spots in enterprise networks (Friedman & Hoffman, 2008). Moreover, as the use of mobile technologies has increased they have become ideal targets for hackers to exploit (Bhattacharya et al.; La Polla, Martinelli & Sgandurra, 2013). Shahzad, Akbar and Farooq (2012) cited data indicating that the number of malware attacks on smartphones in 2011 increased by more than three thousand percent. More recently, Lin et al. (2014) indicated that the number of malware attacks has increased from hundreds to greater than 50,000 in just two years.

The security vulnerabilities in smartphones and tablets can be of significant consequence, because they are often targeted by those desiring to exploit the weaknesses associated with accessing enterprise networks (Altalbe, 2013; Friedman & Hoffman, 2008). Because mobile technologies tend to be in an always on status, and can be easily accessed by jailbreak software, they are considered to offer greater exposure to malicious attack (Ghosh et al., 2013). The risk is especially noteworthy because of the vulnerability

to unauthorized network intrusion as a result of the number of lost and stolen mobile devices (Boyles et al., 2012).

While mobile device use is a concern, the extensive availability and somewhat uncontrolled use of apps can also be problematic. The easy availability of the so-called free mobile apps can expose mobile devices to adware that in some instances is not entirely harmless. The problem is that there is no guarantee that the app has undergone a security review to determine if they are free of malicious code embedded by hackers (Thaanum, 2013). Because the mobile apps are so readily available for download, by the time users become aware there is a security or privacy concern, the hacker could have achieved their goal (Seo et al., 2014). A common practice used by hackers is to embed malware in an appealing app, thereby disguising its real intent (Lin et al., 2014). The actual purpose of the app might be to collect sensitive personal information that leads to identity theft, and the user would be unaware. The malware could also be intended to take control of business and financial accounts for the purpose achieving financial gain by redirecting assets or authorizing illegal activities. An equally dangerous purpose for using malware might be for hackers to gain control of devices in order to manipulate other accounts on enterprise networks (Seo et al.). In some cases, malware has proven robust enough to circumvent systems that are protected with strong security (Lin et al.). Indeed, as Arabo and Pranggonno (2013) noted, the presence of mobile malware is a significant security risk to enterprise networks. Allowing mobile devices to join enterprise networks expose them to malware that could serve as a conduit for the removal of privacy and other sensitive data (Miller, Voas, & Hurlburt, 2012; Seo et al.; Thaanum). Consequently,

it is essential to secure mobile devices when operated in the enterprise network environment because of their critical role in overall security (Lin et al.; Seo et al.).

Government organizations are investigating approaches to mobile device ownership and use and have acknowledged that there are significant risks in using mobile technologies (VanRoekel, 2012b). There are several approaches available, and some organizations are considering the use of a Bring Your Own Device strategy (BYOD), (Ghosh et al., 2013). A BYOD strategy allows users to provide their own personal devices to perform government functions with limited control and support by the organization (Disterer & Kleiner, 2013; Miller et al., 2012). A second option is to employ a Choose Your Own Device (CYOD) approach in which the organizations provide the device or a range of devices for users to select from (Ghosh et al.). With the CYOD option, organizations provides some support, controls are not especially strict, and users have leeway in how the device is used for personal activities. A third approach employed is a Here's Your Own Device (HYOD) strategy. With the HYOD approach, organizations provide the device, the support and specify how the device is to be used. When choosing the HYOD option, the organization has total control over the device, and the users have little say in how the device is configured or operated (Ghosh et al.). Finally, there is the Own Your Own Device (OYOD) strategy that tends to be the least restrictive approach. The OYOD approach allows users to bring in any device and to use it as they choose. With the OYOD approach, organizations have little if any control over, or responsibility for the device and potentially face the greatest risks (Ghosh et al.).

When implementing any of the mobile device ownership and use approaches, organizations are faced with significant challenges that make developing privacy and

security policies more complicated (Lin et al., 2014; Miller et al.). Before adopting any approach, it is vital that decisions be made based on which technologies are essential, and assure that adequate security and privacy measures are in place (Haag, 2011). This requires that policies be in place defining the tasks of control, storage and licensing that agencies and departments are to use for securing mobile devices and vetting commercial mobile app. The extent to which appropriate security protocols and app management processes exist, and are used remains an open question (VanRoekel, 2013b). As an example, in interviews with government agencies and departments, VanRoekel (2013a) determined, that although many organizations are already incorporating commercial mobile technology into their operations, the methods for managing devices and mobile apps are in the early stage of development. Moreover, he reported that many of the mobile apps are of a commercial nature, raising questions about the level of risk that organizations have knowingly assumed. Importantly, the procedures used by agencies and departments are similar in that they are linked to business operations, address security concerns, and assess for compliance with accessibility requirements. The approaches tend to be driven by administrative versus technical controls (VanRoekel, 2013a). Government agencies and departments security and privacy requirements for protecting technology and data are driven by statutes, rules, and regulations. (Campbell et al., 2010; Eom & Kim, 2014; Ward & Mitchell, 2004). Because these requirements are non-discretionary, agencies and departments must either be compliant or seek relief from the requirements (VanRoekel, 2012b).

To mitigate the challenges that federal agencies and departments face in deploying mobile technologies, they must address privacy and security in areas that

include (a) Mobile Device Management (MDM), (b) Mobile Application Management (MAM), (c) Information and Access Management (IAM), (d) and Data Management (DM), (VanRoekel, 2013b). First, a MDM methodology is required to manage the devices at the individual and enterprise level. An inherent weakness of mobile technology is the capability for uncontrolled use outside of the enterprise environment. Also, the existence of limited and often questionable security controls on mobile technologies requires the use of a formal mobile device management policy to protect personal and enterprise assets (Harvey & Harvey, 2014). MDM policies are needed to prescribe how data are categorized, tagged and safeguarded for sharing non-sensitive information using mobile devices. The MDM procedures must also specify how to encrypt sensitive information for storage on mobile devices or transmission across unsecured networks. (Krishna, Sayi, Mukkamala, & Baruah, 2012; VanRoekel). Second, in addition to managing the devices, protocols must be established for controlling the use of mobile apps. MAM policies must address the distribution, storage, and deployment of mobile applications. Moreover, the policies must describe practices for how apps are installed, uninstalled, monitored, and allowed to behave. Mobile users who are allowed to upload apps from any source of their choosing can cause the introduction of mobile malware thereby creating security vulnerabilities in enterprise networks (Harvey & Harvey). Third, IAM policies are required to satisfy federal mandates to implement processes that verify employee credentials and control access to sensitive government information. Because mobile technologies can be used to store large amounts of personal information about users, they can become rich targets for exploitation if lost or stolen (Miller et al., 2012). The impact of lost or stolen devices is significant as on average, as Boyles et al.

(2012) noted, one in three smartphone owners' devices have been lost, or they have experienced inappropriate access to their private information. While most federal agencies and departments are required to have information and access management policies, it is not clear that existing policies and tools exist, or if they are present how they are being used with mobile technologies (Miller et al.; VanRoekel, 2012b). Fourth, the ability to use mobile devices and apps that are capable of collecting large amounts of sensitive information has the potential of exposing sensitive personal data (Boyles et al.). In the investigation of privacy and data management on mobile devices, Boyles et al. found that a concern of mobile device owners is protecting their data. Additionally, they found that more than 10% of mobile phone owners had experienced the loss or theft of their device or had their data exposed to others without their consent. They further noted that users were reluctant to use and often uninstalled mobile apps because of concern with security and privacy.

How Mobile Learning has Changed the Landscape of Training and Learning

Because the discipline is relatively new, there is limited research on the change and influence that mobile learning has had, with much of the reporting in the higher education and business contexts. In one example, Mileva (2011) investigated the use of mobile learning as performance support for engineering students in higher education settings. They found that using mobile technology neither helped nor impeded student learning. However, they found that students expressed a preference for the course delivered by mobile technology due to its anywhere or anytime availability. However, a change they found promising because of the experience gained in implementing the course, was to continue the development of management level mobile learning courses.

In another study, Solvbert and Rismark (2012) examined higher education students in a mobile learning environment and explored the decisions of students as they negotiated the contexts of time, space, content, and technology. They compared students' choices as they moved between learning environment in which they had the option of participating in scheduled videotaped lectures in classrooms, participating in scheduled videotaped lectures off-campus, or participating in on or off campus classes using mobile technology. The results indicated that each of the learning environments had unique challenges and that students reacted differently in each environment. For example, they found that using mobile technologies for off-campus learning created demands in which students experienced difficulty within the learning process and had problems with the technology, which they described as fragmented. They argued that optimizing the affordances of mobile learning will require that educator or trainers planning its use recognize, adjust to and accommodate the unique way in which learners negotiate mobile learning environments, interact with content and with other learners. The outcomes of the study were partially attributed to being limited by a small sample size, the brief period that the students had access to the mobile technology and the use of self-reporting from group interviews.

In a field study that examined the conversion of a mandatory elearning course to mobile learning, Haag (2011) reviewed the use of smartphone technology to examine course effectiveness from the aspects of learner performance, attitude, and satisfaction. His study required the use of the existing instructional design, which limited the ability to make desired improvements such as removing unnecessary content from the course. However, the course was considered successful with (a) 85% or participants indicating

that they would use the converted mobile course, (b) 84% of participants stating that they were satisfied with the course, and (c) 70% of participants indicating that they preferred the mobile version. On the other hand, challenges were encountered because the course was designed using elearning guidelines instead of those determined to be required for mobile learning content. Many of the identified challenges were technical in nature, such as an inability to bookmark, small graphics and text size. Furthermore, during follow-up interviews, participants expressed concerns about the relevancy of mobile delivery, quality of course design, and the ability to "game the test" to achieve a high score. Haag concluded that redesigning the course using a mobile learning instructional design strategy vs. being required to use the elearning course as designed could have had a favorable impact. Even under the course redesign constraints, Haag determined that technological advances such as smartphones were capable of supporting mobile learning.

The impact of mobile technology use for learning in government agencies and departments remain insufficiently explored (Cruz et al., 2010; Haag, 2011; Tucker, 2010). Confounding the understanding for the use of mobile learning is the constant arrival of new technology presenting challenges and raising questions about what solutions best align with organizational learning strategies (Berking et al., 2012; Cruz et al.). While mobile technology makes it possible for learners to have better control in accessing anytime and anywhere learning opportunities, it also introduces the need for practitioners to recognize the impact of aligning the technology and the appropriate learning theory with an effective instructional design framework (Berking et al.).

Although government agencies and departments have begun to explore the use of mobile learning, there is limited evidence to document their efforts, with much of the

reporting confined to DOD settings. For example, Cruz et al. (2010) and Ruth, Mastre and Fricker (2012) investigated the trends in mobile technology use and attitudes about using the technology for learning for resident and distance learning students at a northeastern United States Military Post Graduate School. In two other examples, Tucker (2010) examined the use of smartphones in United States Army training activities, and Archibald et al. (2011) examined the use of mobile technology attitudes and user concerns across the United States DoD. Another study by Haag (2011) examined the delivery effectiveness of smartphone use in a mobile learning pilot by the United States Army Quartermaster School as an extension of classroom training. There is also a report published by the United States Army Training and Doctrine Command (TRADOC) Army Learning Concept – 2015 that described plans for the future use of mobile learning (Morton, 2011). Yet another example is the study by Berking et al. (2012) exploring the impact of instructional design theories and learning strategies that supported mobile learning. With the exception of the Berking et al. study, the type of guidelines these initiatives employed was unclear. Government organizations might have used established standards such as those for elearning, but the standards used was not described in the literature. Even if elearning or other standards were used, their appropriateness for mobile learning is questionable (Berking et al., 2012; Koszalka & Ntloedibe-Kuswani, 2010). A final example is the ADL initiative's Mobile Training Implementation Framework (MoTIF) project survey, Berking et al (2013) found that respondents regarded the use of mobile technology for performance support as very promising for wide and sustained use for mobile learning. However, other than the comments related to this theme there are no

other mention of social interactions or performance support, which could be either a lack of awareness about this capability or the decision to defer its pursuit.

Summary

This chapter reviewed studies that examined the use of mobile technologies, the different descriptions of mobile learning, the use of mobile learning in both higher education and the US government DoD organizations, the considerations and measures associated with mobile technology security concerns, and the way that mobile learning use is effecting change. The literature revealed and affirmed that mobile learning is a relatively new area that is believed to be capable of contributing to teaching and learning. Published studies exploring government interest in mobile learning have concentrated on DoD organizations (Archibald et al., 2011; Berking et al., 2012; Berking et al., 2013; Cruz et al., 2010; Dabbagh et al., 2011; Haag, 2011; Tucker, 2010). Notably, none of the studies has performed an in-depth investigation of the use and influence of mobile learning implementation in the context of government cabinet-level departments or agencies. The reviews revealed that although there are interests in mobile learning, research on the area remains limited. Therefore, the study focused on building a picture of the decisions, approaches, and evaluative techniques that government cabinet-level agencies and departments use in pursuing the use of mobile learning, which will increase the understanding and contribute to the body of research.

Chapter 3

Methodology

Overview

There are limited published studies on how and in what way the approaches that organizations choose for implementing mobile learning for training effect the overall program outcome in cabinet-level agencies and departments. However, the debate over what constitutes mobile learning and how to make the best use of mobile technology for learning continue to grow. The goal was to build an expanded picture of approaches used by United States government cabinet-level organizations in mobile learning implementation efforts. A concurrent triangulation mixed methods case study, as described by Creswell and Plano-Clark (2011), was used to investigate mobile learning implementation efforts and an attempt made to develop a comprehensive portrayal of the current state. It explored how the decisions are made to use mobile learning, approaches used for implementation, and the methods that were used for evaluation.

The methodology chapter is organized into six sections including this overview. The second section, research design, describes the guiding methodology that was used. The third section is data collection and explains the sampling strategy, ethical concerns, the method used to gain access to participants, instrumentation, the types of data that were collected, and the protocol for data validation. The fourth section is data analysis and describes the steps undertaken to prepare the mixed data for reduction, display, comparison and integration in readiness for interpretation. The fifth section is interpretation and describes the technique used to assess how the research questions were

answered, compare the results with the literature, reflect on meaning making, and identify new questions. The sixth section provides a summary of the chapter.

Research Design

The method defined by Yin (2009) served as a broad guide for the case study. The Yin approach is iterative in nature and is comprised of activities involving planning, designing, preparing, collecting, analyzing and reporting. Case studies are found effective in investigating current phenomena and incorporating a variety of data sources (Flyvbjerg, 2006; Hung & Zhang, 2012; Thomas, 2011; Wingkvist & Ericsson, 2011; Yin, 2009). Moreover, case studies have been used in a number of investigations to explore mobile learning from a range of perspectives. As an example, Ekanayake and Wishart (2011) examined student and teacher use of mobile phone cameras for teaching and learning in a science lesson. Saccol et al. (2011) studied the use of mobile learning tools to evaluate competence in corporate settings. Attalla et al. (2012) examined business students' intent to adopt mobile learning at an Egyptian university. Flood, Harrison, Iacob and Duce (2012) explored issues related to the users interaction during all phases of an apps' lifecycle and Jones et al. (2013) examined how learner control using technology can affect inquiry.

While case study research can be effective in investigating contemporary issues, the approach has drawn its critics. Case study research has been criticized for the inadequate statistical rigor especially as it relates to a single case research effort (Tellis, 1997). In addition, case studies are sometimes characterized as not being generalizable because of their small populations (Yin, 2009). However, criticism of the case study is unfounded and can be mitigated by employing a mixed method approach which allows

for including more than a single case as part of the research investigation (Yin). To address the potential weaknesses associated with case study research, a mix method design, using both quantitative and qualitative data was used to offset the weakness of using a single method (Creswell, 2013). Mixed methods research, as defined by Creswell, is the collection and analysis of both qualitative and quantitative data, and the use of a unique design for understanding or corroborating data. Mixed method design is a relatively new field and offers an alternative worldview to guide the research (Creswell; Christ, 2013). Mixed method research improves the quality of investigation efforts by using multiple approaches and strategies, thereby allowing for a wider range of data analysis and deeper understanding of the phenomenon under study (Sharp, Mobley, Hammond, Withington, Drew, Stringfield, & Stipanovic, 2012; Tellis, 1997).

Mixed methods procedures are increasingly being used to investigate various aspects of mobile learning (Wingkvist & Ericsson, 2011). For example, Park and Jung (2013) used a mixed method approach to examine mobile learning in the context of informal learning. They used qualitative and quantitative surveys to determine if there was an association between user demographics, patterns of use, associated experiences and their views of the usefulness of mobile learning. In the study of workplace training Davies, Rafique, Vincent, Fairclough, Packer, Vincent, and Haq (2012) used mixed methods research to explore the use of mobile learning by medical students in clinical setting. They developed a conceptual model to examine the extent to which learning theories contributed to their explanation of how and when to use mobile learning. In testing their model Davies, et al. found that a proven theoretical base could improve the chance of effectively using mobile learning. Although the study was conducted using

personal digital assistants with medical student participants in clinical environments, it determined the model generalizable across contexts and technologies such as smartphones or tablets.

Mixed method research can be challenging in its implementation because there is no single prescribed approach as there is in quantitative research. Therefore, it is essential to recognize that the mixing of methods in research efforts can be time-consuming and difficult to carry out (Teddlie & Tashakkori, 2009). Another consideration with mixed methods research design is whether or not a theoretical basis should be established. Indeed, if the research requires a theoretical basis, the question then becomes how it should be used to order the phases of the study. Finally, due to of the variability allowed in mixed methods research, decisions have to be made on when and how to integrate quantitative and qualitative data to represent the phenomena under study (Creswell, 2013; Teddlie & Tashakkori).

Effective mixed method research requires that a number of elements be addressed in developing an approach or plan (Creswell, 2013). First, a research design must be chosen that spell out the procedures that guide the inquiry. Second, a research philosophy or worldview must be identified that establish the foundation and perspective from which the research can be examined and understood. Third, the strategy must be selected that determines how data are to be collected, analyzed, and integrated.

A mixed methods concurrent triangulation case study was used to explore and document the processes that government cabinet-level organizations choose to implement and evaluate mobile learning initiatives. The inquiry used the Creswell and Plano-Clark (2011) concurrent triangulation design model (See Figure 1).

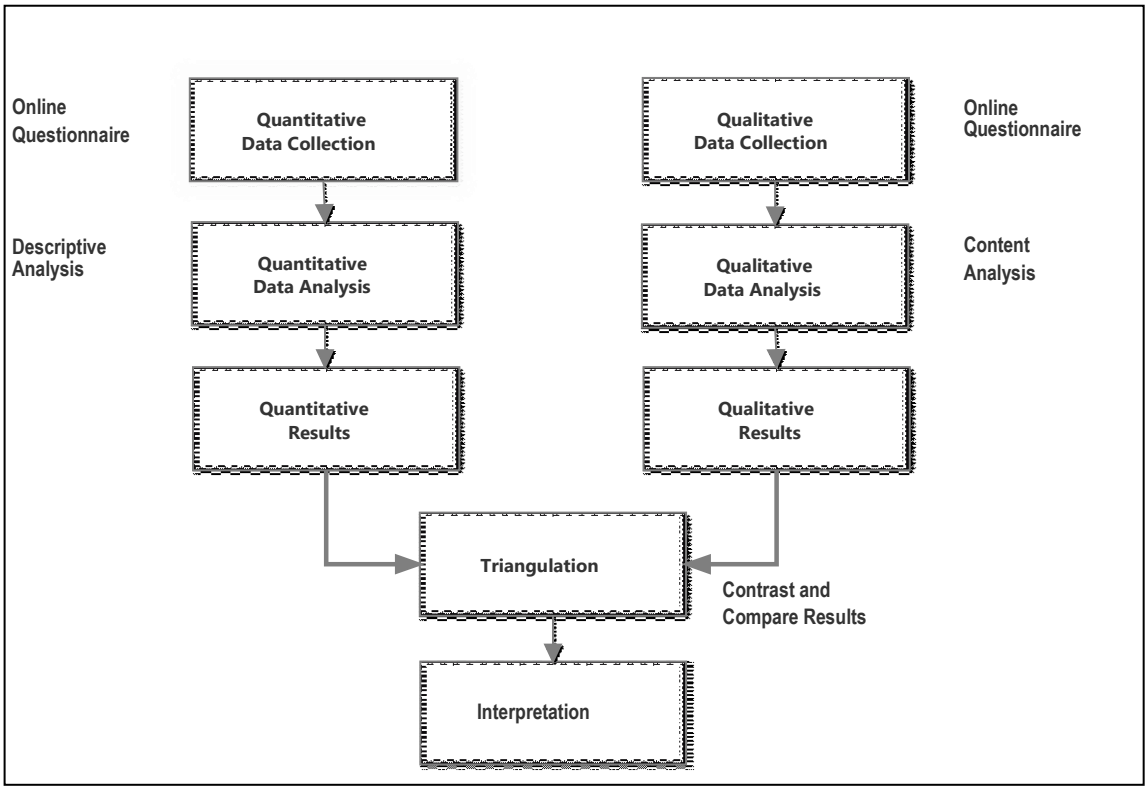


Figure 1. Concurrent triangulation research design model. Adapted from "Designing and conducting Mixed Methods Research,"2nd Edition, (p.118), by J. W. Creswell and V. L. Plano-Clark, 2011, Thousand Oaks, California: SAGE. Copyright 2011 by SAGE Publishing. Adapted with permission.

In a concurrent triangulation design quantitative and qualitative data are collected at the same time, given equal priority, and merged after analysis at the point of interpretation. The concurrent triangulation strategy is well suited for exploring research questions and corroborating the findings of quantitative and qualitative studies (Creswell & Plano-Clark; Onwuegbuzie, Johnson, & Collins, 2009). In fact Fielding (2012) concured and argued that mixed methods concurrent triangulation designs are intended to allow data acquired from different methods to be linked, which is of great benefit in examining and understanding complex concepts.

It is important to note that all research methods have weaknesses and combining different methods might enhance and conceal their flaws (Moran-Ellis, Alexander,

Cronin, Dickinson, Fielding, Sleney & Thomas, 2006). A weakness associated with using concurrent triangulation methods is the difficulty of analyzing two types of data and resolving conflicts that might arise during interpretation (Creswell, 2009). However, the weakness can be offset by the benefit of a more informed portrayal and a wider range of dimensions of the phenomena under investigation (Vogt et al., 2012). The overarching questions that guided the study were intended to develop a picture of the state of mobile learning implementation efforts in cabinet-level government agencies and departments organizations.

Worldview

In orienting the study, it was recognized that there are a number of worldviews associated with mixed method research. A worldview is the philosophical perspective and assumptions that guide a research effort (Creswell, 2013). For example, there is the post-positivist worldview that makes use of quantitative data that tends to be based upon the use of a hypothesis and objective information intended to arrive at conclusions that are generalizable. On the other hand, constructivists posit that understanding and meaning are constructed by means of interpreting the actions and perspectives of participants and the values of the investigator. Another philosophical perspective is the transformative worldview which advocates a methodology that recognizes societal, political and social interests are not disassociated, nor or they equal, and offers a strategy for research that can address those concerns (Mertens, 2007). Finally, there is the pragmatic worldview that represents a philosophical point of view that research outcomes are best determined by the practical effects and the extent to which the results of multiple methods are used to examine a problem (Creswell).

The philosophical underpinnings of the concurrent triangulation mixed method research are based on the pragmatic worldview. The decision to use the pragmatist worldview was to build on the practical experience, examine the reality of the experience, and refine the basis for the experience (Creswell, 2009; Christ, 2013). Pragmatism has been found supportive of mixed methods research and its use encouraged due to the significance that is placed on the research questions as opposed to a single research method (Jeanty & Hibel, 2011; Sharp et al., 2012). In fact Feilzer (2010) suggested that an individual need not feel compelled to adopt or exclude a given strategy, but can use the method that is determined most beneficial in answering the research question. Accordingly, the pragmatic philosophy influenced the design of the inquiry. The method was considered effective and afforded the flexibility of collecting and analyzing both qualitative and quantitative data in a manner that portrayed a more complete picture of mobile learning (Creswell, 2013; Creswell & Plano-Clark, 2011; Johnson, Onwuegbuzie & Turner, 2007).

Mixed method data collection required the determination of (a) the level of interactions between the data, (b) the manner in which the data are weighted, (c) the approach to timing of the data, and (d) how the data are mixed (Creswell & Plano-Clark, 2011). Interaction is the extent to which the data are combined or separated during the study. The study kept quantitative and qualitative separate during the data collection and analysis phases and converged the data during the integration phase. Weighting strategies involved determining which data, quantitative or qualitative, were given priority or if the data were prioritized equally. The investigation gives equal priority to quantitative and qualitative data. Timing required determining the order in which the quantitative and

qualitative data were collected. The strategy determined that quantitative and qualitative data were collected concurrently. Mixing strategies determined what stage or stages of the process that the quantitative and qualitative data results were described, collected, or combined. The strategy that were used called for mixing to occur during interpretation, with the conclusions addressed in detail in the discussion of the report.

Data Collection

Prior to beginning the data collection process, a strategy was developed that described the methods for gaining access to study participants and addressing ethical issues, the types of data to be collected, and procedures for assuring quality in the data collection process (Teddlie & Tashakkori, 2009). The data collection strategy also made sure that items chosen for use in the data collection process effectively addressed the research questions (Clarke & Dawson, 1999). The strategy used for data collection was that defined by Creswell (2009). The steps by Creswell included bounding the research or establishing the parameters for what is included in the phenomena under study, determining the data types to be collected, and establishing a protocol for data validation.

Participant selection played a significant role in the investigation, yet studies documenting mixed methods research sampling strategies remain limited (Sharp et al., 2012; Teddlie & Yu, 2007). However, there are models that are useful in guiding data collection such as the steps identified by Creswell (2009), and these steps were used in this investigation.

Participant Access

To contain the study, the targeted participants were confined to the education and training communities in cabinet-level government agencies and departments. These

participants were chosen because they have been charged with developing strategies for using mobile technologies and are possibly considering the use of mobile learning (VanRoekel, 2012a). Although random selection would have been the preferred strategy, probability sampling was not viable as an option for the population. In fact purposive sampling was determined to be the most appropriate method because of limited access to participants and resource constraints in the study (Vogt et al., 2012). Purposeful sampling, a non-probabilistic technique, relied on the judgment of the investigator in determining study participants and focused on specific characteristics of the study group (Creswell, 2009). The decision to use purposive sampling was appropriate due to the potential for increased access to participants and the potential for including organizations with some degree of mobile learning experiences (Tashakkori & Teddlie, 2010). While gaining access to a representative sample of the targeted population might have been difficult, Tashakkori and Teddlie (2010) argued that as few as five participants could be adequate in most common designs. The study used a purposive sampling strategy for participant selection with the goal of integrating quantitative and qualitative data at the interpretation stage (Creswell, 2009; Fielding, 2012; Vogt et al., 2012). The sample size was equivalent across all data types, and the online questionnaire used a variety of measurement techniques to collect quantitative and qualitative data.

Ethical Concerns

Because study participants were federal employees, the investigation followed the ethical standards for research on human subjects. In particular, the ethical requirements to obtain informed consent and guarantee the protection of participants were met (Teddlie and Tashakkori, 2009). Specifically, a statement was included in the introduction of the

online questionnaire (Appendix B) that reflected respondents' informed consent by taking and completing the online survey. The informed consent notification contained, (a) the name of the principal investigator, (b) the nature of the study, (c) the reason participants were asked to take part in the study, (d) an explanation of benefits and risks related to the study, (e) how privacy would be protected, and (f) the right of participations to take part voluntarily or withdraw at any time. Prior to initiating the research, the Nova Southeastern University Institution Review Board approved the procedures for compliance with ethical standards (see Appendix A).

Participant Access

A self-administered online questionnaire was determined to be the most effective and timely means for gaining access to study participants. Participant communications was initiated, and sustained through an intermediary, to enhance the likelihood of acquiring sufficient data and offsetting the participant access limitations. Questionnaire response rates can be influenced by how and when respondents are notified to participate and consequently have an effect on data quality. The use of pre-notification and reminder communications can have a favorable impact on response rates, and were used in the data collection process (Fan & Yan, 2010). With some categories of participations such as government employee or vulnerable populations, assuring anonymity is required and direct access will be limited. A means used to overcome the lack of direct access was to send participant notifications via an intermediary (Lavrakas, 2008). As described in the IRB approval to proceed, all communications with respondents were initiated through the Chair of the Interagency Federal Chief Learning Officers Council (CLOC) who acted as liaison between department and agencies Chief Learning Officers (CLOs). The CLOC is

comprised of senior officials in United States government agencies and departments that share best practices and collaborate on more efficient ways of providing training and development services. The CLOs were also the gateway that afforded the widest possible access to the population of interest.

To announce the data collection process, a pre-notification email (Appendix F) was sent to the CLOC Chair containing a request to department and agencies CLOs asking that they notify their learning communities of the intent to publish the mobile learning online questionnaire. The data collection process was initiated by sending an email to CLO members, via the CLO Chair (Appendix G). The email contained a link to the self-administered online questionnaire. The email requested that CLOs forward the email to their agency and department training communities requesting that participants complete the online questionnaire. The announcement informed participants that the online questionnaire would be open for 30 days, and the duration of each respondents' participation in the online questionnaire was anticipated to be less than 30 minutes. A statement was included in the introduction of the online questionnaire that reflected respondents' informed consent by taking and completing the online questionnaire.

Although online questionnaires are an easy and efficient way to reach respondents initially, the self-report nature of the instrument creates the need to send out reminders (Fan & Yan, 2010). Reminder notifications can be beneficial in influencing respondents' decisions for participating in and completing questionnaires and can reduce non-response rates (Fan & Yan; Lavrakas, 2008; Teddlie & Tashakkori, 2009). For this reason, a reminder email (Appendix H) was sent to CLO's five days prior to the close of the online questionnaire, advising of the end of the campaign and requesting that they remind

participants of the deadline. A thank you email (Appendix I) was sent at the conclusion of the online questionnaire. Participant anonymity was maintained during the data collection process by using a numerical coding protocol that did not store any identifying information such as Geodata, IP address, email invite data or respondent identification. Any identifying information that participants inadvertently provided was immediately destroyed.

Instrumentation

A self-administered online questionnaire, The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments, used both structured and semi-structured questions to capture participant data (Appendix B). Structured questions were used to elicit predefined responses whereas unstructured questions allowed respondents to provide personal and more elaborate perspectives in their responses (Lavrakas, 2008; Sue & Ritter, 2012; Teddlie & Tashakkori, 2009). The use of an online questionnaire was chosen because it offered the most effective and timely means to access and administer to the target population (Wingkvist & Ericsson, 2011).

The design of the online questionnaire used existing and previously validated instruments. The use of existing previously tested instruments were valuable in confirming the reliability and validity of questionnaires (Clark & Dawson, 1999; Creswell, 2009; Fink, A. 2013; Teddlie & Tashakkori, 2009). The instruments used by Ruth, et al. (2012) in their study of mobile learning trends at the US Naval Academy and the Naval Postgraduate School and Berking, et al. (2013) in their Mobile Training Implementation Framework (MoTIF) project needs assessment, were revised to focus

upon items that were considered relevant. Ruth et al. established reliability and validity by submitting their instrument to expert reviews that examined item comprehension, instrument item flow, and overall design. They piloted of their instrument prior to launch. Berking et al. established reliability and validity for their instrument by performing a limited formative assessment that examined instrument alignment with objectives, question comprehension and questionnaire administration. In addition, the questions in the study by Ally and Palalas (2011) informed the online questionnaire design. Permission to use and modify each of the research instruments was requested and received from Ruth, et al. (Appendix C), Berking, et al. (Appendix D), and Ally and Palalas (Appendix E).

The online questionnaire is divided into eight parts. The questions in the demographic section gathered participants' gender, age group, level of education, years of experience in education or training, organizational affiliation and current job or position in the organization. The job or position classifications were derived from the Office of Personnel Management, data, analysis and distribution, federal employment reports, full-time permanent age distribution (Lukowski, 2013). Questions in the mobile technology decision section addressed Research Question One and examined factors influencing the decision to use mobile learning. The questions explored how organizations allow mobile technologies to be used, the extent to which policies for use were in place, and the approaches taken. Questions in the environment section addressed Research Question Two and investigated whether or not mobile technology was used for learning. The questions were a combination of structured and semi-structured items that explored (a) how organizations defined and decided to use mobile learning, (b) the

number of mobile learning projects organizations implemented, (c) the types of mobile technologies organizations used for learning, (d) the types of activities mobile learners were allowed to perform, (e) the types of activities learners actually performed on mobile technologies, and (f) the types and the rates with which mobile device capabilities were incorporated into mobile learning. The questions in the content section were also focused on Research Question Two and examined how mobile technologies were integrated. The questions examined (a) organizational plans for developing mobile content, (b) which devices are considered best for mobile content delivery, (c) what changes organizations made to make content mobile, (d) the operating systems that mobile learning were created for, (e) how mobile content was or would be used, (f) what type of content mobile learners accessed, (g) the difference between content designed for mobile learning and non-mobile learning courses, (h) the changes observed in learner after implementing mobile content, and (i) organizational perceptions of whether the instructional design process for mobile learning and traditional course should be different. Questions in the educator and trainer section addressed Research Question Two and explored (a) organizational perceptions of how and when to use mobile learning, (b) the level of experience that organizations educators or trainers have with mobile learning projects and with converting existing content to a mobile format, (c) views about using the latest technology for teaching and learning, and (d) reactions to the use of mobile learning. The questions in the learner section focused on Research Question Two and (a) examined how the mobile learner is supported when in a mobile context, (b) mobile learner's perspectives on the use of mobile technology for learning, (c) the types of devices that are used most often by mobile learners, (d) the resources that are available to the mobile

learner and (e) the changes observed in learners after implementing mobile learning. The questions in the evaluation section focused on Research Question Three and addressed the methods used to evaluate mobile learning implementation efforts. The questions explored (a) the processes for measuring the effectiveness of mobile learning, (b) the specific metrics that organizations used, and (c) the changes resulting from ~~of~~ the assessment of mobile learning. The final section is comprised of two questions and examined what organizations were doing differently as a result of mobile learning availability and organizations' perceptions on when mobile learning would become an integral part of their education and training programs.

Data Types

A crucial step in data collection is identifying and describing the types of data that are to be collected (Creswell, 2009). The goal in examining the state of mobile learning in cabinet-level agencies and departments was to collect both quantitative and qualitative data. The investigation used a self-administered online questionnaire containing both quantitative and qualitative components to examine the approaches taken by cabinet-level government agencies and departments in their decisions to use mobile learning, approaches used for implementation, and what methods were used for evaluation of mobile learning. The combinations of structured and semi-structured questions were used to corroborate data acquired as a result of participant responses (Creswell, 2013; Sue & Ritter, 2012; Yin, 2009; Yin, 1994).

Online questionnaires are a manageable and cost effective means for acquiring large amounts of quantitative data from large populations (Wingkvist & Ericsson, 2011). Semi-structured open-ended questions afford the opportunity to corroborate data acquired

as a result of questionnaire responses (Creswell, 2013; Yin, 2009; Yin, 1994). The online questionnaire collected data on (a) participant demographics, (b) general population characteristics, (c) organizational use of mobile technology, (d) environmental factors influencing mobile learning implementation approaches, (e) how mobile technology and content was integrated, (f) educator and trainer experiences and proficiencies implementing mobile technologies for learning, (g) factors affecting students' use of mobile technology for learning, (h) and mobile learning implementation measurements. The online questionnaire was open from May 27, 2015 through June 26, 2015.

Quantitative data related to the research questions were collected using 5-point Likert scales, multiple responses items that included check all that apply options, and forced-choice questions that allowed respondents options to select between predefined alternatives. Likert scales were used to determine the extent of agreement or support there was for the items associated with the research objective (Teddlie & Tashakkori, 2009). Multiple response items were used to produce and expand the data that portray the frequency with which respondents viewed an area of a phenomenon (Lavrakas, 2008). Multiple-choice items were used to gather data describing the statistical variety and breadth with which respondents viewed the phenomena under study.

Qualitative data were collected using open-ended questions that allowed participants to provide their understanding of a particular aspect of the area under investigation (Creswell, 2009). While open-ended questions may be problematic when used in self-administered questionnaires, they are especially useful when investigating a new phenomenon (Sue & Ritter, 2012). In fact, Vogt et al. (2012) pointed out, that the

use of open-ended questions could allow new information to surface that help in understanding and describing a new phenomenon.

In addition to the qualitative data in the online questionnaire, publicly available documents were collected to increase the understanding of the phenomena. Documentation created for non-research purposes and publicly available were retrieved and used to capture data that were possibly not collected in the online questionnaire. The type of documents included publicly available government cabinet-level organizations planning and reporting documents relating to the use of mobile technologies, specifically discussing the use for learning. Clarke and Dawson (1999), Koszalka and Ntloedibe-Kuswani (2010) and Vogt et al. (2012) contend that organizational planning documents can provide meaningful insight into the goals and objectives of organizations, and add to the understanding of implementation decisions.

The task of collecting and managing mixed methods data can be a daunting task. However, the task was made easier by using data analysis software (Tashakkori & Teddlie, 2010). During the data collection period a commercial online survey software tool, SurveyGizmo (htttp://www.surveygizmo.com), was used to collect and store respondent data. Data collected via SurveyGizmo were encrypted and stored in a secure firewall protected data center. Additionally, a qualitative and mixed method software application, Dedoose 5.2.1 (http://www.dedoose.com), was used to perform thematic content analysis. Dedoose software was chosen for the study because it is especially suited to mixed methods studies (White, Judd, & Poliandri, 2012). Data analyzed using Dedoose 5.2.1 were encrypted and stored in a secure firewall protected data center. Data were also stored on a password-protected computer and will be destroyed once the

dissertation report is approved and published. Publicly available documents were also collected to increase the understanding of the phenomena under study. These documents included agency and department planning documents and reports that were a part of the public records. Access to the data was be restricted to the researcher, the dissertation chair, dissertation committee, and the IRB.

Protocol for Data Validation

The design of procedures for data collection must be performed in a way that demonstrates quality and usefulness. That is to say the data collection process must be able to demonstrate the validity and reliability of instruments being used in research efforts. Validity simply means that the data measurement instruments accurately reflect what was intended to be measured (Lavrakas, 2008). On the other hand, reliability means that data measurement instruments are consistently yielding the same results (Teddlie & Tashakkori, 2009).

To ensure the instrument measurements accurately reflected reliability and validity, previously validated instruments were revised and used. The decision to use previously tested instruments does not guarantee that they would retain the aspects of reliability and validity in future research. In fact the use a previously validated online questionnaire can still introduce a number of errors during its administration including coverage errors, nonresponse errors, and measurement errors (de Leeuw & Hox, 2008; Lavrakas, 2008; Sue & Ritter, 2012).

The adapted instruments were tested to re-establish instrument reliability and validity to make sure that research efforts garnered the intended result, (Creswell, 2009). First, coverage error was considered because of the potential that the sample under study

might not have been representative of the target population. However, the effect of coverage error was determined not to be a factor because a purposive sampling strategy was used that focused on key informants (Tashakkori & Teddlie, 2010). Second, nonresponse error, was an area that needed to be considered. Nonresponse errors create the potential that identified participants choose to not participate (de Leeuw & Hox, 2008; Lavrakas; Sue & Ritter). To improve participant response rates, the introduction section of the online questionnaire included information highlighting the importance of the data and stated that respondent data would be maintained confidential. In addition, pre-notification and reminder communications were sent via an intermediary to compensate for possible non-response error caused by respondents' decisions on how and when to participate. (Fan & Yan, 2010; Lavrakas, 2008). Third, to account for potential measurement error that could emerge during the data collection process resulting from poorly designed or worded questions, the online questionnaire was designed so as to not impose undue response burden on participants. The online questionnaire was submitted to expert for review to reduce the potential for measurement error (Bakla, Çekiç, & Köksal, 2013).

The online questionnaire was also tested in two ways to determine if it was usable. Usability is defined as the extent that an instrument is considered by participants to helpful or an impediment to its usage (Lavrakas, 2008). First, the questionnaire was distributed to experts in the field of education and training that were asked to review and validate the instrument to determine if it was usable. Second, experts were asked to critique the questionnaire for the purpose of assessing the instruments construct validity. Lavrakas defines construct validity as the extent to which an instrument measures what it

claims to measure. The feedback from the expert reviews (see Appendix J) led to a revision of the instrument that either reformated, reordered or eliminated some of the questions and responses. Table 1 shows the listing of experts, the educational degrees held and organization of assignment during the time of the groups' instrument review.

Table 1

The Listing of Experts Validating the Research Instrument

Name	Degree Held	Organization
Mark C. Harris	PhD, Computing Technology in Education	Air Force Operational Test and Evaluation Center
Mark Givens	PhD, Computing Technology in Education	Naval Criminal Investigative Services
Dave Mylott	PhD, Computing Technology in Education	Applied Materials
Antonio Rincon	PhD, Computing Technology in Education	General Dynamics, C4 Systems

The modified questionnaire was then piloted with potential participants of the study for the purpose of improving instrument validity and reliability. Performing a pilot of the research instrument is a critical component of instrument design that provides crucial information on whether or not the questionnaire will work (Lavrakas, 2008). Feedback obtained from pilot participants resulted in further revision to the instrument and the development of the final online questionnaire.

Data Analysis

Mixed methods analysis as defined by Tashakkori and Teddlie (2003) means combining the use of quantitative and qualitative techniques during some phase of a study, usually following the data collection, to interpret research findings. They suggested that the use of mixed methods analysis could allow the strengths of one method to offset the weaknesses of the other. Mixed methods data analysis was the research

strategy chosen to analyze the quantitative and qualitative data and to check the validity and accuracy of the results (Creswell, 2014).

Creswell (2014) argued that data analysis is an ongoing activity throughout the research process. Similarly, Tashakkori and Teddlie (2010) advised that for data to be useful in forming decisions, all sources must be examined on a continuing basis. To be effective mixed methods data analysis must be interactive and contain methods for capturing and organizing the data, reading and rereading the data, developing codes and descriptive themes, interpreting the data, and reporting on the findings.

Data analysis followed a modified version of the seven-stage model described by Tashakkori and Teddlie (2003). Their model included data reduction, data display, data transformation, data correlation, data consolidation, data comparison, and data integration. However, the Tashakkori and Teddlie model is not prescriptive and steps crucial to the research can be determined based on the chosen research design. Indeed, Creswell and Plano-Clark (2011) argued that only data reduction and data display offered a logical sequence. For the aforementioned reasons the investigation used the Creswell and Plano-Clark data analysis model, described as an inherently mixed analysis variant, that incorporated data reduction, data display, data comparison and data integration. Quantitative and qualitative data from the online questionnaire were continuously analyzed to determine if and how the research questions were addressed (Hesse-Biber & Griffin, 2013). The procedures used were those described by Koszalka and Ntloedibe-Kuswani (2010), Tashakkori and Teddlie (2003), Terras and Ramsay (2012) and Traxler (2010), in which quantitative and qualitative data analysis were separate but ongoing processes during all stages of the study. In addition, publicly available program

documents and process instruments used in the implementation and evaluation of mobile learning effectiveness were examined to determine how the organizational objectives were stated and measured, what techniques were used, and what decisions were made. The publicly available documents were reviewed, and themes developed to link organizational activities to the use and evaluation of mobile learning (Creswell & Plano-Clark, 2011).

The task of data analysis can be made easier by using data analysis software (Creswell, 2014; Tashakkori & Teddlie, 2010). For this reason, software applications were used to analyze and link structured and semi-structured questionnaire responses (Tashakkori & Teddlie, 2003). Quantitative data collected in the questionnaire were continually analyzed using Statistical Package for the Social Sciences (SPSS v.22) to identify patterns. Descriptive statistics were used to summarize and describe the results. Summaries of the descriptive statistics are also presented in narrative and tabular form from which findings and conclusions were drawn (Tashakkori & Teddlie, 2010). An ongoing review was also performed of the qualitative data to identify preliminarily and define general themes and patterns (Creswell).

Quantitative Analysis

The quantitative analysis is presented according to the research questions and the associated dimensions. Because the study was designed to provide descriptive rather than inferential results, data were examined as received without further analysis. Data analyses were initially performed using SurveyGizmo and simple summaries developed to depict the data across a spectrum of possible outcomes. In addition, Statistical Package for the Social Sciences (SPSS v.22) was used for confirmatory purposes on some items.

Descriptive Statistics were calculated for items using 5-point Likert scales, multiple responses items that include check all that apply options, and forced-choice questions allowing respondents options to select between predefined alternatives. The quantitative analysis was performed in order to determine a single number most representative of the data and the extent to which the data for each item varied. Where Likert scales were used, determinations were made of the extent of agreement or support for the item that was associated with the research objectives (Teddlie & Tashakkori, 2009). The multiple response items were analyzed to produce and expand the data that portrays the frequency with which respondents view an area of a phenomenon (Lavrakas, 2008). Additionally, multiple-choice items were analyzed to summarize how respondents viewed the phenomena under study. The descriptive statistics were used to indicate the extent of respondents' involvement in using mobile learning, and to summarize and describe the results. A summary of the descriptive statistics are presented in narrative and tabular form from which findings and conclusions were drawn (Tashakkori & Teddlie, 2010).

Qualitative Analysis

A content analysis was performed on the online questionnaire qualitative data and publicly available documents to identify text that described activities related to the research questions. Lavrakas (2008) asserted that content analysis is a research method used to assess open-ended questions for the purpose of coding and categorizing text data before performing descriptive analysis. Similarly Vogt et al. (2012) viewed content analysis as the technique of converting qualitative data such as words, themes, phrases into quantitative data based upon their frequency or relationship.

The content analysis was performed following the model identified by Bauer (2000). First, the review of text data such as open-ended questions and publicly available documents were performed within the context of the research questions to identify any linkages. Second, a strategy for coding the data was developed that accounted for both research design and data collection. Third, an iterative process of review was performed, and the coding strategy tested. An initial set of codes were subjected to subsequent reviews to link them to research questions and eliminate duplicative codes and themes. The resultant themes were used to sort each category and identify patterns and final coding guidelines were established. Fourth, data were sampled to examine and establish process reliability. Finally, specific procedures were established that described the basis for the codes. The procedures describe code structure and how consistency was established for the process.

Qualitative data were also analyzed using narrative frameworks that allowed for patterns and theme to emerge (Creswell, 2003; Patton, 1990). Theme development was an iterative process of reading, organizing and rereading respondent comments and combining data to see if the comment touched on a single or several aspects of the research question or its dimension. Comments were grouped and regrouped to link the data with similar characteristics. Themes were generated based upon repetition of key words or concepts that reoccurred in a meaningful way until saturation was achieved. Final determinations were the result of continually reviewing respondent comments, deciding the appropriate theme, and indexing emergent categories as appropriate levels of the same phenomena.

The Consolidated Framework for Implementation Research (CFIR) helped define the themes (Damschroder, Aron, Keith, Kirsh, Alexander & Lowery, 2009). These themes included, (a) access to knowledge and information, (b) adaptability, (c) available resources, (d) complexity, (e) comprehensive/multifaceted, (f) implementation climate, (g) knowledge and Beliefs about the innovation, (h) leadership engagement, (i) learner characteristics, (j) literal definitions, (k) needs and resources for those served by the organization, (l)peer pressure, (m) readiness and reflecting, (n) readiness for implementation, (o) relative priority and (p) tension for change. Although some comments were related to the dimension being addressed, in some instances the data reflected commonality within and across other areas. It was recognized that the emergent themes contained similar attributes across dimensions and across data types. Table 2 shows the outcome of coding results from respondent open-ended data.

Table 2

Definition of Themes Informed by the Consolidated Framework for Implementation Research

Themes	Definitions
Access to Knowledge and Information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks
Adaptability	The degree to which an innovation can be adapted, tailored, refined, or reinvented to meet local needs
Available Resources	The level of resources dedicated for implementation and on-going operations, including money, training, and education, physical space, and time

Table 2 (continued

Themes	Definitions
Compatibility	The degree of tangible fit between meaning and values attached to the innovation by involved individuals, how those align with individuals' own norms, values, and perceived risks and needs, and how the innovation fits with existing workflows and systems
Complexity	Perceived difficulty of the innovation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.
Comprehensive/ Multifaceted	Broad and wide ranging descriptions inclusive of mobile learning as well as areas beyond mobile learning (e.g. performance support)
External Policy and Incentives	A broad construct that includes external strategies to spread interventions, including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmarking reporting
Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an innovation, and the extent to which use of that innovation will be rewarded, supported, and expected within their organization
Knowledge & Beliefs about the Innovation	Individuals' attitudes toward and value placed on the innovation, as well as familiarity with facts, truths, and principles related to the innovation
Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation of the innovation
Learner Characteristics	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style

Table 2 (continued)

Themes	Definitions
Literal Definitions	A description of what is meant by mobility and learning (e.g., does a mobile laptop count as mobile learning)
Needs and Resources of Those Served by the Organization	The extent to which needs, as well as barriers and facilitators to meet those needs, are accurately known and prioritized by the organization.
Peer Pressure	Mimetic or competitive pressure to implement an innovation, typically because most or other key peer or competing organizations have already implemented or are in a bid for a competitive edge
Readiness and Reflecting	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience
Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an innovation
Relative Priority	Individuals' shared perception of the importance of the implementation within the organization
Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change

Themes were developed from the qualitative data that were collected in the online questionnaire and in publicly available documents. The ongoing review of the qualitative data preliminarily identified, and defined, general themes and patterns (Creswell). The approach to content analysis was similar to that used by Haanstra, Hanson, Evans, Van Nes, De Vet, Cuijpers and Ostelo (2013) in their mixed methods study in which faced-to-face interviews were used to examine patients notions and expectations of treatment for back pain. One of their goals was to minimize the number of re-emergent codes during the content analysis. They reviewed interview data and developed an initial coding strategy that organized the data into domains. Follow on interviews were used to revise,

adapt and finalize the existing codes based on the emergence of unanticipated domains. They then further subdivided main domains into subdomains to facilitate categorization and manipulation. The constant review and adjustments in codes resulted in reaching the point at which all appropriate codes and themes had been identified, and further refinements were not necessary. They found the use of content analysis to be valid in assessing the extent of patients' differentiation in their notions of value versus expectations pertaining to treatment for back pain.

Data Reduction

Data reduction was the next stage in the data analysis process. Blaikie (2003) reasoned that quantitative data reduction involves organizing a number elements of data into simple scales and indices in order to analyze several responses as a single value. In a like manner, Huberman et al. (2014) argued that qualitative data reduction is the ongoing process of choosing, organizing and simplifying elements of the data under review so that it addresses the issue under investigation in a meaningful way. It is important to note that Huberman et al. also opined that the use of the term data reduction implies the loss or weakening of data and proposes the term data condensation in this phase of the data analysis process. Reduction involved reviewing the data with a focus on determining which data were significant, which data required emphasis, and which data should be omitted (Miles & Huberman, 1994). The reductions steps used in the study accommodated all of the data obtained from respondents.

Quantitative Data Reduction

For quantitative data reduction, scales were used to demonstrate participant responses based on their views of the identified dimensions of mobile learning (Blaikie,

2003). In analyzing quantitative data, simple percentages were used to measure items. In instances where 5-point Likert scales were used, the intent was to determine the extent of agreement or support for an item and-were weighted by assigning values ranging from *5 for strongly agree* to *1 for strongly disagree*. In instances where forced questions or multiple response items were used the aim was to portray the frequency and percentages with which respondents viewed the items under study, using ordinal scales and values coded according to the number of options in each question (Blaikie).

Qualitative Data Reduction

The qualitative data reduction for the online questionnaire and publicly available documents was guided by the steps described by Miles and Huberman (1994) and Suter (2012), which involved developing codes and themes that condensed the data into a simplified form thereby making it easier to draw conclusions. The first step was to examine all of the qualitative data to determine what participants were saying about mobile learning usage. Next, the data were coded to align the respondent input with the dimension under study. Finally, frequency counts were made of the number of words and phrases mentioned by respondents to determine the degree to which comments represented similar or different views about a theme (Miles & Huberman).

Qualitative reduction followed a first and second cycle coding process. First cycle coding was a key part of data analysis and meaning making. Descriptive coding was initially used to label words or phrases for categorization and follow on analysis. Next, clustering was performed to organize similar data into unique groups associated with each research question and dimension, to enable more in-depth analysis and to gain better insight into the data meaning (Miles, Huberman & Saldaña, 2014). During the clustering

process, attribute coding was used to align the general and demographic data reported to address the research questions and their associated dimensions (Saldaña, 2013). In addition, magnitude coding was used to demonstrate the frequency and intensity of the mixed data (Saldaña). In-Vivo coding was used in instances where participants own words addressed a specific dimension of research questions (Miles, et al., 2014).

The next part of the qualitative data reduction process was second cycle coding which involved reviewing and reducing the initial codes, themes and categories. The resultant codes and themes were submitted to continuous reexamination to discover patterns in participant views and activities, to create a more condensed set of codes and themes specifically related to the research questions (Miles et al., 2014). The qualitative data were then examined to determine the extent of alignment against the research questions.

Data Display

According to Miles and Huberman (1994) just as in data reduction, display is an interactive and central component of data analysis. They argued that data display involves reducing the quantitative and qualitative data to an organized and simplified form. The goal of data display was to present cogent and easily understandable pictures of what patterns and interrelationships the data were revealing. Indeed Onwuegbuzie and Teddlie (2003) suggested that visual displays make it easier to analyze and compare quantitative and qualitative data. However, Miles et al. (2014) argued that the use of displays alone does not provide a complete picture and must be accompanied with narrative. Data display involved reducing the quantitative and qualitative data to simplified forms from which descriptions and conclusions were derived (Miles &

Huberman). The combination of narrative, figures, and tables are used to display the data. The intent is to provide summarized, yet whole responses that address the research questions and dimensions under review (Miles et al., 2014).

Data Comparison

Data comparison was achieved by examining and linking quantitative and qualitative from the online questionnaire as well as qualitative data from public documents and website postings. The strategy for data comparison used was that described by Creswell and Plano-Clark (2011) in which descriptive data, thematic data and in-Vivo data from open-ended comments were synthesized. The data were first associated with each of the research questions and their related dimensions. Comparisons were then made by examining the quantitative data with summary statistics and the qualitative data using thematic analysis to identify potential connections and to explain differences identified in participants responses. A determination was then made of the extent to which the combined results addressed the research questions and the comparative analysis presented in tabular and narrative form.

Once the conceptual scheme was suitably differentiated, the quantitative and qualitative data were integrated to lay the foundation for constructing a report of the findings. This process involved reexamining the results of all the preceding analyses to create conceptual understandings of the total communicated experiences of participants in the sample. Triangulation was achieved by combining the results of different data types and comparing the findings. The public documents that were intended to increase the understanding of the phenomena were both limited and informative by their absence.

Limited access to plans and reports inhibited gaining greater insight into how the participants' have embraced the phenomena and disallowed making broader comparisons.

Data Integration

The integration of mixed methods is defined by Tashakkori and Teddlie (2010) as the point at which data elements and analysis strategies are considered to be merged and are reliant upon each other for producing a result. Fielding (2012) argued that because data integration relies on converging the data from multiple sources, it has to be, and is the central focus of concurrent triangulation mixed methods research. The decision of how the mixed method data are managed is central to how data are collected and analyzed (Creswell, 2014). Moreover, the mixed methods data integration strategies must address the way the data are to be connected.

As called for in the concurrent triangulation strategy, data integration occured during interpretation, with the results described in the discussion (Tashakkori & Teddlie, 2003). Quantitative and qualitative data were maintained separately during the data collection and data analysis stages. Descriptive statistics were used to analyze quantitative data. Data analysis software were used in developing codes and themes from qualitative data collected in the form of semi-structured and text documents. Mixed methods data integration occurred in the interpretation phase.

Interpretation

The interpretation phase represents the final step in the analysis procedure and involved assessing the results derived from the quantitaive and qualitative results, comparing the findings and explaining their meaning (Creswell, 2014; Creswell & Plano-Clark, 2011). Interpretation represents the most reasonable explanation and judgment of

what the data reveals (Tashakkori & Teddlie, 2003). Suter, (2012) contended that not only do researchers arrive at differing interpretations of the same data, they sometimes misinterpret the data. Because of the potential for misrepresentations of data, it was important to engage in cautious and reflective reasoning while interpreting results.

Interpretation consisted of developing an understanding of the quantitative and qualitative results and explaining their meanings. The fundamental nature of qualitative data is that during interpretation the researchers' personal background and experiences will have an influence on results. The triangulations of quantitative and qualitative data were used to counter the potential of researcher bias and thereby enhance the findings in the interpretation phase (Johnson, et al., 2007). Data triangulation was used during the interpretation phase to converge, contrast and compare quantitative and qualitative results. The extent to which the triangulated results converged and agreed was used an indication of validity (Creswell, 2014; Tashakkori & Teddlie, 2003). The conclusions, implications and recommendations for further study from the analysis and interpretation of result are described in detail in the discussion (Collingridge, 2013; Creswell).

Summary

The study used a concurrent triangulation mixed methods research design that explored the approach taken by cabinet-level agencies and departments in using or considering use of mobile learning. An eight part self-administered online questionnaire was used to gained insight into how decisions were made, how mobile learning is being used or considered for use. The questionnaire examined how mobile learning use was evaluated to determine if outcomes were achieving intended purposes. The development, validation and approval processes for the online questionnaire are discussed.

The chapter described the purposive sampling procedure used including participant selection and demographic characteristics. The approach to data collection that involved using an intermediary to contact participants, and the procedure for selecting both quantitative and qualitative data types are described. The protocol used to reestablish validity and reliability for previously validated instruments was reviewed. Also addressed are the approach to quantitative and qualitative data reduction, data display and data comparison. The chapter concluded with a review of the procedures for quantitative and qualitative data analysis, data integration and, data interpretation.

Chapter 4

Results

Overview

This chapter presents the results of a mixed methods study that examined how cabinet level government agencies and departments choose, implement and evaluate the use of mobile learning. The chapter is arranged to enable the reader to understand the linkage between the problem, research questions, research activities, and results. Presented are an overview, analysis results and summary of results. The problem addressed was how and in what way do the approaches that organizations choose for implementing mobile learning affect the program outcomes (Passey, 2012). The goal was to gather data that would increase the understanding of challenges encountered by cabinet-level agencies and departments in pursuing the use of mobile learning. Data collected using the concurrent triangulation mixed methods case study presents a picture of the experiences and challenges encountered in pursuing the use of mobile learning. The results of the analysis effectively addressed each of the three research questions.

Data Collection and Analysis Results

The data that were collected and analyzed are presented to address each of the three research questions and focus on seven dimensions that included participant demographics, mobile technology decisions, the mobile learning environment, mobile learning content, educators/trainers, learners and assessment. Two items captured what organizations are doing differently as a result of mobile learning implementation efforts and when mobile learning is expected to become integral to education and training

programs. Quantitative and qualitative data are presented using narrative, figures and tables.

Publicly Available Documents

The methodology retrieved publicly available government cabinet-level organizations planning and reporting documents relating to the use of mobile technologies, specifically as relates to the use for learning. Documentation created for non-research purposes were sought out to augment data captured in the online questionnaire. The intent of collecting both quantitative and qualitative data to offset the weakness of using a single method, as called for by Creswell (2013), was hampered somewhat because of the limited availability of accessible documentation.

Early in the data collection process, searches for publicly available documents were made using terms related to mobile learning in government and mobile technology use in government. Finding artifacts in the form of human capital strategic plans, training and development plans or organizational strategic plans was anticipated. The important consideration when examining documents is whether those that are available provide insight into the phenomena and the organizations under study (Bowen, 2009). Indeed he suggested that the absence of documents as well as the nature of the content in those documents that are found can provide telling insight into the activities of organizations.

The greatest number of documents located were government agency and department website postings that described efforts to establish a foundation and strategies for the use of mobile technology. The majority of publicly available documents were in the form of website postings of strategy documents, milestone progress, and minutes of meetings. Table 3 provides a listing of some of the public documents that were reviewed.

Table 3

Types of Documentation Located

Documents
Charter of the Interagency Federal Chief Learning Officers
Digital Strategy Milestone Deliverables
Digital strategy: Delivering Better Results for the Public
Federal Chief Information Officer Digital Strategy
Federal Government Mobile Apps Directory
Interagency Federal Chief Learning Officers Council charter
Leveraging New Technologies for Employee Development Programs
Memorandum on Building a 21st Century Digital Government
National Technical and Education Resource (NTER)
Office of Personnel Managements Training and Development Policy Wiki.
Office of Personnel Management, Data, Analysis and Distribution, Federal Employment Reports, Full-time Permanent Age Distribution website

A principal and overarching document discovered was an executive memorandum issued by the President of the United States, requiring heads of cabinet-level agencies and departments to develop plans for operationalizing the administrations' strategy for making the best use of emerging technologies (Obama, 2012; Snead, 2013).

Another web posting found was the Federal Chief Information Officer Digital Strategy, which related to the presidential executive memorandum. The digital strategy called for agencies and departments to develop plans to use emerging technologies in the delivery of their services (VanRoekel, 2012a; VanRoekel, & Park, 2013). It charged agencies and departments with finding efficient and effective ways to use web-based and mobile technologies in their programs and processes for delivering services including the adoption of commercial mobile apps (VanRoekel, 2013a).

The Digital Strategy Milestone Deliverables is a different web posting linked to the digital strategy that identified specific actions for, and progress achieved in, leveraging the capabilities of mobile technologies (VanRoekel, 2013). The milestone deliverables are described as efforts to improve the provision of data to the public, explore efficient and effective ways for technology acquisition, improve the process for customer access to services, and provide a dependable means for assuring the protection of privacy and security (VanRoekel, 2012b; VanRoekel, 2013b).

Another set of documents found were associated with the Chief Learning Officers Council (CLOC) activities during the period between January 2013 and January 2015. One document was the Interagency Federal Chief Learning Officers Council charter, which described the mission, authority, purpose, roles and responsibilities of the organization. The CLOC charter is a high-level document focused on strategic and operational collaborative efforts related to learning and development for the federal workforce. A review of the document revealed that the charter did not specifically discuss the use of mobile learning. Other CLOC documents found were strategic planning and recurring meeting minutes, accomplishment reports, memoranda of understanding between the Chief Human Capital Officers, Chief Learning Officers and the Office of Personnel Management. A number of the documents were available and contained information considered noteworthy. However, some documents contained information of the CLOC was considered sensitive. Seale (2012) pointed out that although information posted on websites might be publicly available; there are divergent views on the need to obtain the author's permission prior to use. The CLOC Chair-requested that the minutes

and other meeting documents not be included in the study. For this reason,-the content was not included in the reporting (Bergquist, 2015).

An additional web posting reviewed was that of OPM's "Training and Development Policy Wiki." The stated purpose of the Wiki was to serve as a forum for government agencies and departments to share ideas, best practices and tools that could improve the delivery of training and development services to the federal workforce (Smith-Heimbrock, 2013). The Wiki, created in 2011, suggested an early recognition by OPM of the role that new technologies could play in employee development. Moreover, the wiki contained a number of guides, policies, and tools offered by both the public and private sector. In fact, the Wiki offered a section on Leveraging New Technologies for Employee Development Programs that mentioned mobile learning. However, there were no documented activities associated directly with the use of mobile learning. A review of the Wiki found that the most recent update was on February 10, 2015.

A search of the Department of Energy website revealed the use of the National Technical and Education Resource (NTER), which is described as an open source mobile learning solution that supports the Office of Energy Efficiency and Renewable Energy (Garcia, 2012). The NTER site contains both elearning and mobile courses designed to support workforce education and training needs. However, the lack of mention of this mobile learning solution in the documentation of either the Digital Strategy implementation reports or the Chief Learning Officers documents is quite telling.

Where there are documented instances in which mobile technologies are being used, the primary focus seems to be on mobile apps. A review of federal government mobile apps directory (https://www.usa.gov/mobile-apps) revealed a rather extensive use

of mobile apps to support the delivery of federal services (Eom & Kim, 2014). Again, there are instances of the use of mobile content; however, the focus is primarily aligned with enabling the use of agency or department services and performance support efforts.

Online Questionnaire Response Rate

Through purposive sampling strategies, 28 online questionnaires were distributed via an intermediary to study participants, all of which were returned. Nine questionnaires were dropped from the analysis due to incompletion (i.e., only the demographics portion was completed), resulting in a sample size of 19. Of the 19 questionnaires, all were 100% complete except for one, in which the participant did not responded to more than 66% of the total items in the questionnaire. This resulted in a response rate for this study of 68%. Based on Fowler (2002), the response rate is extremely favorable for survey research methods and even more favorable for online surveys (Nulty, 2008).

Demographic Characteristics

The initial questions in the questionnaire focused on sample demographics and gathered participants' gender, age group, level of education, years of experience in education or training, organizational affiliation and current job or position in the organization. The job or position classifications used were derived from the OPM data, analysis and distribution, federal employment reports, and full-time permanent age distribution website (https://https://www.opm.gov/policy-data-oversight/data-analysis-documentation/federal-employment-reports/reports-publications/full-time-permanent-age-distributions/) (Lukowski, 2013).

Respondents' demographic data revealed diversity in participants' gender, age group, level of education, years of experience in education or training, organizational

affiliation, and current job or position in the organization to be diverse. Participants consisted of highly educated, middle-age professionals, mainly U.S. cabinet agency or department workers, with a decade or more of experience as a practitioner in the field of education or training. Data indicated that more than two-thirds of the respondents (68%) were men. Online questionnaire data also revealed that respondents were comprised of a broad range of ages with the nearly 80% between 45-64 years of age. Furthermore, the data indicated that nearly all participants have some formal education; with the majority (79%), having earned advanced degrees. Most of the respondents held a master's degree (57.9%) or doctorate degree (21.1%). Two respondents (10.5%) held a Bachelor's degree or Associate's degree and two participants (10.5%) had no formal schooling beyond Secondary.

When asked about their experience in the field of education and training, all respondents but one had some experience. The majority of the participants, nearly 74% had 16 years or more of experience. Three respondents (15.8%) had 10-15 years of experience and one respondent (5.3%) had 4-5 years of experience. One respondent had less than 1 year of experience (5.3%).

As shown in Figure 2, data revealed that two third of respondents (63.2%) were U.S. cabinet department workers. The remaining respondents worked in either an independent agency (21.1%), a government corporation (5.3%), a regulatory agency (5.3%), or a sub agency (5.3%).

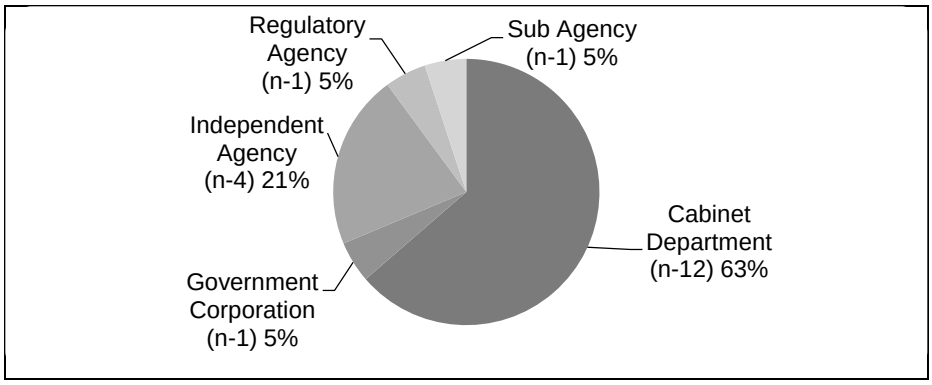


Figure 2. Descriptions of respondents' organizational assignments.

As shown in Figure 3, respondents' job and positions were varied with nearly one-half (47.4%) identified as either managers or others. Between 21% and 26% of respondents identified as Learning Content Creators, Educators, Instructional Designers or Instructor/Trainers. In providing open-ended comments, more than one-third (36.8%) of respondents identified their job/positions as Chief Learning Officers. In other open-ended comments, one respondent self-identified as a Strategic Human Capital Specialist, and another as a HR Specialist.

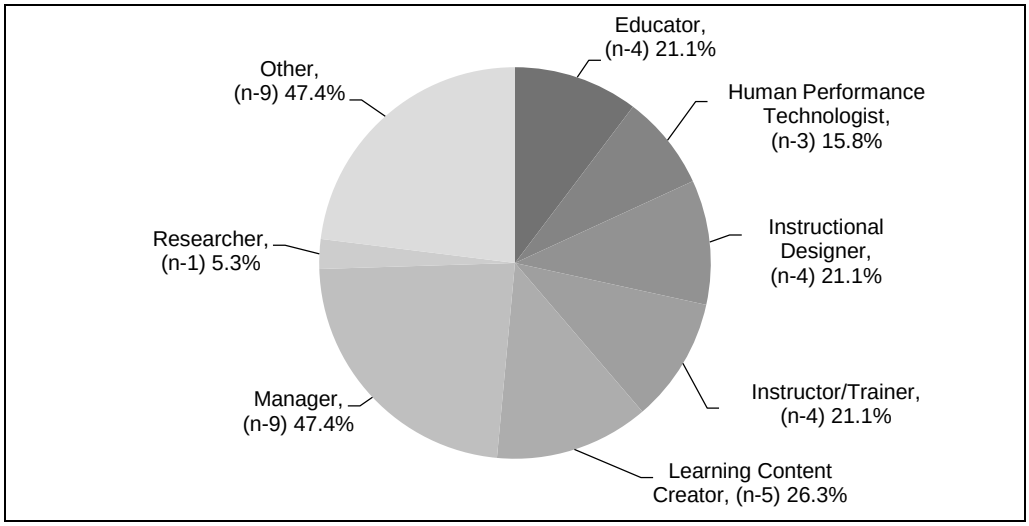


Figure 3. Description of current job position titles in agencies and departments.

Research Question One: What are the influences that led to the decision to implement mobile learning?

The combination of structured and semi-structured questions informed by existing literature, captured how participant reached the decision to use mobile technology, how organizations allowed mobile technologies to be used, the extent to which policies for use were in place and approaches taken to ownership and use.

Mobile Technology Decisions, Use and Policy

A number of decisions must be made before organizations can effectively leverage mobile technology for learning (Ozdamli & Cavus, 2011; Passey, 2012. Decision must be based upon asking the right questions pertaining to how the tools can best achieve the desired training and learning outcomes (Saccol et al., 2011; Sostak, 2012). The student, the technology, and the various aspects of mobility are all intertwined with the appropriate pedagogy and must be included in the decisions for mobile learning use. Additionally, decisions by agencies and departments to use mobile technologies come with increased security concerns and present greater risks in protecting personal and organizational information (Bhattacharya et al., 2014; Boyles et al., 2012; Keengwe & Bhargava, 2013; Lin, Huang, Wright, & Kambourakis, 2014; Martin & Ertzberger, 2013; Pereira & Rodrigues, 2013; VanRoekel, 2012b; VanRoekel, 2013b). Depending on the approach chosen for implementing mobile technologies for learning, decisions have to be made on how devices and data are managed and how to ensure that adequate security and privacy measures are in place (Haag, 2011).

This section addressed Research Question One and examined the factors that influenced to the decisions to implement mobile learning. When asked how organizations

allowed mobile devices to be used, nearly two thirds of respondents (63.2%) indicated that organizations allowed both work and personal use. However, slightly more than one-third (36.8%) allowed mobile devices for work use only. The data also revealed that when responding to an item that asked if their organization had a policy for mobile device ownership and use the majority of participants (79%) had policies. On the other hand, the remaining participants (21.1%) did not have a policy for mobile device ownership and use. Nonetheless when asked in an open-ended follow-up question to provide an explanation of their organizations policy responses reflected a variety of approaches to policies on mobile device ownership, most participants indicated a focus on work use, not training. All of the comments were related to the themes of external policy and incentives and relative priority. One respondents stated that there was "Department Policy on the use of government issued devices," while two others stated that there was an "official use only" policy. Another respondent described a "policy established that describes usage and application downloads." One respondent stated his/her "organization has several policies and internal procedures governing mobile device ownership and use." A different respondent commented that his/her "agency put in place a mobility policy when it rolled out blackberries and BYODs." Yet another remarked that there was a policy in his/her organization "for communication, scheduling, training, accessing information and workers must follow agency policy for protecting information." One stated, "The organization provides the device along with the support, and specifies how the device will be used." With more elaboration, a respondent commented:

> The Office of the Chief Information Officer offers a new service, Agency Mobilize Program, allows employees to connect to the . . . Departments network using expanded mobile options. Employees can access email, check calendars, and keep up with work contacts while in the office, on the go, or from anywhere. Agency has provided a Quick Reference PDF, Mobilizer User Guide, User Agreements, checklists, etc.

One respondent stated that that "There is a very extensive policy on use of mobile devices within my agency," while another stated that he/she was "not sure."

The expectation was that agencies and departments would have established conditions of use policies if they were engaging in the use of mobile technology. To this end, the data indicated that agencies and departments were engaging in the use of mobile technologies. For the most part, the agencies and departments have recognized the need for policy and there are varying levels of effort underway for its establishment. It is important to note however that the data overall revealed and buttressed findings by VanRoekel, (2012b) of the need for continued focus to address the broad range of concerns that come with the use of mobile technologies.

Table 4 shows the result of an open-ended item that asked respondents to describe the policy for mobile device ownership and use. The table presents the two emergent themes that were determined to be most representative of patterns identified by respondent comments reflecting organizational policy on mobile device ownership and use.

Table 4

Themes and Categories that Describes the Policies for Mobile Device Ownership and Use

Themes	Respondent Comments
External Policy and Incentives	Department policy Department Policy on the use of Government issued devices Focus is on work use, not training
External Policy and Incentives	Government Security Policy Official use only Official use Only Our organization has several policies and internal procedures governing mobile device ownership and use Policy established that describes usage and application downloads The agency put in place a mobility policy when it rolled out blackberries and BYODs The Office of the Chief Information Officer offers a new service, Agency Mobilize Program, allows employees to connect to the DOT network using expanded mobile options. Employees can access email, check calendars, and keep up with work contacts while in the office, on the go, or from anywhere. Agency has provided a Quick Reference PDF, Mobilizer User Guide, User Agreements, checklists, etc The organization provides the device along with the support, and specifies how the device will be used There is a very extensive policy on use of mobile devices within my Agency Use for communication, scheduling, training, accessing information, must follow agency policy for protecting information
Relative Priority	not sure

Regarding the approaches to mobile device ownership and use their organizations employ, respondents were allowed to check all that apply and to add open text comments. The data showed that the majority (84.2%) of respondents use a Here's Your Own Device (HYOD) approach. Just over a quarter (26.3%) uses a Choose Your Own Device

(CYOD) approach. The least used approaches were Bring Your Own Device (15.8%) and Own Your Own Device (10.5%).

More than one third allowed mobile devices for work use only and the majority of organizations have a policy. In general, agencies and departments have acknowledged the implications for having policies and there are varying levels of effort underway for its establishment. Moreover, HYOD were the widest used approach (84.2%) by agencies and departments.

Research Question Two: What are the approaches taken in implementing mobile learning?

To address the research question data were organized around four dimensions that included the mobile learning environment, mobile learning content, mobile learning educators/trainers, and the mobile learner. The results were presented using the combination of quantitative and qualitative data. The sources of quantitative data were from the mobile learning online questionnaire, comprised of 5-point Likert scales, multiple responses items that include check all that apply options, and forced-choice questions allowing respondents options to select between predefined alternatives. The sources of qualitative data were open-end questions and respondent comments captured in the online questionnaire as well as from public documents that were expected to discuss the presence or absence of efforts in implementing mobile.

Mobile Learning Environment Dimension

Mobile learning environments are all of the elements required for learners to be successful including instructors, other learners, and instructional resources (Ozdamli & Cavus, 2011). According to Park (2011), sound approaches are required to implement

mobile learning successfully. Teall et al. (2011) noted that guidelines used in designing mobile learning must take into account both the learner and the learning environment. Moreover, Ng (2013) and Wilkin et al. (2013) asserted that it is important to recognize that the existence of organizational environmental factors, such as leadership participation and support, available resources, and the skills of the instructional staff needed to integrate mobile learning into existing programs, will influence success.

Mobile Technology Use for Learning

Related to mobile learning environments, also examined was whether or not mobile technologies were used for learning, how mobile learning was defined, how organizations decided to use mobile learning, how mobile learning use was approached, the number of mobile learning projects organizations have implemented, the types of mobile technologies organizations used for learning and the types of activities mobile learners were allowed to perform. the types of activities learners actually perform on mobile technologies, the types with which mobile device capabilities have been incorporated into mobile learning, and the rates of use for each.

When asked if their organizations used mobile learning the data showed that nearly half (47.4%) of the respondents organization use mobile learning. A small number (21.1%) of respondents' organizations did not use mobile learning and one respondent was not sure. More than one-fourth (26.3%) indicated 'other' regarding their organizations use of mobile learning, with some commenting that their organization is "exploring and studying the opportunity" or "just created our first mobile learning application and getting ready to launch the system" and "entering the arena now." The

data indicated that some organizations that provide mobile devices are in transition with regard to the use of mobile learning as one respondent commented

> We have a learning transformation strategy that includes mobility. We need the devices to be in place to support. Currently, the standard devices are blackberries, but the organization is moving to iPhones, Android, and tablet technologies. Once in place, then we can move to mobile learning."

These comments are considered associated and consistent with the theme of adaptability, indicating that respondent have the willingness but have questioned their readiness and ability to use mobile technology for learning. In addition, when compared the qualitative themes of readiness for implementation generated by respondents comments were found to be consistent with the quantitative data and suggested that for the most part there is a clear but cautious interest in the use of mobile learning.

Mobile Learning Definitions

Because defining mobile learning continues to be a challenge, respondents were given the opportunity to offer their descriptions and interpretations of the discipline. When asked in an open-ended item to define mobile learning, several themes emerged from participant responses. Table 5 presents the result of an open-ended item that asked respondents to describe how mobile learning is defined. The table presents the three emergent themes identified as literal definitions, access to knowledge and information, and comprehensive/multifaceted. The themes were determined to be most representative of patterns in respondent comments and reflected their definitions of mobile learning.

Table 5

Themes and Categories of How Mobile Learning is Defined

Themes	Respondent Comments
Literal definitions	Learning obtained through a mobile device (phone, tablet, etc.) Learning through the use of mobile technologies Learning access available through phone, tablet and other portable devices Mobile learning is learning that can be consumed using a mobile device Technically, it's anytime/anyplace learning on a small device using available connections Being able to learn or do training on your smartphone or tablet Mobile learning is learning through content interactions using personal electronic devices for educational purposes in many locations at any time
Access to Knowledge and Information	Employee access to learning on demand Employees can easily access learning anytime and anywhere Having access to courseware on my device Having assess to courseware any time and any place Learning at the moment of need using a mobile device Learning not attached to a workstation that can be accessed anywhere at anytime Mobile device that can accessed learning modalities at any location and at any time Unlimited access to training that is not restricted by location
Comprehensive/ multifaceted	Mobile redefines the process of learning and HPT [human performance technology], taking it out of a silo and placing it closer to the point of performance with embedded metrics Learning through social and content interactions, using personal electronic devices

Literal Definitions

The comments related to the theme of literal definitions are representative of much of the current state of mobile learning in which a universally agreed upon definition continues to emerge. The majority of the comments tended to be device centric and

focused on the technology. As shown in Table 5, one respondent defined mobile learning as “Learning access available through phone, tablet and other portable devices” and another remarked that it was “Learning through the use of mobile technologies.” Two respondents described mobile learning in terms that were from a contextual perspective, with one commenting that “Technically, it's anytime/anyplace learning on a small device using available connections” and another stating that “Mobile learning is learning through content interactions using personal electronic devices for educational purposes in many locations at any time.”

These comments are telling in that they represent the wide ranging perspectives found in the research (Denham, Quick, & Atkinson, 2012; Elias, 2011; Ferreira et al., 2013; Macdonald & Chiu, 2011; Thinley et al., 2014; Wu et al., 2012; Yadegaridehkordi & Iahad, 2012). The focus of the comments defining mobile learning are possibly suggestive of how agencies and departments are viewing mobile learning.

Access to Knowledge and Information.

As shown in Table 5 in defining mobile learning the theme of access to knowledge and information came forward through the analysis and were concentrated around the access to and the availability of learning irrespective of the context. The comments points to the significance that the mobility of the learner represented. These comments highlighted an area in which respondents conveyed the importance of control and it is curious to note that several comments made by respondents are instructive of the role that access to knowledge and information played in how they defined mobile learning. This is noteworthy because, as pointed out by Jones et al. (2013) learner control using technology can have an effect on learner inquiry. While the mobility of the

technology is important, it is not just the mobility of the technology but also the mobility of the learner that must be considered. Indeed Ferreira et al. (2013) argued that the mobility of the technology, the mobility of the learner and the context in which learning is to occur are all central to the process of learning. Taken collectively these comments illustrated a recognition that the learner, the technology and the context must all be considered as essential when mobile learning is defined.

Comprehensive/Multifaceted.

Respondents provided only a few comments related the theme of comprehensive multifaceted definitions. Despite the fact that the comments reflected earlier responses with a focus on technology, they were found to be more expansive and wide-ranging. These comments are consistent with other research on the use of the combination of mobile learning and performance support systems. In fact in their ADL initiative's Mobile Training Implementation Framework (MoTIF) project survey, Berking et al (2013) found that respondents regarded the use of mobile technology for performance support as very promising for wide and sustained use for mobile learning. However, other than the comments related to this theme there are no other mention of social interactions or performance support, which could be either a lack of awareness about this capability or the decision to defer its pursuit.

Because organizations are trying to decide how best to use mobile learning, respondents were given the opportunity to describe their use. In an open-ended item, where some respondents remarked that their organizations do not use mobile learning, others indicated a variety of accounts of how their organizations decided to use mobile learning.

Table 6 presents the result of an open-ended item that asked respondents to describe how organizations decided to use mobile learning. The table presents the five emergent themes that were determined to be most representative of patterns identified as leadership demands/leadership engagement, keeping up with innovation and technology/tension for change, needs and resources of those served by the organization, and keeping up with other administration/peer pressure. The themes were determined to be most representative of patterns in respondent comments and reflected their decisions to use mobile learning.

Table 6

Themes and Categories of How Organizations Decide to Use Mobile Learning

Themes	Respondent Comments
Leadership Demands/Leadership Engagement	Introduced by chief learning officer (CLO) and supported by Human Capitol leadership and through chain of command They heard the buzz word, and thought it was a good idea without doing a needs assessment
Keeping up with innovation and technology/Tension for Change	In line with current technology solutions and the way of the world We need to keep pace with what's possible technologically The mission almost demands it. By agency nature the mission is inherently mobile More data [available] on mobile/micro learning as a promising practice Needed to take advantage of new mobile technologies and changes in workforce requirements Part of the learning management system (LMS) product
Needs and Resources of Those Served by the Organization	Customer demand and interest Increase in employees working remotely and requiring access to learning away from their desk Shifting employee preference (generational demographics). Need for "just in time" learning
Keeping up with other administrative / Peer Pressure	Agency has benchmarked against other agencies (e.g., Air Force and Federal Aviation Administration) They're more advanced in distance learning
Available Resources	We also need to give the incoming generation the tools they need and expect, and we need to be more efficient and effective in a tighter budget environment Budget cuts limiting live training

The theme of leadership demands/leadership engagement came through as important to respondents as demonstrated by their comments. Respondents' remarked that the role and influence that leadership played was central to the decision to use mobile learning. Indeed both Ng (2013) and Wilkin et al. (2013) argued that organizational environmental factors such as leadership participation and support can be important factors in the decision to use mobile learning.

Yet another theme that emerged from respondents' comments when deciding to use mobile learning was keeping up with innovation and technology/tension for change. Currency seemed important to respondents as they commented broadly about the need to keep up-to-date with emerging technologies to support agency and department mission requirement. The themes of needs and resources of those served by the organization and available resources also emerged as noteworthy in respondents' decisions to use mobile learning. These comments are insightful, in that they echo the observations in a General Account Office report on federal training investments that acknowledged the duress training organizations face during times of fiscal constraint (Jones, 2012).

Approach to Mobile Learning

This section examined the approaches taken in implementing mobile learning as relates to mobile environments. When asked if their organization had established an approach for using mobile devices for learning, just over one-fifth (21.1%) have an approach. However, the majority (63.1%) did not have an approach or that they were not sure of having an approach. In others comments two respondents indicated that an approach was "in development" or that they were "working on it."

Table 7 shows the result of an open-ended item that asked how organizations approach the implementation of mobile Learning. The table presents the three emergent themes identified as adaptability, compatibility, and readiness and reflecting. The themes were determined to be most representative of patterns identified by respondent comments that explained their approach for implementing mobile learning.

Table 7

Themes and Categories Explaining How Organizations Approach the Implementation of Mobile Learning

Themes	Respondent Comments
Adaptability	We have a learning transformation strategy that includes mobility. We need the devices to be in place to support. Current, the standard devices are blackberries, but moving to iPhones, Android, and tablet technologies. Once in place, then can move to mobile learning
Compatibility	Access to e-learning programs through a third party provider Mobile friendly Learning management System Use for communication, learning and scheduling - must follow agency security policy Amalgamation of learning and performance support. Re-org of learning to bite-size pieces appropriate for digesting via mobile. More aggressive use of job aids in mobile form to reduce risk and increase productivity at point of performance Use of Books 24x7, Skillsoft, and iBooks is the primary way we engage around mobile learning. Employees have access to learning content in all 3 of these arenas
Readiness and reflecting	Still being defined

The qualitative data were informative in developing a deeper understanding of why the majority of respondents did not have an approach to the use of mobile technology for learning. The thematic data indicated concerns with adaptability as agencies and departments' believed they lacked the necessary mobile learning technology. Additionally, the data indicated that compatibility was a consideration as uncertainty in which technology to use, or how to integrate it with existing programs we

identified. The data also indicated the inability to adapt mobile technology for learning and raised questions about agencies' and departments' progress and readiness for implementation. When these qualitative data were compared with the descriptive statistics related to having and approach for using mobile learning, there was consistency with the results revealing the lack of an approach.

Mobile Learning Projects

Regarding mobile learning projects that their organization has implemented, nearly half of the respondents (47.4%) have implemented up to two projects. One or two respondents have implemented between three and four projects. However, more than a third (36.8%) has no implementations. None of the respondents has implemented more than five mobile learning projects.

The data associated with agencies and department implementations of mobile learning projects were consistent when compared with the qualitative thematic data related to how mobile learning was defined and how respondents decided on its use. Analogous to the definitions and use data, there was a variety of vaguely defined mobile learning projects underway. These connections were viewed as important indicators of a cautious movement toward the use of mobile learning. However, the lack of tangible indications of commitment raised questions of agencies' and departments' readiness for implementation.

Regarding technologies used for learning, Figure 4 is a graphic representation of the types of mobile technologies respondents used by organizations. The most use was made of tablets (57.9%) and smartphones (52.6%). The next most widely used were cell phones (31.6%), e-book readers (21.1%), and phablets (5.3%). About one-fourth of

respondents (26.3%) used no mobile technologies for learning in their organizations. When responding to the others options one respondents said the use of "laptop computers" and one respondent remarked, "mobile desktops from which [I/we] can access our learning management system." Agencies and departments makes use of a variety of mobile technologies, and have explored the use of mobile technologies for learning. However, others comments bring into question the beliefs of what mobile learning is and how it should be implemented.

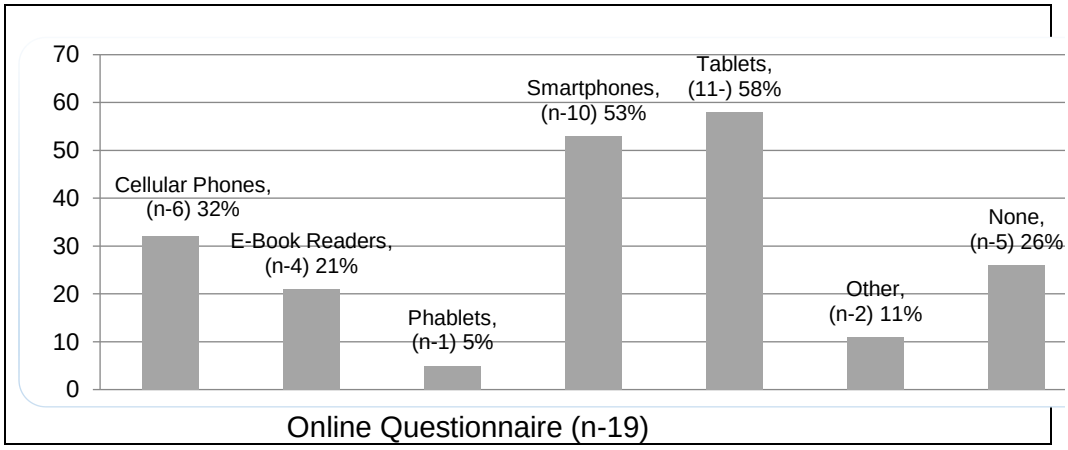


Figure 4. Mobile Technologies used for Learning. The figure presents the types of technologies organizations identified as used in implementing mobile learning. The numbers on the left of the figure represents the percentage of use for each of the technologies. The vertical bars represent each of the technologies used for learning, and contained both the number of responses, and the percentages for each technology use. Other response identified categories not on the list.

In an effort to understand the level of organizational support that existed, respondents were asked to select from seven choices, all activities that learners were allowed to perform on mobile devices at work. As shown in Figure 5, a variety of activities were allowed, with the greatest uses identified as checking e-mails which was nearly 90% and browsing the internet at nearly 80%. More than half of the respondents were allowed to download/view video files (57.9%), download applications (52.6%), download/listen to audio files (52.6%), download e-books (52.6%). Only two participants

(10.5%) were not allowed to perform any activities on mobile devices at their organization. In an other comment, one respondent added being allowed to "Read e-books," which was a variation of the item of being able to download e-books. These findings are important because they indicated that learners are allowed to use a wide range of technologies that have the potential for supporting mobile learning environments.

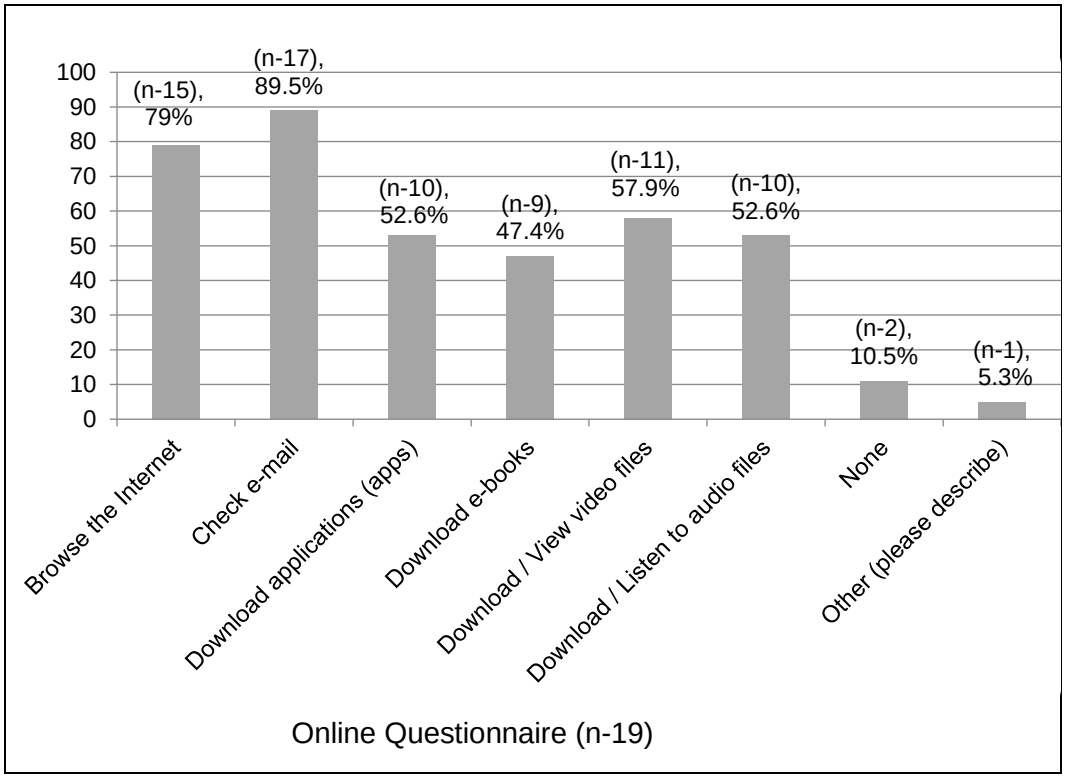


Figure 5. Activities learners are allowed to perform on mobile devices. The figure presents the types of technologies that learners are allowed to perform on mobile devices. The numbers on the left of the figure represents the percentage for each of the allowed technologies. The vertical bars represent each of the allowed technologies used for learning, and contained both the number of responses, and the percentages for each technology use. Other response identified categories not on the list.

As shown in Figure 6, in response to a select all that reply item asking what activities learners actually use mobile devices for, more than two-thirds (68.4%) accessed communications tools. Nearly one-third (57.9%), use mobile devices to access social networking websites (63.2%). However, more than half (57.9%) accessed instructional

material. Data indicated that learners have an equal preference (47.4%) for using mobile devices to perform learning assignments and to acquire supplemental content. Learners had a lessor preference for using mobile devices to collaborate with other learners (31.6%), and for assessing their learning progress (26.3%). The least preference shown was for creating personalized mobile learning experiences (21.1%) and uploading multimedia content (21.1%). Three participants (15.8%) used none and in an open-text box comment, one participant (5.3%) said "in development."

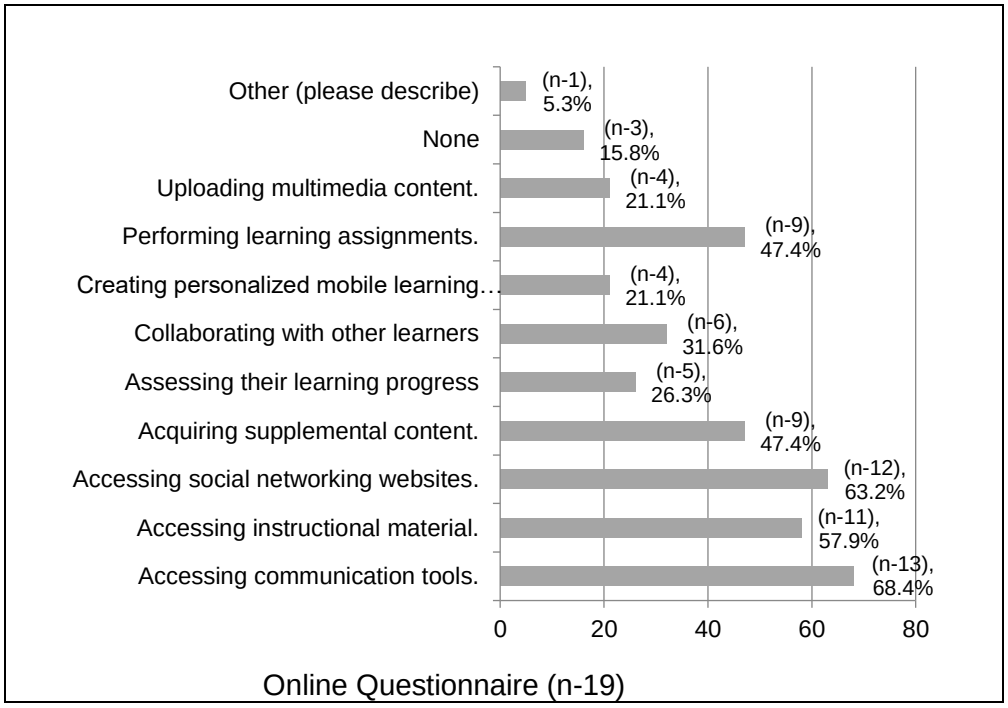


Figure 6. Activities in which learners actually use mobile devices. The figure presents the types of activities for which learners actually used mobile devices. The numbers on the bottom of the figure represents the percentage for each of the activity use. The horizontal bars represent each of the activities for which learners actually used mobile devices. The figure contains both the number of responses, and the percentages of actual use for each device. Other response identified categories not on the list.

The only mobile technology used specifically for learning was accessing instructional material, which was greater than 50%. The data conveyed the limited degree

to which mobile technologies were used and adapted for learning to meet organizational needs and indicated organizational implementation concerns associated with its use.

Data displayed in Figure 7 revealed a wide variety of mobile technology uses and identified document viewing (57.9%) as the most frequent mobile device capabilities incorporated into the design or implementation of a mobile learning solution. The next most, and equally used capabilities incorporated were voice/phone communications and media viewer/playback (36.8%), followed by text messages and media viewer (31.6%). Camera use, search and touchscreen interaction are the third most capability incorporated at (26.3%). The least used were notifications (15.8%), microphone (10.5%), geolocation use (10.5%), and internal sensors use (5.3%). Nearly a third (31.6%) of respondents has integrated no mobile device capabilities.

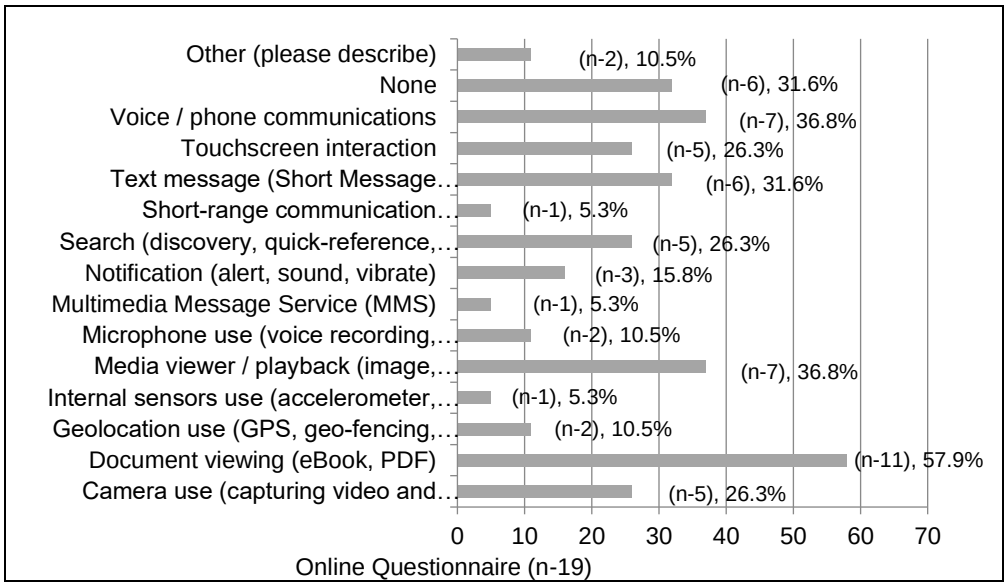


Figure 7. Mobile device capabilities incorporated into the design or implementation of a mobile learning solution. The figure presents the types of capabilities that respondents reported that they have incorporated into mobile learning solutions. The numbers on the bottom of the figure represents percentages for each of the capabilities incorporated. The horizontal bars represent each category of capability incorporated. The figure contains the number of responses and percentages of each capability incorporated. Other response identified categories not on the list.

Overall, the participants acknowledged combining mobile technology for learning activities. Moreover, with the greatest focus on document viewing the data are suggestive of learning that is less interactive. Any number of factors could be influencing the respondents' efforts; however, the open text comments intended to enrich the data were not helpful.

Regarding rate of devise use, the highest rates of use were moderate (38.5%) and high (23.1%). Interestingly the data revealed a combined rate of use of 25% as low or very low. Six respondents (31.6%) did not check any boxes or leave an open-item response, which raises the question of why and whether or not the sequencing of this questioning played a part in its reliability.

Mobile Learning Content Dimension

The items in this section addressed Research Question Two and focused on the content dimension. The combination of structured and semi-structured items examined how mobile technologies were integrated. The items first explored organizational perceptions of mobile learnings capacity to enable new strategies and methods, plans for developing mobile course materials, and which devices were considered best suited for mobile content delivery. Also examined were the changes made to make content available on mobile devices, the operating platforms for which mobile content would be created, how organizations designed and developed content for mobile devices, the type of content mobile learners had accessed, and the difference between content designed for mobile learning and non-mobile learning courses. The final items explored were the changes observed in learners after implementing mobile content, and organizational

perceptions of whether the instructional design process for mobile learning and traditional courses should be different.

Ferreira et al. (2013) argued that the attractive feature of mobile learning is that the technology allows people in a mobile capacity to have ubiquitous access to learning content and the ability to associate with others as desired. However, the successful use of mobile learning content requires an effective interaction between all of the dimensions. The mobility of the technology, the mobility of the conceptual space intended to foster learning, the mobility of the social interactive components, and the mobility associated with choice in adjusting the chronology of events are all contributors to the process of learning (Ferreira et al.).

Respondents were asked in a 5-point likert item if mobile learning enabled new strategies and methodologies in their organization. Just over one-fourth of respondents (26.3%) strongly agreed, about one-third agreed (31.6%) and about one-third neither agreed nor disagreed (31.6%). The remainder either disagreed (5.3%) or strongly disagreed (5.3%). The data reflected an overall belief that mobile learning enabled new strategies and methodologies.

Data showed that regarding their organizations' plans for developing course materials for use on mobile devices only three respondents' (15.8%) organizations are developing course materials only for use on mobile devices. Just more than a quarter of respondents (21.1%) organizations are now developing course materials for use on mobile and stationary devices. However, more than half of the respondents (52.6%) have plans to develop course materials on mobile devices, although little had been done. It is also significant to note that 10.5% respondents have no plans to develop course materials

for use on mobile devices. These data are consistent with quantitative and thematic data found in other dimensions that suggested overall, respondents are moving toward the use of mobile learning content. However, respondents are examining ways to adapt and position mobile learning against other organizational priorities.

When asked which mobile devices (if any) are best suited for mobile content delivery in their organization, participant data (see Figure 8) indicated that smartphones (79%) and tablets (79%); were best and equally suited. Other mobile devices such as E-Readers (21.1%); Phablets (21.1%); Cellular Phones (15.8%); Mobile Digital Media Players (10.5%); and MP3 Players (5.3%); were less suited for mobile content delivery.

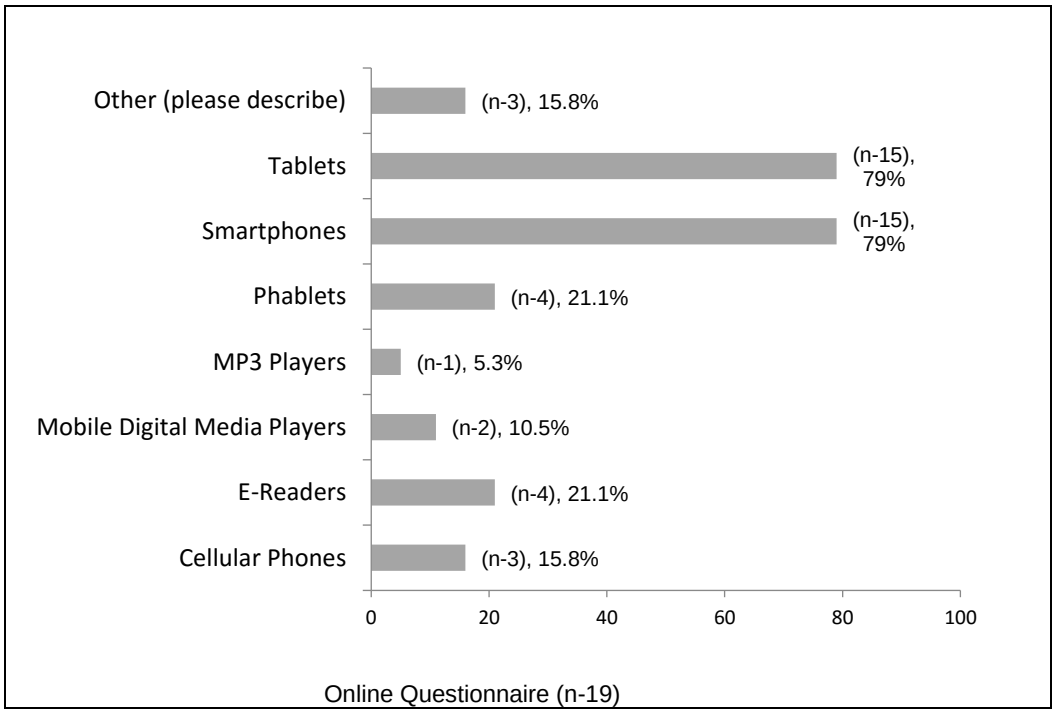


Figure 8. Mobile devices considered best suited for content design and delivery. The figure presents the types of mobile devices that respondents reported best suited for content design and delivery. The numbers on the bottom of the figure represents percentages for each of the devices presented to respondents. Respondents were allowed to select all that applied. The horizontal bars represent each devices category. The values in the horizontal categories represent the number of responses and percentages for each listed device. Other response identified categories not on the list.

In open-text comments, one participant (15.8%) remarked, “Mobile desktop (laptop),” another commented “laptop pcs,” and a third commented, “don’t know.” The data are similar to comments suggesting a broad view of mobile learning by respondents. Overall, respondents indicated an expansive view of devices that are appropriate for mobile learning, and were consistent with other findings in the study.

When asked about changes to content to make it accessible on mobile devices the majority of the respondents (63.2%) organizations had not made changes. However, when asked in an open-ended item to describe the changes made to content to make it accessible on mobile devices, (24.1%) of respondents stated it had mostly to do with the theme of adaptability, compatibility, and relative priority. Comments included “shortened content to only what the learner ‘needs to know,” “re-organizing video and print content for better accessibility (separate from 508 compliance) at a remote work site,” and “had to modify existing content to be compatible with mobile devices.” One respondent said that network changes were made to “make the internal collaboration network available on mobile devices.” Another respondent commented that instead of adapting materials for mobile devices, “we have had to modify existing content to make it compatible with mobile devices. Now designing learning content and collaboration activities with mobile devices in mind.” Yet another respondent commented that the individual “took previously developed material and redesigned it to be responsive.” One respondent commented that the organization had changes “Built into contracts for course development.”

When compared with other dimensions, the findings agree and are supportive of respondent data that indicated concerns of adaptability, described as the need to make changes to networks, mobile technology and content.

Table 8 presents the result of an open-ended item that asked respondents to describe the content changes made to make it accessible on mobile devices. The table presents the three emergent themes determined to be most representative of patterns identified by respondent comments explaining changes that were.

Table 8

Themes and Categories of Content Changes to make it Accessible on Mobile Devices

Themes	Respondent Comments
Adaptability	making the internal collaboration network to be available on mobile devices
Compatibility	re-organizing video and print content for better accessibility (separate from 508 compliance) at a remote work site shortened content to only what the learner 'needs to Took previously developed material and redesigned it to be responsive we have had to modify existing content to be compatible with mobile devices. we are now designing learning content and collaboration activities with mobile devices in mind
Relative priority	not sure

Regarding platforms for which content will be created, data displayed in Figure 9 revealed that the most commonly used were iOS (68.4%), Windows (63.2%), and Android (63.2%). The Blackberry iOS was the least preferred platform (26.3%) for creating content, and one respondent was not sure.

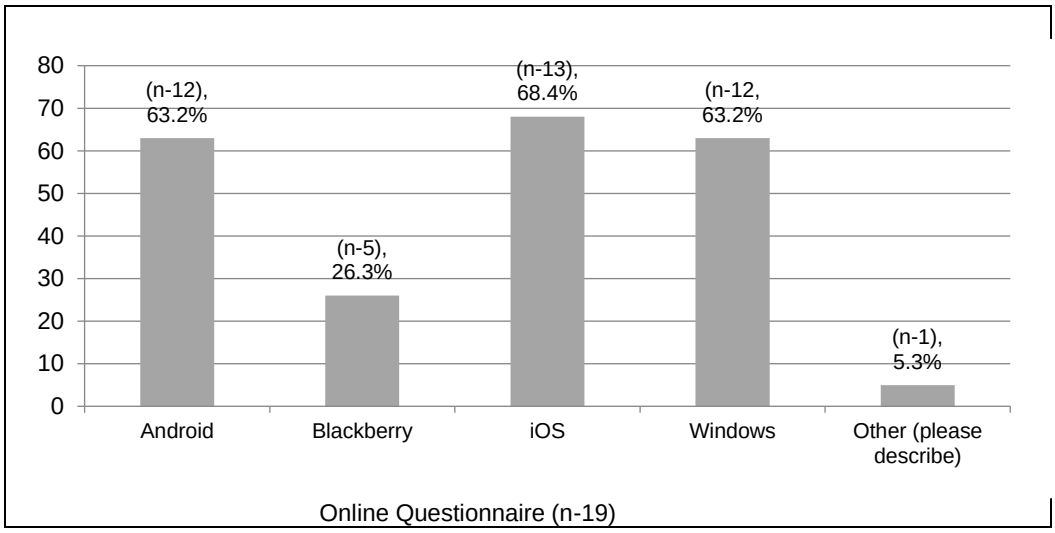


Figure 9. Platforms that content will be created for in organizations. The figure presents the category of operating systems for which respondents indicated plans for creating content. The categories on the bottom of the figure represent the operating systems that were presented as choices. The values on the left side of the figure are the percentages for each of the operating systems presented to respondents. Respondents were allowed to select all that applied. The values in the vertical categories represent the number of responses and percentages for each listed operating systems. Other responses identified categories not on the list.

The data revealed that when asked how their organizations design and develop content for mobile devices, approximately half of respondents' used in-house staff (47.4%) or external developers (52.6%) to design and develop content for mobile devices. When responding with other comments four respondents are either "using expertise in other agencies," "don't know," "not sure" or "not at all." The data are revealing in that based on participant responses content development capacity would need.

The data in Figure 10 showed that the content learners accessed the most on their mobile devices included development training (36.8%); mandatory training (36.8%); compliance based courses (31.6%). Somewhat less accessed were recorded audio lectures (26.3%), recorded video lectures (26.3%) and performance support checklists (15.8%). In

open-text responses six participant comments included “Selected Skillsoft courses,” “Not applicable,” “don’t know or “not sure.”

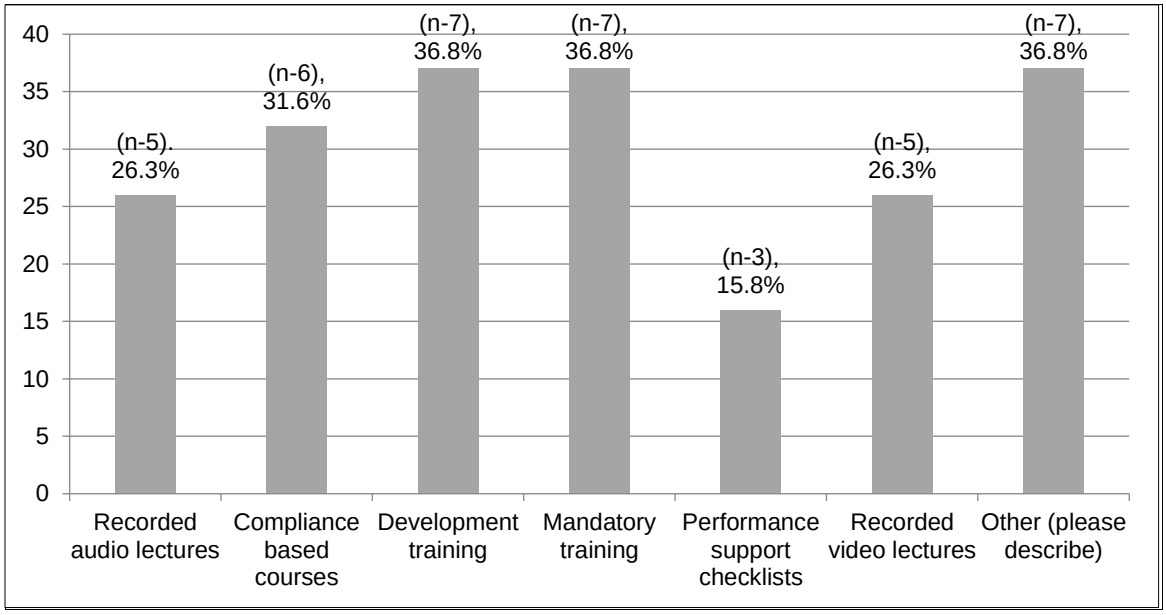


Figure 10. *The type of Content that Learners have accessed on their Mobile Devices.*

When asked in an open-ended format about the differences between courses designed for mobile devices versus a course not using mobile devices, respondents offered a wide range of remarks. Data from respondent comments revealed themes related to adaptability, compatibility, complexity and relative priority (see Table 9 for details). Two participants offered technology focused comments related to the theme of adaptability such as “courseware is designed for smartphone capabilities,” or “Designed specifically for Smartphone applications.” Another respondent the only difference was the “Size of the display only.”

Respondent comments linked to the theme of compatibility included statements about accessibility and size with one respondent remarking, “you must access and identify the most appropriate platform, content type, and devices that will support the course.” Other respondents commented that mobile courses should be “short and sweet”

and another commenting that courses should be “Shorter more modular.” Another respondent remarked “The no mobile courses were paper based generally PowerPoint vs software application based.”

When describing differences related to the theme of complexity respondent comments were that, “There is a skill and methodology to designing in a virtual environment that is different than in person.” One respondent stated, “the process calls for a complete revamping of the traditional training process so that decisions, evaluations, and databases account for the use of learning / performance support at the PoP rather than propagate silo'ed approaches.” She/he also mentioned, “Content is orchestrated to better support work performance and situational awareness.”

Several respondents comments associated with the theme of relative priority stated that that “we don’t have courses for mobile” or that designing for mobile was “Not applicable for our organization at this time,” or they were “not sure.”

Table 9 shows the result of an open-ended item that asked about the differences between courses designed for mobile devices versus a course not using mobile devices. The table presents the four emergent themes that were determined to be most representative of patterns identified by respondent comments that identified differences in courses design for mobile and non-mobile devices.

Table 9

Themes and Categories Describing How Courses Designed for Mobile Devices are Different from Courses Not Using Mobile Devices

Themes	Respondent Comments
Adaptability	Courseware is designed for smartphone capabilities Designed specifically for Smartphone applications Size of display only You must access and identify the most appropriate platform, content type, and devices that will support the course
Compatibility	More attention to accessibility & scale-ability. Shorter More modular very different. There is a skill and methodology to designing in a virtual environment that is different than in person. The no mobile courses were paper based generally powerpoint vs software application based not as content rich short and sweet
Complexity	Content is orchestrated to better support work performance and situational awareness. The process calls for a complete revamping of the traditional training process so that decisions, evaluations, and databases account for the use of learning / performance support at the PoP rather than propagate silo'ed approaches.
Relative priority	Not applicable for our organization at this time NA None we don't have courses for mobile Not yet not sure

Respondents were asked in an open ended item about changes their organization observed in learners after implementing mobile content delivery (if applicable). Data analysis linked respondents' comments to the themes of implementation climate, readiness and reflection and relative priority (Table 10). Respondent comments related to the theme of implementation readiness showed the extent to which mobile content delivery was embraced by learners and supported by organizations. There is evidence of change as the data indicated that respondents observed "Increased demand from newer/younger employees" and a "lack of awareness from older employees." Moreover,

one noted that the results of a “Pilot study indicated that a significant percentage found access and utilization was easy.” Other respondents remarked that the “field access to just in time learning programs increased,” and that there was “good participation by the user community” and that “easier access; increased usage of a variety of content.” Yet another respondent remarked that there were “Greater participation rates (e.g., for executive leadership seminars after implementing GoTo Meeting, increased participation by 70% and 30% of participants participate using GoTo Meeting.” A level of organizational interest is highlighted by the following participants’ remarks, “Right now highlight a level of excitement about the possibilities due to the novelty effect. We need to keep our eyes on the impact at the PoP to identify and capitalize on the value to the organization,”

Respondents’ comments associated with the theme of readiness and reflection identifies a mixed degree of commitment by organizations as indicated by one respondent remarking “No feedback for mobile applications” and another saying “None due to limited applications and limited use.” Respondents comments associate with the theme of relative priority revealed that implementing mobile content delivery is not a priority. For example, one participant responded with “not yet implemented,” and another remarked “we don’t have mobile.” Five participants responded with “not applicable” comments. Taken collectively it is reasonable to believe that respondent comments suggest that some participants have experienced favorable learner outcomes while others do not view mobile content delivery as a priority.

Table 10 shows the result of an open-ended item that asked for descriptions of changes observed in learners after implementing mobile content delivery. The table

presents the three emergent themes that were determined to be most representative of patterns identified by respondent comments.

Table 10

Themes and Categories Describing Changes Observed in Learners after Implementing Mobile Content Delivery

Themes	Respondent Comments
Implementation climate	Easier access; increased usage of a variety of content field access to just in time learning programs increased Good participation by the user community Greater participation rates (e.g., for executive leadership seminars, after implementing GoTo Meeting, increased participation by 70% and 30% of participants participate using GoTo meeting) Increased demand for newer/younger employees; lack of awareness from older employees Move to more instructor-led training Pilot study indicated a significant percentage found access and utilization to be easy Right now, extreme excitement about the possibilities due to the novelty effect. We need to keep our eyes on the impact at the PoP to identify and capitalize on the value to the organization
Readiness and reflecting	No feedback for mobile applications None due to limited application and limited use
Relative priority	We don't have courses for mobile Not applicable for our organization at this time Not yet implemented Not sure Na

The majority of respondents either strongly agreed (21.1%) or agreed (42.1%) that instructional design process for mobile learning should be different from the instructional design process for traditional elearning. Only one respondent (5.3%) disagreed. About one third (31.6%) of respondents neither agreed nor disagreed.

The findings reflect an overall belief the instructional design process for mobile learning should be different from the instructional design process for traditional elearning. The fact that none of the respondents strongly agreeing that the instructional

design process for mobile learning should be different from the instructional design process for traditional elearning is in conflict with the notion that frameworks for existing educational technology is appropriate for mobile learning (Berking et al., 2012). Ng and Wilkin, Rubino, Zell and Shelton (2013) cites the importance of recognizing that organizational environmental factors, such as leadership participation and support, available resources and the skills of the instructional staff needed to integrate mobile learning into existing programs, will significantly influence success.

If they agreed or strongly agreed there should be a difference, the themes that emerged from the rationale provided by respondents included adaptability, compatibility and complexity. The themes addressed a number of technological, learner, design and assessment factors. For example in a comment related to adaptability, one respondent remarked that there is the "Need to factor in bandwidth and screen size in the design" and another mentioned the necessity to "leverage the platform and understand screen size and limitations."

A respondents comment related to the theme of compatibility was that with mobile "Content is designed to be interactive, presented in small segments, very concise and visually engaging" and another remarked that content has to be "based on intuitive interactive processes." In addition respondents commented about the significance of learner considerations with one stating the need to "Think about what can be learned in smaller segments on your own, at your own pace and what pieces need to be in a class-room or more interactive setting," another saying "Keep the content compact and targeted. Short modules to keep the learner engaged" and yet another remarking of the need for support in the form of more read-ahead and more post learning references.

With respect to the theme of complexity respondents also provided comprehensive comments focused on aspects of instructional design. One participant stated, “the design process for mobile learning should be driven by the content objectives identifying unique requirements for the use of a mobile device. Either for features (i.e. camera, GPS, video) or for context (i.e, field work).”

Another respondent provided the following comment relating to the importance of assessment in the design process:

> Task analysis takes on renewed value since there is PoP proximity. Risk and attention to the PoP situation takes on greater importance in design. There is an opportunity to engage in what has been called "stealth assessment" of actions taken at the PoP in order to evaluate the impact of mobile learning on actual performance. This is a case in which mobile can change the traditional business of learning in ways similar to the ways the Gutenberg Press changed the business of information sharing.

The comparison of the rich thick data revealed by the qualitative themes with the descriptive data showed that respondents held similar views. The data revealed that in terms of the need for separate instructional design processes for mobile learning and for traditional elearning respondents there was overall agreement.

Table 11 shows the result of an open-ended item that asked that respondents describe the rationale for why the instructional design process for mobile learning should be different from the instructional design process for traditional elearning. The table presents the three emergent themes that were determined to be most representative of patterns identified by respondent comments.

Table 11

Themes and Categories for Rationale of why the Instructional Design Process for Mobile Learning Should be Different from the Instructional Design Process for Traditional Elearning

Themes	Respondent Comments
Adaptability	Need to factor in bandwidth and screen size in the design leverage the platform and understand screen size and limitations
Compatibility	Content is designed to be interactive, presented in small segments, very concise and visually engaging based on intuitive interactive processes Think about what can be learned in smaller segments on your own, at your own pace and what pieces need to be in a class-room or more interactive setting Keep the content compact and targeted. Short modules to keep the learner engaged Need for support in the form of more read-ahead and more post learning references
Complexity	the design process for mobile learning should be driven by the content objectives identifying unique requirements for the use of a mobile device. Either for features (i.e. camera, GPS, video) or for context (i.e, field work) Task analysis takes on renewed value since there is PoP proximity. Risk and attention to the PoP situation takes on greater importance in design. There is an opportunity to engage in what has been called "stealth assessment" of actions taken at the PoP in order to evaluate the impact of mobile learning on actual performance. This is a case in which mobile can change the traditional business of learning in ways similar to the ways the Gutenberg Press changed the business of information sharing

The majority of respondents believe mobile learning enables new strategies and methods for content development and delivery and a third of respondents are developing course materials only for use on mobile devices or for use on mobile and stationary devices. More than half of the respondents have plans to develop course materials on mobile devices, but little has been done. Smartphones and tablets were best suited for mobile content delivery.

The majority of the respondents had not made changes to content to make it accessible for mobile devices. However aapproximately a fourth of respondents made changes to shorten content “to be “compatible with mobile devices” and for “making the internal collaboration network available on mobile devices.”

The most commonly used platforms were iOS, Windows, and Android and the primary means to design and develop content for mobile devices was through the use of in-house staff, external developers or “using expertise in other agencies,” are. Development training, mandatory training, compliance based courses are the type of content most accessed by learners.

Differences between courses designed for mobile and courses not using mobile devices emphasized the importance of the need to “access and identify the most appropriate platform, content type, and devices that will support the course”. Differences also require an “understanding that the skills are different for designing in a virtual environment than a non-virtual environment,” and that “the process calls for a complete revamping of the traditional training process so that decisions, evaluations and databases account for the use of learning/performance support at the POP rather than propogate [sic] silo’ed approaches.”

The data revealed varied results for changes observed in learners after implementing mobile content delivery. Learners embraced the mobile content delivery; there was increased demand from newer/younger employees, and the increased usage of a variety of content, especially executive leadership seminars. The data reflected a mixed levels of commitment as evidenced by little implementation in some cases and not at all in others and a “lack of awareness for older employees.”

The majority of respondents either strongly agreed or agreed that instructional design process for mobile learning should be different from the instructional design process for traditional elearning. Thematic revealed, “the design process for mobile learning should be driven by the content objectives identifying unique requirements for the use of a mobile device. Either for features (i.e. camera, GPS, video) or for context (i.e., field work).”

Educators/Trainers Dimension

This section provides results related to research question two and focused on the educator/trainer dimension. The items are the combination of structured and semi-structured items that examined participants’ perceptions of how and when to use mobile learning. The items also explored the level of experience that educators and trainers have with mobile learning projects and with converting existing content to a mobile format. Additionally, participants views about using the latest technology for teaching and learning, and reactions to the use of mobile technology for learning were examined.

Mobile technologies afford learners the ability to access information and communications across the contexts of space, time, and location, its use is driving change in teaching practices (Fritschi et al.; 2012; Kukulska-Humes, 2010). For mobile learning to be successful, educators and trainers need to recognize its unique requirements. Combining the vast array of new technologies with the appropriate theoretical approaches for instructional design, support for the learning process, and technology integration is a significant challenge (Glazatov-Sponsor, 2012). The deployment of mobile learning requires an in-depth knowledge of implementation frameworks and the use of the information to inform mobile learning strategies (Chao, 2012; Cochrane, 2012; Frohberg

et al., 2009). Having the skills to incorporate the appropriate learning theory and the capabilities of the technologies into the chosen instructional design strategies are essential to attaining desired outcome for mobile learning initiatives. (Berking, et al.,2013; Park, 2011).

In an item that examined educators or trainers' level of experience with mobile learning, the data showed that only two respondents (10.5%) agreed that there was a general understanding within their organization about how and when to use the capabilities of mobile devices for learning. Just more than one-third (36.8%) disagreed and two respondents (10.5%) strongly disagreed. None of the respondents strongly agreed and nearly one-half of the respondents (42.1%) neither agreed nor disagreed. The findings are consistent with earlier data that indicated only a small number of respondents were prepared to engage successfully in the use of mobile devices for learning.

When asked about the level of experience with mobile learning projects, just over one-fifth (21.1%) of respondent educators or trainers had been involved in mobile learning projects. However, over one-third (36.8%) of respondents indicated educators or trainers in their organization had no exposure to mobile learning projects. Other responses (42.1%) indicated they did not know, that it was not applicable, or that there had been "limited exposure. A few leaders emerging who are comfortable" with the technology and [sic - are] "helping lead the transformation." One respondent remarked, "experience is a function of the perceived mission of the HR unit. In some cases, it was very high. In other cases, it's myoptic [sic]." When compared with data in other dimensions, the findings are consistent with earlier data that indicated a small number of

respondents were prepared to successfully engage in the use of mobile devices for learning.

The data further revealed that nearly half (47.3%) of the respondents felt their organization did not have educators or trainers with experience converting existing courses and learning materials to a mobile format. Only two respondents (10.5%) agreed that their organization had educators with such experience. A substantial number (42.1%) neither agreed nor disagreed when asked, indicating, most likely, they did not know. When compared with data in other dimensions the findings are consistent with earlier data. The data revealed that educators and trainers lack experience in converting course content to a mobile format and indicated the lack of preparation for successfully engaging in the use of mobile devices for learning.

Just more than one-fifth (21.1%) of respondent' educators and trainers held views that the latest trends should have an impact on their teaching, learning strategies, and methodologies, but this is currently not the case. Less than one-fifth (15.8%) of respondents believed that educators or trainers hold views that the latest technology trends and developments in teaching and learning should not have an impact on their teaching and learning strategies or methodologies. However, over a third (36.8%) of respondents' educators or trainers believed that the latest technology trends and developments in teaching and learning should be continuously evaluated due to the new affordances that technology could provide. A small number (10.5%) of educators or trainers hold views that the latest technology trends and developments in teaching and learning should be considered with caution, because new technology can bring about unintended changes to teaching and learning strategies, and methodologies. One

respondent (5.3%) felt it was “a mix right now, as we are undergoing a transformation.” The data indicated that overall educators and trainers hold favorable but cautious views about the potential impact that the latest technological impacts would have on teaching and learning.

Table 12 shows the result of an open-ended item that asked respondents how and why educators or trainers have reacted to the use of mobile technology for learning.

Table 12

Themes and Categories that Describe How and Why Educators or Trainers have reacted to the Use of Mobile Technology for Learning

Themes	Respondent Comments
Implementation Climate	With favor, excitement and encouragement. Eager to learn more & optimize usage. They have embraced it, however they do not get management support to pursue it properly. 1/3 resist; 1/3 are assessing; and 1/3 are ready to go (as in any major change) most respond slowly because they do not have the background in mobile learning or technology. Only a few individuals are leading the charge. varied- some are in favor others are not it's a lot of work and there is a steep learning curve. We know it's the way to go so everyone is willing to make the change and learn how to do this well It's a mixed bag. Some with HPT background see the potential and how the technology impacts the business of training. Others are very concerned it could require them to change, and they would like to keep the status quo Depends on the organization . . .technical delivery adapting faster than core competency and leadership courses
Leadership Engagement	They have embraced it, however they do not get management support to pursue it properly
Relative Priority	Not interested, other pressing issues to address. Not applicable for our organization at this time. Have not expanded the use of mobile technologies yet Have not fully implemented the capability for mobile learning capability

The table 12 presents the three emergent themes that were determined to be most representative of patterns identified by respondent comments as implementation climate, leadership engagement, and relative priority. In describing educators' and trainers' reactions to the use of mobile technology for learning related to the theme of implementation climate a respondent remarked, "most respond slowly because they do not have the background in mobile learning or technology." Another commented that "1/3 resist; 1/3 are assessing; and 1/3 are ready to go (as in any major change)." However, two other respondents' remarked that educators or trainers have reacted "With favor, excitement and encouragement" and were "Eager to learn more & optimize usage."

As identified by respondent other comments related to the theme leadership engagement data were varied, with one respondent remarking that, "It's a mixed bag. Some with HPT background see the potential and how the technology impacts the business of training. Others are very concerned it could require them to change, and they would like to keep the status quo." Another respondent commented that it "depends on the organization . . . technical delivery adapting faster than core competency and leadership course." Yet another remarked, "it's a lot of work and there is a steep learning curve. We know it's the way to go so everyone is willing to make the change and learn how to do this well." Still another stated, "Only a few individuals are leading the charge." However, related to the theme of leadership engagement one respondent commented that "They have embraced it; however they do not get management support to pursue it properly"

Comments related to the theme of relative priority were consistent in describing educators' and trainers' tepid reactions to the use of mobile technology for learning. One

respondent commented, “Not interested, other pressing issues to address,” and another remarked the organization, “Have not expanded the use of mobile technologies yet.” Others remarked of not implementing mobile technology for learning or that the question was not applicable at this time.

The analysis of themes that emerged from educators’ and trainers’ reaction to the use of mobile technology for learning were compared with the descriptive data on educators’ and trainers’ views on the impact that the latest technology had in teaching and learning. The data found in the educator and trainer dimension were congruent with the findings of other dimensions indicating that there was interest in the use mobile learning but the readiness to do so is questionable. Although educators and trainers were receptive to the use of mobile technology for learning, the data indicated that the use of mobile technology for learning required further organizational support and prioritization.

Learner Dimension

This section provides results related to Research Question Two and focused on the Learner Dimension. The items were the combination of structured and semistructured questions that examined how learners were supported when in a mobile context. The items explored the extent that learners have all the information needed when in a mobile context and mobile learners perspectives on the use of mobile technology for learning. Also examined were the types of devices that were selected most often by mobile learners, the resources that learner can control, and the changes observed from the learners’ perspective after implementing mobile learning.

Mobile learning involves a process in which mobile technology affords individuals on the move the opportunity to engage in learning activities in different

contexts. Although mobile learning makes it possible for learners to have better control in accessing learning opportunities anytime and anywhere, it also presents challenges (Berking et al., 2012). There are many things that can disrupt the mobile learner that must be accounted for if mobile learning is to be successful (Terras & Ramsey, 2012). The student, the technology, and the various aspects of mobility must be grounded in the appropriate pedagogy and must be included in decisions pertaining to mobile learning use. It is important to acknowledge the user's mobility and then focus on the affordances of technology that will allow the learners to take actions that support their learning experiences (Denham, Quick, & Atkinson, 2012).

When asked if mobile learners had access to all the information they needed for learning when they were away from their workstations, data showed that just over one-fifth of respondents (21.1%) agreed. The data also revealed that more than one-third of respondents (36.8%) disagreed, and that the same number (36.8%) neither agreed nor disagreed. The data also indicated that (5.3%) strongly disagreed. None of the respondents strongly agreed that mobile learners had access to all the information they needed for learning when they were away from their workstations. While the findings were similar to other dimensions, the overall low numbers indicated learner support was not sufficient.

The data revealed that just over one fifth (21.1%) of participants strongly agreed or agreed that learners had a positive perception about using mobile devices for learning in their organization. Data also revealed that slightly more than one-fourth (26.4%) of respondents strongly disagreed or disagreed that learners had a positive perception about using mobile devices for learning. However, the majority of participants (52.6%) neither

agreed nor disagreed. The respondents that agreed or strongly agreed comprised a minority that believed learners have a positive perception about using mobile devices for learning. While the finding are similar to other dimensions the data suggested that an important aspect of learner support required attention.

More than half of respondents indicated that learners choose tablets (57.9%). In a like manner, data revealed that more than half of learners selected Smartphones (52.6%). Mobile devices learners selected less often were cellular phones (15.8%), followed by Phablets (10.5%), and E-Book Readers (10.5%). Learners did not choose MP3 Players or Personal Digital Assistants. The comparisons of learner mobile device selection are consistent with mobile device use in other dimensions suggesting moderate use. Figure 11 presents the data on mobile devices learners selected most often.

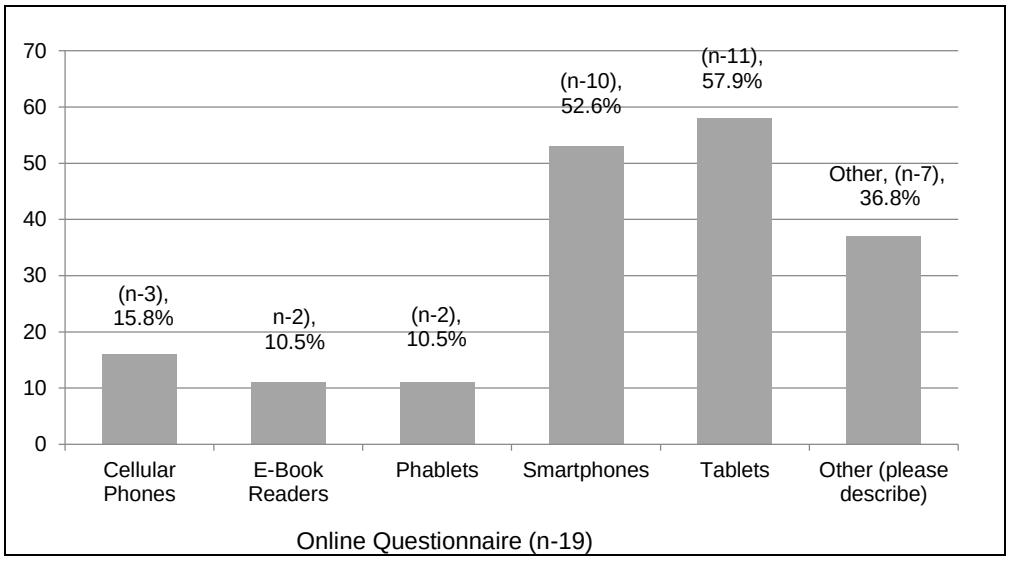


Figure 11. The type of mobile devices that learners select most often. The figure presents the categories of mobile devices that respondents were presented as choices for reporting devices selected most often by learners. The categories on the bottom of the figure represent the types of devices that were presented. The values on the left side of the figure are the percent scale used. Respondents were allowed to select all that applied. The values above each vertical category represent the number of responses and percentages for each listed operating systems. Other responses identified categories not on the list.

As displayed in Figure 12 the data indicated learners had the most control over the pace of the information being presented (42.1%). The next resources that learners had the most control over were the choice of multimedia presented in various formats (Facebook, YouTube, Twitter, blogs, wiki's) (36.8%), followed by the means to communicate with teachers or instructors and others (31.6%), and methods of interaction with all relevant content (26.3%). The resources that learners have the least control over were access to discussion boards (15.8%) and the provisions for self-evaluation (5.3%). When asked to please describe 'other' one respondent said, "we are in the process of piloting our first blended learning course this month." Nearly a third of respondents (31.5%) commented that, "don't have mobile learning," "not applicable" or "were unsure."

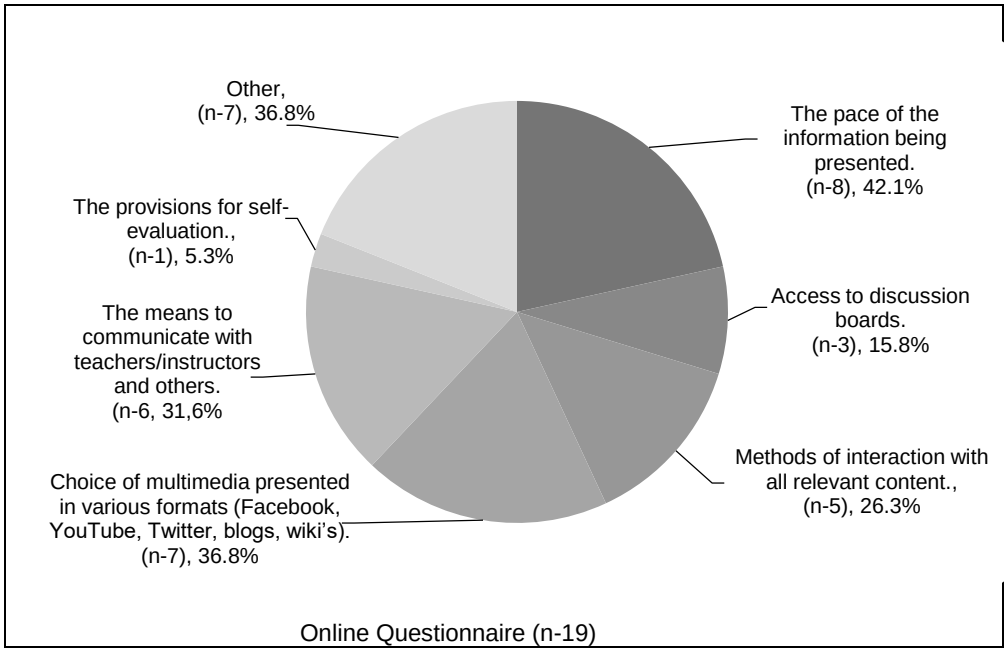


Figure 12. The mobile resources that learners can control. The figure presents the types of mobile learning resources respondents were presented with as choices for reporting the types of resources that learners can control. Shown are the reported values reflecting the number of responses and percentages for each of the type of control that learners were allowed. Respondents were allowed to select all that applied. Other responses identified categories not on the list.

Consistent with the findings in other dimensions the data associated with learner control, the ability to communicate with teachers or instructors, and perform self-evaluation were viewed as important. While the finding was similar to other dimensions, the data suggested that an important aspect of learner support required attention.

When asked in an open-ended question what changes were observed from the learners' perspective when mobile learning had been implemented, the themes that emerged from respondent comments included implementation climate, knowledge and beliefs about the innovation, learner characteristics, readiness and reflection, and relative priority. Table 13 presents the five emergent themes and respondents comments determined most closely aligned with each theme.

Table 13

Themes and Categories Describing Changes Observed from the Learners Perspective when Mobile Learning has been Implemented

Themes	Respondent Comments
Implementation Climate	Greater participation, as it's more efficient and effective for them More enthusiasm. More "ownership" of the responsibility for learning
Knowledge and Beliefs about the Innovation	Coming to the experience with the mindset that learning takes place in a certain way. They were confused initially when mobile job aids were introduced because they thought it should look/feel like a traditional course. Steps had to be taken to orient them to job aids as a separate type of "learning" that directly supports a task at the PoP. After that, they got it

Table 13 (continued)

Themes	Definitions
Learner Characteristics	appreciation for not having to travel for an onsite course; learners report increased fatigue because there is a lot more energy and engagement required a times in the virtual environment; people are learning to be okay getting on camera; there is a shift in expectation that almost all learning should be available on a mobile device
Readiness and Reflecting	Not enough data to access not far enough to measure no data available at this time we don't have courses for mobile we are still determining the impact
Relative priority	Not applicable for our organization at this time Have not fully implemented the capability for mobile learning Have not implemented mobile technologies yet not sure or none

In remarks about observed change related to the theme of implementation climate, one respondent talked about, “Greater participation, as it's more efficient and effective for them,” and another commented that there were, “More enthusiasm. More ‘ownership’ of the responsibility for learning.” Related to the theme of knowledge and beliefs about the innovation one respondent commented:

> Coming to the experience with the mindset that learning takes place in a certain way. They were confused initially when mobile job aids were introduced because they thought it should look/feel like a traditional course. Steps had to be taken to orient them to job aids as a separate type of learning that directly supports a task at the PoP. After that, they got it.

Related to the theme of learner characteristics a respondent wrote:

Appreciation for not having to travel for an onsite course; learners report increased fatigue because there is a lot more energy and engagement required a times in the virtual environment; people are learning to be okay getting on camera; there is a shift in expectation that almost all learning should be available on a mobile device.

Some respondents' comments related to the theme of readiness and reflecting included, "not enough data to access/measure," "no data available at this time," or "we are still determining the impact." One respondent wrote, "we don't have courses for mobile."

Consistent with the findings in other dimensions the reporting associated with changes observed from the learner's perspective when mobile learning had been implemented disclosed both varying levels of challenge, interest in, or expectations for mobile learning use. The data reflected divided perspectives thereby making it plausible to conclude that limited emphasis had been placed on the learner.

Research Question Three: What are the methods used to evaluate mobile learning implementation efforts?

Mobile Learning Evaluation Dimension

This section provides results related research question three and focused on the mobile learning evaluation dimension. The combination of structured and semi-structured items examined the processes for measuring the effectiveness of mobile learning. Also examined were the specific metrics that organizations use, and the changes made because of the assessment of mobile learning.

Evaluating mobile learning efforts present a new set of challenges and require a new approach to evaluation (Cochrane, 2011). Evaluating mobile learning without an appropriate framework can be difficult and problematic (Thinley et al., 2014). The relative newness of the discipline, the variety of mobile learning technology offerings, and the disruptive activities in contexts in which the learning might occur can contribute to the challenge of evaluation and calls for a framework specifically tailored to mobile learning (Ting, 2012; Traxler, 2011). Indeed, Sharples (2013) and Vavoula and Sharples (2009) noted that challenges can arise in evaluating mobile learning when activities occur with changes in the contexts of time, location, and curriculum. The success of mobile learning initiatives requires that mobile learning evaluation be comprehensive, practical and useful (Traxler, 2007).

The data showed that one-half (50%) of organizations did not have a process in place to measure the effectiveness of mobile learning implementation. Four respondents (22.2%) indicated that there was a process, and two respondents (11.1%) were not sure. One respondent (5.3%) wrote that the evaluation was, “in development. Planning the use of some discrete mobile job performance metrics as well using Flurry ‘mobile analytics software.” Consistent with the findings in other dimensions, overall the data showed limited focus on the evaluation of mobile learning.

More than half of the respondents (55.6%) strongly disagreed or disagreed that the strategy to evaluate mobile learning effectiveness was embedded in the overall training and instructional strategy for the organization. Only four respondents (22.2%) agreed the strategy to evaluate mobile learning effectiveness was embedded in the overall organizational training strategy. Four respondents (22.2%) neither agreed nor disagreed.

The majority of respondents (77.8%) disagreeing, combined with respondent data that neither agreed nor disagreed, made it is plausible to conclude that it was not common practice to embed mobile learning evaluations strategies in the organizations overall training strategy.

The data revealed that approximately two-fifths (38.9%) of respondents agreed the same techniques were used to evaluate the impact of mobile learning as other training programs in their organization, although none of the respondents strongly agreed. Conversely, nearly one-third (27.8%) disagreed and one-third (33.3%) neither agreed nor disagreed. Consistent with findings for having an embedded strategy, overall, the data indicated that with the majority of respondents (61.1%) disagreeing, combined with respondent data that neither agreed nor disagreed, it was reasonable to conclude that mobile learning evaluations strategies were in the early developmental stage.

Data presented in Figure 13 showed that nearly one-half (44.4%) respondents used course completions to measure mobile learning effectiveness.

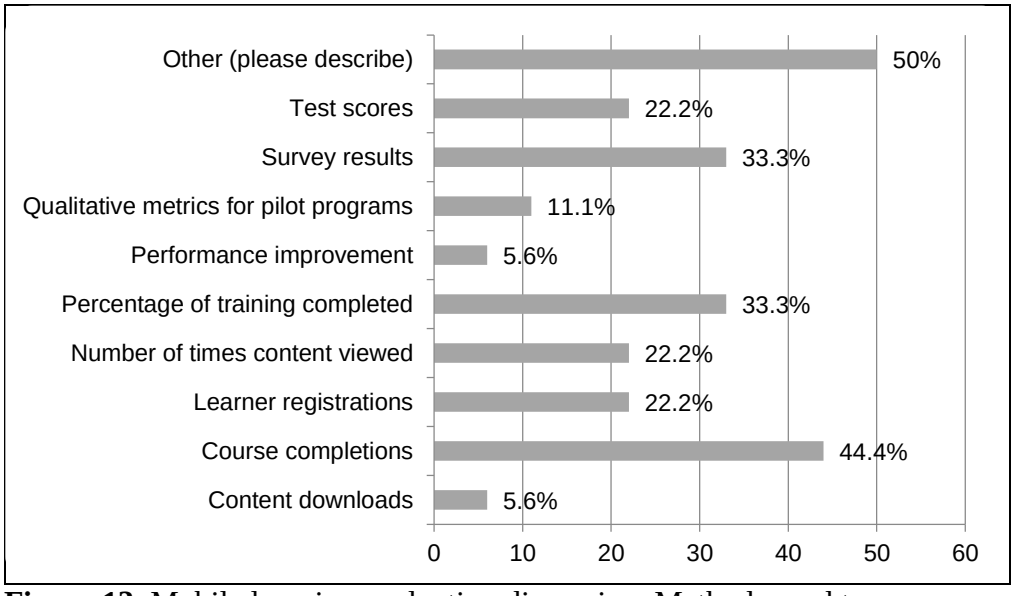


Figure 13. Mobile learning evaluation dimension. Methods used to measure mobile learning effectiveness.

In addition, one-third of respondents (33.3%) used percentage of training completed and similarly one-third of respondents (33.3%) used survey results for measurement. On the other hand, data revealed less use made of learner registrations (22.2%), test scores (22.2%) and number of times content viewed (22.2%). However, data revealed the least use of qualitative metrics for pilot programs (11.1%), content downloads (5.6%), and performance improvement (5.6%). No use was made of time spent using mobile devices per course as an effectiveness measure. When asked to describe in others, one respondent commented "Reporting Analytics," and another remarked, "Have not fully implemented the capability for mobile learning." Others comments included, "when viewed by lat/long. All this is in development," "don't have mobile learning," not applicable or were "unsure."

When respondents were asked in an open-ended item to comment about changes their organization made because of mobile learning assessments, the themes that emerged were implementation climate, leadership engagement, readiness and reflecting and relative priority. Related to the theme of implementation climate, responses included being, "more open to innovative solutions," and that there had been "some improvement in the number of courses designed for mobile access." Comments associated with the theme of leadership engagement included "reduced travel costs, greater application of technologies already in house, such as GoTo meeting," and that we are, "moving forward to gain support from senior leadership to extend implementation." Another respondent remarked that there is, "more commitment to acquiring mobile learning inside the organization [CIO is highly involved]."

Concerning the theme of readiness and reflecting some respondents indicated that their organization did not have mobile courses; while some respondents indicated they were not sure what changes had been made at this point. Comments related to the theme of relative priority indicated that, “it has not fully implemented the capability for mobile learning,” or “it discontinued mobile learning projects.” Consistent with other dimensions, respondent comments reflected uncertainty about how much of a priority, as well as the extent of commitment and receptiveness to mobile technology for learning.

Table 14 presents the four emergent themes and respondents comments determined most closely aligned with each theme.

Table 14

Themes and Categories Describing Changes Made as a Result of Mobile Learning Assessments

Themes	Respondent Comments
Implementation climate	More open to innovative solutions. Some improvement in the number of courses designed for mobile access Reduced travel costs Greater application of technologies already in house (e.g., GoTo meeting)
Leadership Engagement	Moving forward to gain support from senior leadership to extend implementation More commitment to acquiring ML inside the organization. CIO is highly involved
Readiness and reflecting	we don't have courses for mobile I don't know what changes have been made at this point
Relative priority	Have not fully implemented the capability for mobile learning They have discontinued mobile learning projects None, none, not sure, N/A, na, na

Final Section

This section is comprised of two items that examined and presents data on what organizations are doing differently as a result of mobile learning availability, and when to expect it becoming an integral to education and training programs. When asked what

their organization was doing differently because of the availability of mobile technologies for learning and training, the data resulted in the themes of readiness and reflecting, readiness for implementation, and relativity priority (Table 15).

Table 15

Themes and Categories that Describes what Organizations are doing differently as a Result of the Availability of Mobile Technologies for Learning and Training

Themes	Respondent Comments
Readiness and reflecting	Looking at high risk situations to determine where learning and performance support at the PoP can reduce risk. slight increase in the number of technical organizations who are considering mobile learning as an option for field operators We are in the process ofidentifying processes to move forward we are now thinking of ways to best incorporate mobile learning into more aspects of our overall learning strategy we don't have courses for mobile
Readiness for Implementation	Initiated projects to bring mobile learning capabilities to the department Internal development of trainers to build experience Looking at high risk situations to determine where learning and performance support at the PoP can reduce risk
Relative priority	they are offering more learning solutions still evaluating Not available (nothing) not sure, Nothing at this time

Related to the theme of readiness and reflecting one respondent commented, “we are now thinking of ways to best incorporate mobile learning into more aspects of our overall learning strategy.” Another remarked that the organization is, “Looking at high-risk situations to determine where learning and performance support at the PoP can reduce risk.”

Related to the theme of readiness for implementation respondents remarked that they “Initiated projects to bring mobile learning capabilities to the department” and initiating the, “internal development of trainers to build experience.” Another respondent commented that the organization is, “looking at high risk situations to determine where learning and performance support at the PoP can reduce risk.”

Respondent comments linked to the theme of relative priority described a “slight increase in the number of technical organizations who are considering mobile learning as an option for field operators.” Some respondents stated that they are still evaluating or nothing was being done. Consistent with findings in other dimensions, respondent comments indicated a curiously cautious yet optimistic outlook, but not enough actual efforts to demonstrate meaningful change.

When responding to the an item asking if they believed mobile learning would become an integral part of their organization's education and training program within one year, only four respondents (21%) indicated that it would. About half of the respondents (52.6%) believed it would be the case in two years and a small number (10.5%) believed it would take three years. Some (15.8%) were not sure when mobile learning would become an integral part of their organization's education and training program. The data shows that more than two-thirds (68.4%) of respondents held the belief that mobile learning would become integral to their organizations within two to three years. Therefore, it is likely that the prospect for mobile learning use, though not immediate, was believed to be on the horizon.

The analysis of what organizations are doing differently as a result of the availability of mobile technologies for learning and training revealed that respondents

had, “initiated projects to bring mobile learning capabilities to the department,” were initiating the “internal development of trainers to build experience,” and that the organizations were “looking at high risk situations to determine where learning and performance support at the PoP could reduce risk.” Data also showed that organizations, “are now thinking of ways to best incorporate mobile learning into more aspects of [their] overall learning strategy” as well as “looking at high risk situations to determine where learning and performance support at the PoP can reduce risk.” The qualitative results showed that some participants had observed a “slight increase in the number of technical organizations who are considering mobile learning as an option for field operators.”

Summary

This chapter presented the results of a mixed methods case study that examined how cabinet level government agencies and departments choose, implement, and evaluate the use of mobile learning. The chapter organization included an overview, data collection, data analysis, findings, and summary of results. A self-administered online questionnaire and public documents were used to gather data. Data analysis followed the order of the research questions and the associated dimensions, and examined participant demographics, mobile technology decisions, the mobile learning environment, mobile learning content, educators/trainers, learners, assessment, what organizations are doing differently as a result of mobile learning implementation efforts, and when mobile learning is expected to become integral to education and training programs.

The process involved examination of the approaches used by United States government cabinet-level organizations in mobile learning implementation efforts. Quantitative and qualitative data were collected, ananyzed and reported upon. The goal

was to gather data that would increase the understanding of challenges encountered by cabinet-level agencies and departments in pursuing the use of mobile learning and in this way contribute to the research on mobile learning implementation.

Although nearly half the respondents organization used mobile learning, an agreed upon definitions remains elusive. However, the learner, technology and context emerged as important considerations in defining mobile learning. Decisions to use mobile technology for learning were driven by factors such as leadership involvement, budgetary concerns, and the need to support mission activities with up-to-date technologies. While the majority did not have an approach, tablets and smartphones were widely used and several projects had been implemented. Learners were allowed to, and performed a number of activities mobile devices for many common functions. Learners indicated preferences for performing learning assignments and acquiring supplemental content. The capabilities most frequently incorporated into the design or implementation of a mobile learning were document viewing, voice/phone communications, media viewer/playback, text messaging, camera use, and search and touchscreen interaction. Although varied, the rates of use for devices incorporated into mobile were high or very high, led by document viewing.

The majority of respondents believed mobile learning enabled new strategies and methods for content development and delivery and some were developing course materials for use on mobile devices or stationary devices. Although Smartphones and tablets were determined to be suited for mobile content delivery and there were plans to develop course materials on mobile devices, little had been done.

The majority of respondents had not made substantial changes to content to make it accessible for mobile devices. Nevertheless, content had been shortened to make it compatible with mobile devices and for making the internal collaboration networks available on mobile devices.

The most commonly used platforms were iOS, Windows, and Android, with in-house staff, external developers or expertise in other agencies the primary means to design and develop content for mobile devices. Development training, mandatory training, and compliance-based courses were the types of content most accessed by learners.

The differences between courses designed for mobile and those not using mobile devices emphasized the need to "access and identify the most appropriate platform, content type, and devices that will support the course." Differences also identified the recognition that the skills are different for designing in a virtual environment from a non-virtual environment, calling for a complete revamping of the traditional training process.

Changes observed in learners after implementing mobile content delivery revealed learners embracing it as well as increased demand from newer/younger employees. Changes also showed increased usage of a variety of content, especially executive leadership seminars. However, there were mixed levels of commitment as evidenced by limited implementation in some cases, not at all in others, and a lack of awareness for older employees.

There was overwhelming agreement that the instructional design process for mobile learning should be different from the instructional design process for traditional elearning. Additionally, there was strong belief that the design process for mobile

learning should drive the content objectives that identified the need and unique requirements for incorporating the unique features mobile devices.

There is not a general understanding of how and when to use mobile learning, few educators and trainers have experience with mobile learning projects and there is little experience converting existing courses and learning materials to a mobile format. There is little belief that the latest technology trends and developments in teaching and learning will have an impact on their teaching, learning strategies, and methodologies, with some holding that the latest technology trends should be continuously evaluated due to the new affordances that technology could provide. Reactions to the use of mobile technology for learning were, as some questioned the adequacy of their background, while others are looking forward with "with favor, excitement and encouragement." Both educators and trainers competency levels and by management support influence this reactions.

Mobile learners were not able to access all the information needed when away from their workstations and learners do not have a positive perception about using mobile devices for learning. Learners chose tablets and smartphones most often and had the most control over the pace of the information being presented, the choice of multimedia presented in various formats, the means to communicate with teachers/instructors and others, and methods of interaction with all relevant content. After implementing mobile learning, some changes were observed by learners in some instances and not at all in others. There were elements of confusion about what mobile learning is and what it is expected to be.

There is uncertainty that a process is in place to measure the effectiveness of mobile learning, and strong disbelief that strategies were embedded in the overall

training/instructional strategy. The agreement that the same techniques are used to evaluate the impact of mobile learning as other training programs, suggested that mobile learning evaluation strategies are in the early developmental stage. Method most used to measure mobile learning effectiveness were course completions, percentage of training completed and as use of survey results. Changes made because of mobile learning assessments included “moving forward to seek senior leadership commitment and support, increased application of technologies already in house, and some improvement in the number of courses designed for mobile access. However, some have not fully implemented or do not have mobile courses, and others have discontinued mobile learning projects.

The majority believed mobile learning would become integral to their organizations within two to three years. Because of the availability of mobile technologies for learning and training, projects have been initiated, the internal development of trainers to build experience have begun, and determinations are being made in situations where learning and performance support can mitigate risk. Discussed in Chapter 5 are the conclusions, implications and recommendations.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Overview

The chapter contains five sections. First is the overview. Second is the goal and conclusions that address the analysis of the research questions. Third are the implications. Fourth are recommendations for future research and last is a summary of the final report.

Mobile learning continues to emerge as an area of interest that is predicted to have a major influence in education and training. As mobile technologies become increasingly ubiquitous and acquire expanded capabilities, interest in its use for learning is on the rise. The purpose of the mixed methods case study was to examine approaches United States government cabinet-level organizations use in mobile learning implementation efforts by analyzing and converging quantitative and qualitative data. The aim was to increase the understanding of the level of progress and challenges encountered by cabinet-level government organizations in pursuing the use of mobile learning. The findings, conclusions and recommendations have the potential to inform future implementations and contribute to the research on mobile learning use.

Conclusions

The significance and impact of moving from traditional or elearning environments to mobile learning does not appear to be universally understood. Simply converting learning to a mobile format and considering that to be effective mobile learning is not enough. The use of an instructional system design framework not specifically tailored for

addressing the unique characteristics and requirements of the mobile learning environment, learner, trainer/educator, content and evaluation can be a problem. The study sought to build an expanded picture of approaches used by United States government cabinet-level organizations in mobile learning implementation efforts. It explored how decisions were made to use mobile learning, approaches used for implementation and the methods used for evaluation.

Demographics

The participant demographics were both ideal and not so ideal for exploring the use of mobile learning. The demographics were ideal in that respondents were well-educated government professionals working in organizations that have a record of embracing technology. The adult characteristics of the group were generally associated with intrinsically motivated individuals driven by both personal and professional reasons (Hashim, Tan, & Rashid, 2015). However, the majority of participants were middle age managers and research suggests that their age groups are not necessarily receptive to the use of mobile learning. Older users have been found to view mobile learning as less useful and are more concerned about the difficulty associated with its use (Yadegaridehkordi & Iahad, 2012). On the other hand, with a middle-aged workforce, government organizations face the challenge of succession planning and attracting younger workers. Younger workers will have integrated mobile technology into much of their lives and come to the workforce with the expectation of its use in the workplace. Recruitment efforts must factor in the expectations of a changing workforce.

With the data showing a great number of participants to be senior or middle age managers at a mid-career point, their influence and decisions will set the direction for

mobile learning in agencies and departments. The identified job types and positions will have a significant influence on decisions to pursue the use of mobile learning and their support is essential. If mobile learning is to take hold and succeed in government organizations, it will be important for leaders to develop an awareness of how and when to use it and demonstrate a commitment for support (Baran, 2014).

The three research questions used to guidee the study were:

1. What are the influences that led to the decision to implement mobile learning?

2. What are the approaches taken in implementing mobile learning?

3. What are the methods used to evaluate mobile learning implementation efforts?

Research Question One: What are the influences that led to the decision to implement mobile learning?

Mobile Technology Decisions

The decision to use mobile technology continues to permeate the lives of nearly everyone, influencing how it is used and how individuals go through their daily activities (Anderson, 2015). A widespread method chosen by agencies and departments is the deployment of mobile devices for both work and personal use, or a Here's Your Own Device (HYOD) approach and this is a promising finding. The decision to use the HYOD approach is significant because when learners are required to use a device with which they are familiar, implementing mobile learning becomes less of a challenge. These decisions suggest a recognition of the benefit mobile technology affords and acknowledgment of the need to establish controls. However, organizations must be prepared to deal with the challenge of providing devices that are different from those currently being used by educators, instructors and learners. For example, use of HYOD

devices might be more restrictive than users are accustomed, creating a reluctance on the part of users to accept them. In addition, the devices provided by organizations might be more or less current, or possess different capabilities than those in which users are accustomed.

A number of agencies and departments have established mobile device ownership and use policies to ensure some measure of control. However, just as with their mobile learning implementation efforts, the policies used by agencies and department are in the early stages. The importance of having comprehensive policies in place that accommodates and guide mobile learning prior to beginning its use cannot be overstated and might not be recognized in the early stages (Ally, Grimus, & Ebner, 2014). Organizational policies must set out the criteria for how and in what way the various facets of the mobile learning effort are to interact (Vosloo, 2012). The areas that must be addressed include the technology, the learner, processes and procedures for the overall learning environment use and management. It is essential that all organizations place strong emphasis on policy proposals, and consider guidelines such as described by West and Vosloo (2013). Because government agencies and departments have a variety of venues for sharing information, they can benefit from prior or ongoing implementation efforts. In many cases where organizations are pursuing mobile learning use, there are great benefits in examining established policies and sharing best practices as organizations mature their efforts for using mobile learning.

As mobile learning implementation matures, the need for accommodative policy revisions will be integral to any decisions to expand its use. Because of organizational differences, a one-size fits-all option may not be feasible in agencies and departments

because of their risk tolerance. Those organizations with more restrictive policies that are interested in implementing mobile learning should evaluate the approach to device use that best fits their situation.

Research Question Two: What are the approaches taken in implementing mobile learning?

Mobile Learning Environments

Efforts to establish successful mobile learning environments continue to be challenging, driven in part by the lack of a clear definition or specific requirements. Because of the many factors that will affect mobile learning environments, it is essential to identify and address the technical, pedagogical, learner, educator or instructor competency, and organizational support requirements (Barbosa, 2013; Uosaki, Ogata, Li, Hou & Mouri, 2013).

Findings for whether or not organizations use mobile technology for learning are interesting. With current efforts largely focused on preparing for or initially exploring the development or use of mobile learning, organizational commitment remains somewhat reserved. Importantly, government organizations have decided to use mobile devices for numbers of reasons such as use of smartphones to extend classroom training, supporting distance learning students, and using mobile applications to support service delivery. Even though many organizations are interested in using mobile learning, a true reflection of the current state is best described as experiencing a level of excitement about the possibilities due to the novelty effect. According to Ciampa (2014), the novelty effect occurs due to a learner's positive perception as the result of the introduction of a new technology in the learning environment. He argued that the novelty effect fades as leaners

become familiar with the technology. A conclusion to be drawn is that at this time organizations are either not currently prepared or that there is a lack of support in moving forward with the use mobile technology for learning (Baran, 2014).

With most organizations not having established approaches for using mobile devices for learning, it is reasonable to conclude that the absence is related to not fully embracing mobile devices use for learning. The few approaches that have been identified point to an interest in investigating the technologies available for use by learners and covers a divergent array approaches. It is promising to note the extensive availability of mobile technologies that can be exploited to create opportunities for learning. However, the use of only one of these technologies specifically for learning and training suggest a cautionary approach. Any number of reasons could explain the lack of willingness to move forward with the use of mobile technology for learning. For example, the lack of an understanding about how best to use mobile technology for learning might be a factor. However, it is more likely that the inhibiting factor is the readiness of most organizational elements in agencies and departments to adopt mobile learning.

Attempts at defining mobile learning continue to be elusive, with the conclusion that this is due in part to the newness of the discipline, the constantly changing nature of emerging technologies and their broadening capabilities. In a like manner, consensus comprehensive definitions for mobile learning environments continue to evolve. The challenge remains that of understanding and establishing a meaningful linkage between the learner, the technology, and the contexts in which learning takes place and is supported (Pandey & Singh, 2015). The appropriate recognition and characterization of mobile learning and mobile learning environments are crucial to use of mobile

technology for learning. In defining mobile learning, a detailed accounting is required for all of the conditions and contexts that may affect the use of mobile technology for learning. Of primary importance will be developing a realistic set of requirements that descriptively portray the interactions between learners, Instructors, content, technology, and evaluation (Barbosa, 2013; Uosaki et al., 2013).

Many agencies and departments have decided to use mobile learning but this is not the prevailing state of affairs throughout government. The decisions on how organizations decided to use mobile devices for learning are understandably wide-ranging and tentative considering that most organizations are just now beginning to show an interest. For the most part, the decisions are driven by the awareness of technological advances and the desire to find ways for using the technologies in support of mission needs. As with many new endeavors the way that organizations are going about the use of mobile learning is disparate, with many waiting and watching to see what others are doing. It is encouraging to note that senior managers will be involved in the decision to use mobile technology for learning, giving it the best chance for suceeding. Because organizations did not mention following an instructional system design process in their decision-making, it is reasonable to conclude that a formal technology integration process might not have been followed.

Implementing mobile learning projects require that educators and trainers possess competencies for integrating the total learning experience and the full array of technology across all of the contexts in which learning takes place (Tondeur, van Braak, Siddiq, & Scherer, 2016). Because mobile learning is a relatively new phenomenon, a challenge that have not been sufficiently addressed is that of teachers developing the skills and

competencies required of in this discipline (Sung, Chang & Liu, 2016). Indeed, it is not a surprise that educators and trainers have limited experience implementing mobile learning projects. It is reasonable to conclude that the complexities found in the myriad of technologies that are available have proven to be a challenge to agencies and departments' efforts. Organizations will need to address the weaknesses associated with educator and trainer lack of skills and the required support if they are to overcome these inhibitive influences. Establishing programs that encourage and support educators and trainers in acquiring the expertise to combine current competencies with those needed to implement mobile learning programs will be essential to successful outcomes.

Agencies and departments have positioned themselves well for entering the world of mobile learning because of their use of tablets and smartphones. Where integration of technology is occurring, it is robust. Analogous to the results found in the literature, learners are using mobile technologies to perform a variety of personal activities and this can translate into the willingness to use these devices to learn (Wong, Wang, Ng, & Kwan, 2015). Even though learners have demonstrated the readiness for mobile technology use, agencies and departments have not harnessed its full power in the production of mobile learning solutions. With document viewing as the widest use, the appropriate direction seems to be to determine learner needs and identify the appropriate pedagogical approach that can be combined with the chosen technology in supporting and satisfying those needs.

The lack of constraints placed on the activities that learners are allowed to perform on their mobile devices enables successful mobile learning environments. Many of the activities that organizations have allowed are consistent with and adaptable to the

use of mobile technology for learning. The wide variety of activities that agencies and departments allow learners to perform demonstrates the receptive nature of mobile technology and contributes to the potential of its use (Sharples, 2013).

When considering mobile devices for learning it is important to determine the intended use. A challenges is accounting for the different device capabilities, learning contexts, and learner preferences. It is essential to consider and accommodate the way in which learners are expected to use mobile devices. The finding that learners actually use mobile devices to access agency and department communications tools and social networking websites are likely to be beneficial to mobile learning efforts. Learners' use of mobile devices to access instructional material, perform learning assignments and acquire supplemental content demonstrates that learners hold favorable views on mobile learning. The use for both work and learning also support essential elements for establishing a meaningful mobile learning environment. This approach to mobile learning use also reduces and possibly eliminates the challenge of needing to develop additional skills (Sharples, 2013).

According to Grimus and Ebner (2015), simply deploying existing content on mobile devices is not likely to achieve the intended results. Mobile learning implementation efforts achieves a greater degree of success when device capabilities frequently used by learners are incorporated into the design of mobile learning environments. As mobile device capability use becomes a greater part of everyday life, a dependence is developed (Wong et al., 2015). What follows this reliance is the willingness to use of mobile device capability, and the development of a perceived compulsion for its use. The capabilities agencies and departments have incorporated into

the design or implementation of a mobile learning solution are document viewing, voice/phone communications, media viewer/playback, text messages, camera use, and search and touchscreen interaction. The decisions to incorporate capabilities that are familiar, can serve to reduce and possibility eliminate the need for learners to develop new or different skills.

Just because learners have access to mobile technology does not mean that they are receptive to mobile learning. The type and rate of mobile technology use can have an impact on the learners' perception and acceptance of mobile learning. Although agencies and department indicate a moderate, high, or very high rate of mobile technology use for learning, the greatest focus is on document viewing. Although document viewing can be effective, the choice of design and delivery can also be a distraction to the learning process. Overcoming this challenge will require that instructional design and usability address key factors such as whether the content and any associated internal links are structured in a way that learners can easily understand, render and use (Berge, Muilenburg, & Crompton, 2013).

Mobile Learning Content

Mobile learning studies are increasingly finding that emerging technologies are capable of enabling new strategies for content development and delivery (Hashim et al., 2015; Sung et al., 2016). If organizations are to integrate mobile learning into their education and training programs they must develop a strategy that addresses a number of key elements. Palalas (2013) proposed a six-phase approach in the guide for developing mobile learning strategies. The phases included: (a) a needs assessment, (b) collecting empirical evidence and feedback, (c) establishing feedback exchange and

communications mechanisms, (d) evaluating and ensuring infrastructure support, (e) providing training and professional development for all affected parties, and (f) developing a detailed vision document that is shared with and supported by organizational leadership.

The integration of mobile learning relies on the extent to which educators and trainers possess the beliefs, knowledge, and skills in the use mobile technologies (Sung et al., 2016). In fact, Mykowska, Kostrzewa and Orda (2014) argued that some trainers either do not see the value of mobile technologies or they consider becoming proficient too much of a challenge. Based on the evidence it is reasonable to conclude that agencies and departments hold the belief that the affordances of mobile technology for learning is beneficial and is capable of innovating the delivery of educational and training services. However, not all agencies and departments are onboard at this time and these beliefs and perceptions must change if mobile learning implementations are to succeed.

While the resistance to mobile learning is decreasing and the discipline is becoming more widely embraced, planning is not moving forward at the same pace. Shuler, Winters and West (2013) contended that the lack of planning has led to failed implementation efforts. Although many agencies and departments intend to use mobile learning for course delivery, little has been done. These findings indicate that the limited efforts by agencies and departments are believed to be influenced by the lack of planning and the associated support for establishing the mobile learning environment.

When educators and trainers are faced with deciding which device is best to use for content delivery a number of factors must be considered. Their attitudes and beliefs, which serve as key determinants in their decision to use mobile technology for content

delivery. Indeed, Rikala, Hiltunen and Vesisenaho (2014) contended that mobile device use relies on both the degree to which educators and trainers believe that they have the skills as well as the perceived ease of use the technology. Choosing to use tablets and smartphones for content development is understandable where these devices represent the widest use by organizations. This will become increasingly important as tablets and smartphones are becoming an increasingly bigger part of everyday life (Anderson, 2015).

The use of mobile technology for learning requires that educators, trainers, and learner have a willingness and possess the skills to do so. It is important to acknowledge that choosing the appropriate mix of technology and pedagogy in the design of content is important and the simple conversion of existing elearning for mobile delivery can be challenging (Grimus & Ebner, 2015). The successful conversion of traditional content to mobile depends on recognizing and accommodating the unique requirements associated with the learner and the learning environment (Deegan, 2015). The failure to grasp the need for an instructional design process that accommodates the requirements of mobile content delivery can result in ineffective instruction. Of equal importance, Deegan contended that learning in mobile environments introduce cognitive challenges that place additional pressures on learners and must be accounted for. The mobile learning strategy must make sure that tools and processes intended for use in a mobile learning environments are systematically planned, sufficiently organized and comprehensively supported to be successful.

While agencies and departments have initiated efforts to convert content to a mobile format, it is not expansive or widespread. The greatest effort has been to shorten courses, although it is unclear how course changes are undertaken. Critical to the success

of mobile learning efforts will be the need for educators and trainers to possess the technical skills to carry out the content conversions (Sung et al., 2016). Organizations must appreciate the impact of revising content for mobile and recognize that merely converting existing material to a mobile format is not enough. A means for acquiring experience and skills required in converting content can be for educators and trainers to begin by modifying existing pedagogically sound mobile courses or via collaborative sharing (Sung et al.).

Agencies and departments must exercise care in choosing the operating platform for the creation of mobile content. It is quite possible that students are using and prefer platforms that are different from those chosen by organizations for content delivery (Farley, Murphy, Johnson, Carter, Lane, Midgley, Hafeez-Baig, Dekeyser & Koronios, 2015). Not surprisingly, the operating system platform most widely selected for content design and delivery are iOS, Windows, and Android, reflecting the choices of many users. These operating systems are likely to reflect the personal ownership of devices that educators or trainers and learner have become accustomed. Those organizations that are still bound to the Blackberry face the decision of either supporting multiple systems or resolving the conditions that mandates use of the devices. The challenge of accommodating the need of learners, educators, and trainers that prefer the use of devices different from those chosen by agencies and departments will be significant and must be reconciled in mobile learning strategies.

The reliance upon a mixture of in-house and external resources for designing and developing content for mobile suggest recognition of either the deficit of skills by educators and trainers, limited resources in organizations, or both. With agencies and

departments not currently having the expertise to design and develop content for mobile devices this is not necessarily a weakness. However, the lack of skills must be accounted for in assuring the support. It is important to note that the reliance on the combination of in-house and external resource is perhaps appropriate for the early stage of implementation (Sung et al., 2016).

It is also not surprising that the greatest extent of content accessed by learners was for development, mandatory, and compliance-based training. By their nature, these courses are non-discretionary training priorities in agencies and departments that call for organizations to exercise all options in meeting the requirements. Indeed, the delivery of the content using mobile technologies enables the learner greater flexibility and access without being constrained by the context of time or place. However, when organizations take advantage of the anywhere and anytime nature of mobile learning, learners are faced with distractions for which there might not have been an accounting. Distractions are an integral component of the mobile learning environment as learners navigate the contextual changes of time, location and topical situations, requiring that the impact on learning activities be account for (Wang, Tang & Zhou, 2012).

Agencies and departments have recognized that there are distinctions between mobile learning and non-mobile learning content design. There is a recognition of the need for different instructional design processes and different skills for courses designed to accommodate the anytime anywhere attributes of mobile environments (Grimus & Ebner, 2015; Wang et al., 2012). However, with descriptions of differences between courses for mobile and non-mobile devices focused primarily on a greater use of web conferencing technology, indicating the continuing confusion in having a clear definition

for mobile learning. The limited use of mobile technology for learning suggests that the skills required have to be developed.

The movement to integrate mobile learning into organizational training and development strategies requires recognition that the role of learners are changing. In traditional instructor led training, content deliveries emphasize presentations by educators and trainers. However, the move of content delivery to mobile learning environments is a more collaborative endeavor, with increased expectation for learner ownership and interaction becoming more prevalent (Cochrane, 2012). Agencies and departments have entered an anticipatory stage of mobile learning use. Thus far, newer and younger individuals have embraced mobile learning after implementation and some of the content types have experienced increased use. This acceptance is an important indication of the conditions found in successful mobile learning implementations. Similar to the findings of Cochrane (2012) there are also indications of some organizational lack of awareness or implementation, which raises questions about the degree of support provided. The prospect of a lack of support could affect implementation and should be examined.

A factor underlying the success of mobile learning instructional design is the recognition of the need for an ontological shift for educators, trainer, and learners. Tashakkori and Teddlie (2010) explained that an ontological shift is necessary, such as changing an individuals' view of how the social world is characterized that individual would like to examine. According to Cochrane (2012), the ontological shift for mobile learning requires that the instructional design process be based on the assumptions of anticipated interactions between the technology, the roles of educators or trainers and learners. There is a strong belief by agencies and departments that the instructional design

process for mobile learning must be different from traditional elearning. There is also the recognition that factoring in the affordance of technology and the context of intended use is essential. However, the capabilities and strategies underpinning the beliefs are not yet fully formed.

Educator/Trainer

The decision to use mobile devices for learning compels educators and trainers to consider different and more complex questions about instructional design. The decisions involve carefully examining and weighing factors related to the role and needs of learners, technology affordances, the context of technology use, as well as the appropriate pedagogy. With just of one-fifth of educators or trainers having experience in mobile learning it is easy to conclude why the understanding of exactly how and when you use it is not be prevalent. The conclusion is supported by the research that indicated decisions on how and when to use mobile devices for learning are influenced by the degree of competence in the technology and the belief of the technologies usefulness (Sung et al., 2016).

Experience in deploying mobile learning is vital and, with some agencies having implemented a number of projects, somewhat of a baseline exists. Educators and trainers must set guidelines for using mobile devices for learning that include goals, how learners are expected to interact, and how activities are measured (Grimus & Ebner, 2015; Wang et al., 2012). However, the current level of experience is insufficient and must be increased to make the best use of mobile learning. Teachers' and trainers' hesitancies to use a new technology are not a new phenomenon. The reluctance can be influenced by factors such as a lack of familiarity with the technology, an understanding of the

associated advantages to be derived, and the extent of organizational support that can be expected (Ally et al., 2014; Baran, 2014). The infrastructure to support collaboration between government agencies and departments exists, offering those prepared to move forward an advantage. Agencies and departments are encouraged to seek the counsel of their associates as they contemplate entering into the mobile learning arena to leverage existing knowledge and experiences (Berge et al., 2013).

The use of mobile technology for learning requires skills that educators and trainers are unlikely to possess (Irby & Strong, 2015). While the skills for the design of traditional courses are similar, converting existing courses to mobile learning is a complex process. With the expansive nature of mobile technology and the complexity of the possible learning contexts, it is critical that educators and trainers are prepared for converting existing courses to a mobile learning format (Sung et al., 2016). It is crucial that the existing educator and trainer skills deficiencies are prioritized and addressed.

The effective implementation of mobile learning relies heavily on the extent to which educators and trainers hold favorable perceptions, understand and are willing to use mobile technology for teaching and learning. (Ally et al., 2014; Rikala et al., 2014). Overall, the attitude about the use of mobile technology as well as the perceived level of expertise appear to be the driving these perceptions (Rikala et al.). For the most part, views of the impact latest technology trends and developments in teaching and learning are cautious. This skeptical approach could be driven by either a lack of organizational interest, skills, resources, or the expectation that mobile learning brings with it unintended consequences. Agencies and departments must address these issues to move forward with mobile learning implementation efforts.

The way that educators and trainers react to the use of mobile technology for learning is crucial to successful implementation of mobile learning programs. Educators and trainers that are unwilling or unprepared to use mobile learning can have a profound effect on the success when implementing mobile learning programs (Ismail, Azizan & Azman, 2013). With some viewing mobile learning as a novelty, and only a minority of educators and trainers reacting favorably to the use of mobile technology for learning, there is much work required to shore up this weakness.

Learner

The population under study, for the most part are adult learners over 21 years of age. It is crucial that mobile learning efforts targeted for adult learners acknowledge their unique approach to learning. Adult learners anticipate being prepared to integrate learning into their work and personal life. Moreover, adult learners are self-directed and have expectation that learning will be an interactive and collaborative process. For this reason, mobile learning programs must afford adult learners the ability to take advantage of their life experiences, and to interact with and discuss learning content with other learners and instructors (Hashim et al., 2015).

It is important that learners have all of the information needed for learning in a mobile context. Kim, Rueckert, Kim, and Seo (2013) contended that learners can resist the use of mobile technology for learning either because of their unwillingness to adopt this new approach to learning or because of deficiencies in either the technology or the methods of instruction. Similar results were found by Farley et al. (2015) in their investigation of university students' use of smartphones to access course materials and activities. They discovered that students preferred using their personal devices for

learning and that students preferred having access to content optimized for the mobile learning environment. Also preferred was the combination of pre-recorded lectures with PowerPoint slides and self-marking quizzes. With the findings that the majority of agencies and departments not believing that learners have access to information needed to perform successfully in mobile learning environments, it is reasonable to conclude that learners are not positioned to make the best use of mobile technology for learning. Successful use of mobile learning by agencies and departments are likely to remain a challenge until there is assurance that mobile learners have access to all of the tools and information that they need in a mobile context.

The type of technology and how it is configured influences learners' perceptions about the use of mobile devices for learning (Kim et al., 2013). In a similar way, when educators and trainers willingly accept and reinforce the use of mobile technology for learning, learners are more likely to develop positive perceptions about its use. Characteristics such as the portability of the device, the extent to which learners have consistent access to the mobile technology, and the ability to use devices for both personal and other use affects learners' perceptions about using mobile devices for learning. The overwhelming belief that learners do not have a positive perception about using mobile devices for learning could inhibit agency and department implementation efforts. It is essential for educators and trainers to acknowledge the role that learners' perception' play in the use of mobile devices for learning and factor those perceptions into the instructional design process.

With smartphones and tablets playing a significant role in organizations' decisions for the type of devices to deploy and individuals indicating a strong preference

for the devices for learning, the prospect for success is enhanced. This conclusion was supported by Farley et al. (2015), who similarly found that there is benefit when individuals are encouraged and supported in taking advantage of skills attained using mobile devices for other activities. Organizations are encouraged to recognize and take advantage of this opportunity.

Of significance is the wide ranging level of control that learners have over mobile resources. As pointed out by Ciampa (2014) and Park and Zarei et al. (2015), there are linkages between control, learner motivation and meaningful results. Control can be achieved by mobile learning designs that afford learners wide ranging choices and controls over the manner in which they are allowed to interact within the mobile learning environment. Agencies and departments are positioning themselves well, having given learners control over the pace of the information being presented, the choice of multimedia presented in various formats, the means to communicate with teachers/instructors and others, and methods of interaction with all relevant content.

It is crucial that organizations come together and examine the impact mobile learning implementation efforts are having on learners. Learners might be motivated to engage in the use of mobile technology for learning with the initial roll out (Farley et al., 2015). However, Ciampa (2014) pointed out that learners' level of interest and use over time might not be sustainable and should be monitored for change. A number of challenges to sustainability are present in using mobile learning, such as the confusion as to why and how mobile learning is chosen and the lack understanding of what mobile learning should look like. Some attempts to understand learners' perceptions on mobile

learning use are beginning to take place. However, the emerging pictures of early implementation efforts do not reflect the potential for sustainability.

Research Question Three: What are the methods used to evaluate mobile learning implementation efforts?

Models for evaluating mobile learning are still being developed, due in part to the newness of the discipline and the effect of rapid changes in mobile technologies. To implement mobile learning, the challenges in establishing an effective evaluation process have to be recognized and reconciled. Evaluation strategies must describe a systematic process for gathering meaningful data on all elements of implementation efforts for use in guiding decision for needed change. One approach to evaluation is a three level framework proposed by Vavoula and Sharples (as cited by Hsu and Ching, 2015) that evaluates usability, the learning experience, and integration into the educational and organizational contexts.

With the majority of agencies and departments questioning the extent to which there are processes in place to measure mobile learning effectiveness, it is reasonable to conclude that one does not exist and this issue will need to be resolved. With learning occurring across the contexts of time, space, content, and technology, performing meaningful evaluation is a challenge. Moreover, the best methods for evaluating mobile learning are still being determined (Levene & Seabury, 2014; Sharples, 2013). As pointed out by Levene and Seabury, it is important that instructional design be informed by evaluation that considers opportunities for course improvement, how usability can be applied to optimize content for the targeted devices, and the philosophical approach to learning or training. The evaluation of all of the elements of mobile learning including

the learning environment, mobile learning content, mobile learning educators/trainers, and the mobile learner will be required if programs are to achieve the intended result.

The lack of a clear relationship between the mobile learning evaluation strategy and overall training/instructional evaluation strategies suggests that agencies and departments are continuing to struggle with how to undertake this task. Selecting a strategy for evaluating mobile learning effectiveness can be a challenge and using the existing organizational training/instructional strategy might not be appropriate. Traxler and Vosloo (2014) attributed the difficulty organizations experience to their attempts at using unrelated ad hoc measures as guides for conducting meaningful evaluations of the learning that occurs with learners in a mobile context. This challenge becomes even more difficult due to the lack of evaluations models or expertise for developing meaningful mobile learning evaluation strategies. Research related to developing strategies for evaluating mobile learning is just beginning to receive attention. Indeed Traxler and Vosloo found that while evaluation is essential to the decision for using mobile technology for learning, a scarcity of research exist for doing so. Effective evaluation strategies will require that organizations capture and evaluate learning in the context of the student, measuring the usability of the technology, determining if the activities are transformative on the program, and evaluating the initiative during program initiatiion and growth (Palalas, 2013; Vavoula & Sharples, 2009).

Agencies' and departments' beliefs that traditional training program evaluation techniques are effective for use in evaluating mobile learning is quite telling. The decisions to use the same techniques for evaluating mobile learning and other training programs in their organizations suggest a lack of awareness of the impact. Traxler and

Vosloo (2014) attributed the use of unrelated ad hoc measures as guides for mobile learning evaluation to the lack of experience in determining how to conduct a meaningful evaluation of the learning that occurs when the learners are in a mobile state. The use of mobile technology for teaching and learning dictates strategies that are different from those used in traditional education and training programs. Effective mobile learning evaluation strategies requires educators and trainers to capture data connected to learners interactions as they continually negotiate numerous transitions through a variety of contexts to measure both learner progress and program effectiveness. Moreover, evaluation strategies must allow mobile learners to have the capacity for self-evaluation and reflection so that they can monitor their progress (Henrie, Halverson & Graham, 2015).

It is reasonable to conclude that agencies and departments are in the early stage of implementation and have not recognized or lack the expertise to identify the unique requirements for evaluating mobile learning inititatives. The UNESCO 2012 Mobile Learning Week report described changes that will be needed in the next 15 years for mobile learning to be sustainable (Shuler et al, 2013). They project significant changes in how the affordance of emerging mobile technologies will enable educators/trainers and learners to conduct more meaningful assessments of learner activities in a variety of contexts, and determine the overall program effectiveness.

Mobile technologies continue to emerge with multiple capabilities that can be incorporated in the learning process (Farley, Murphy, Todd, Lane, Hafeez-Baig, Midgley & Johnson, 2015). As an example, Tabuenca, Kalz, Drachsler, and Specht (2015) described evaluation methods that make use of a simple notifications procedure Short

Message Service (SMS), also known as text messaging, to examine the time self-regulated training graduate students dedicated to learning. Their investigation revealed that sending SMS notifications at a specific versus a random time had a positive effect on students time planning and time management. Their investigation also found that evaluating specific daily and weekly activity patterns of usage, response to notifications based on the time lapse, and student preference for the use asynchronous vs asynchronous time logs led to improved time management skills.

The methods organizations used to measure mobile learning effectiveness that included course completions, percentage of training completed, and use of survey results, provides only a partial picture of program impact. The absence of data or discussions related to the assessment effects of mobile learning technology and the disruptive activities associated with the contextual aspects of time, location, and curriculum suggest that these areas remain unrecognized as significant. Research on more pedagogically relevant and technologically diverse options for evaluating mobile learning is essential.

The kinds of changes that organizations have made because of their assessment of mobile learning can be characterized as seeking senior leadership support, an increased acceptance of mobile technology use, and some improvement in course offerings designed for mobile. However, with a number of organizations expressing both skepticism and a reticence, the success and future mobile learning will be dependent upon agencies' and departments' commitment to address the lack of readiness or reluctance to proceed.

Descriptions of what organizations are doing differently as a result of using mobile technology for learning aligns with most aspects of their implemetation efforts

and represents a guarded approach. Much of the change can be characterized as seeking senior leadership support, organizational commitment, and opportunities for using more wide-ranging evaluation approaches that are recommended (Sharples, 2013). Because organizations are just beginning to explore the use of mobile technology for learning there is still a primary reliance on traditional learning and training methods. Moreover, with the majority believing that mobile learning is two to three years away from playing a role in their organization, acceptance and readiness are still being formulated. By its very nature the use of mobile technology for learning introduces significant change to the teaching and learning process. It is therefore important to be aware of changes in how mobile technology for learning specifically affects educators or trainers, learners, and the general impact on organizations (Cheung, 2015; Li & Goos, 2015). If organizations are to develop effective and sustainable mobile learning it will be critical to identify and capture all of the important aspects of programs (Traxler & Vosloo, 2014). However, the task of identifying and capturing meaningful data will be quite a challenge. Organizations will be faced with preparing educators, trainers, and learners for assessing this new way of defining learning and meaningful outcomes will only be determined over time.

Implications

Mobile learning presents the opportunity for leveraging the wide array of mobile technology for teaching and training, yet only recently has the theoretical and practical implications began to be examined. This study contributes to the knowledge by providing timely evidence describing practitioners' efforts for integrating mobile technology into their education and training activities. The findings indicate that while government agencies and departments acknowledge the promise of mobile learning, thus far it is not

priority. Based upon a review of existing research this study is believed to be the first to examine the implementation of mobile learning across cabinet level government organizations. Although there have been studies examining the use of mobile technology for learning in several United States government organization, much of the focus has been in the DOD. Cabinet-level government agencies and departments have a somewhat different mission focus and the integration of mobile technology into their training and development programs might not have the same sense of focus or urgency. However, the integration of mobile technology for learning into cabinet level agencies and departments should not be significantly different from DOD organizations.

Findings indicate that agencies and departments lack the understanding and experience required to make effective use of mobile learning. If organizations are to use mobile learning they must begin to focus on developing or acquiring the capacity for understanding how best it can and must be integrated. This study provides a picture of the state of mobile learning implementation efforts in cabinet level agencies and departments. It also, serves to provide an increased understanding of the level of progress and challenges encountered by cabinet-level government organizations in pursuing the use of mobile learning. The implications and benefits are that the results of descriptions, decisions, approaches and outcomes can be informative guides and foundational to future research and implementation efforts.

Recommendations

With the finding that organizations continue to have difficulty in defining their concept of mobile learning or in establishing their approach for use, the implications and issues in existing policies and decision guides should be examined. As emerging

technologies become available, new challenges will continue to be discovered. The emergence of new mobile technologies with expanding capabilities requires that organizations have comprehensive policies that accommodate and guide mobile learning prior to, during and after implementation (ally et al., 2014). The emergence of new technologies also require that existing policies are submitted to the constant reexamination and revision to ensure that they are aligned with and informs how best to leverage these capabilities (West & Vosloo, 2013). Future studies should examine the influence that mobile learning policies have on the success that organizations have experienced implementing mobile learning.

There is room for further research that examines the influence that the use of guidelines had on mobile learning efforts. The findings indicated that guidelines unique to mobile learning were not used. The success of mobile learning is dependent upon frameworks or guidelines that account for the interaction between the technology, the nature of the content and method of delivery, and support of the learner as the individual negotiates the context in which learning is to take place (Teall, et al., 2014). Because mobile technology undergoes constant and rapid change, guidelines must continually evolve. Because of the dynamic influences of mobile learning, an ideal area for further study is the examination of the influence of guidelines to overall program success.

Another very promising area for further research is the influence that educators' and trainers' competency play in integration of the total mobile learning experience in using the full array of technology across all of the contexts in which learning takes place. The area of educators' and trainers' skills and competencies required of this discipline has been insufficiently explored (Sung et al., 2016). It warrants further research that

examines the impact that educators' and trainers' competencies and experience have on integrating the extensive range of existing and emerging technologies into mobile learning environments.

The shifting nature of threats to the use of mobile technology combined with recent events that have influenced individuals' views on privacy and security, as described by Rainie and Maniam (2016), make privacy and security an ideal area to examine in future research. The results of the study found that agencies and departments are just beginning the use of mobile technology for learning their policies are in the formative stages, and they have made the decisions to primarily use a Here's Your Own Device approach to mobile device use. A future study should examine the implications of device use policies on privacy and security with the implementation of mobile learning.

Another area worthy of examination is the likely effects of compliance with accessibility standards when deploying mobile technology for learning. The study found that agencies and departments acknowledged the accessibility requirements, but as VanRoekel (2013a) and VanRoekel (2013b) noted few details were offered. As explained by Robson (2015) the myriad of accessibility challenges that learners bring to the mobile learning environment can affect efforts to satisfy accessibility requirements. Factors that can adversely influence the effectiveness of accessibility accommodations in devices chosen for mobile learning include the screen size when interacting with learning activity, the interface for device control positioning and functioning and, learner guidance or help functions. Future research should examine the relationship between the processes and decisions for implementing accessibility requirements when

using mobile technology for learning. Also examined should be the implications of device selection on the ability and effectiveness to comply with accessibility requirements.

A final area worthy of further research would be a longitudinal study exploring the scope and effect of changes and developments in the use of mobile technology for learning over time. Since this mixed methods dissertation was conducted with a purposefully sampled group and a small number of participants at a point in time, it should be replicated in a longitudinal study with a population statistically representative of all cabinet level agencies.

Summary

This chapter presents a summary discussion of the results, provides implications, and offers recommendation for further research. It endeavors to sustain the linkage between the conclusion, implications, and recommendations and the research questions. The aim of study was to increase the understanding of the level of progress and challenges encountered by cabinet-level government organizations in pursuing the use of mobile learning.

The significance and impact of moving from traditional or elearning environments to mobile learning does not appear to be universally accepted. Simply converting learning to a mobile format and considering that effective mobile learning is not enough. The use of an instructional system design framework not specifically tailored for addressing the unique characteristics and requirements of the mobile learning environment, learner, trainer/educator, content, and evaluation can be a problem. It sought to build an expanded picture of approaches used by United States government cabinet-level organizations in

mobile learning implementation efforts and explored how decisions were made to use mobile learning, approaches used for implementation, and the methods used for evaluation.

Presented are the literature on use of mobile technologies, the different descriptions of mobile learning, the use of mobile learning in both higher education and the US government DoD organizations, the considerations and measures associated with mobile technology security concerns, and the way that mobile learning use is effecting change. Mobile learning is a relatively new area and is considered capable of contributing to teaching and learning. A search of the literature revealed that none of the studies had investigated the use of mobile learning implementation in the context of a government cabinet-level government agency or department. This was the case even though there were a number of published studies that explored government interest in mobile learning concentrated on DoD organizations (Archibald et al., 2011; Berking et al., 2012; Berking et al., 2013; Cruz et al., 2010; Dabbagh et al., 2011; Haag, 2011; Tucker, 2010).

A mixed methods case study examined the approaches used by United States government cabinet-level organizations in mobile learning implementation efforts by analyzing and converging quantitative and qualitative data. Three research questions guided the study:

1) What are the influences that led to the decision to implement mobile learning?

2) What are the approaches taken in implementing mobile learning?

3) What are the methods used to evaluate mobile learning implementation efforts?

A self-administered online questionnaire and a search for publically available documents were used to gather data. Data analysis followed the order of the research

questions and the associated dimensions, analyzed participant demographics, mobile technology decisions, the mobile learning environment, mobile learning content, educators/trainers, learners, assessment, what organizations are doing differently as a result of mobile learning implementation efforts, and when mobile learning is expected to become integral to education and training programs.

The study gained insight into how decisions are made, how mobile learning was being used or considered for use, and how mobile learning use was evaluated to determine if outcomes are achieving intended purposes. The examination of data related to mobile technology decisions revealed that mobile devices are allowed for work use only and the majority of participants reported that their organizations have a policy, with the widest use being a Here's Your Own Device approach. Although agencies and departments have recognized the need, there are varying levels of effort underway for policy establishment. The examination of data related to mobile learning environments revealed that nearly half the respondents reported that their organization use mobile learning. However, definitions are representative of mobile learnings current state in which a universally agreed upon definition continues to emerge. Yet, respondents' definitions illustrated a recognition that the learner, the technology, and the context are essential considerations in defining mobile learning.

The investigation of mobile learning content disclosed the strong belief that mobile learning enables new strategies and methods for content development and delivery. Organizations reported developing, or planning to develop, course materials only for use on mobile devices or for use on mobile and stationary devices. Not surprisingly, and consistent with universal use, the investigation found Smartphones and

tablets were considered best suited for mobile content delivery. With learners choosing tablets and smartphones most often for use, it would be interesting to find out if the choices were influenced by policies.

It is not surprising that the study found that nearly half of the respondents felt that there was not a general understating of how and when to use mobile learning. Nor is it a surprise that just only a fifth of educators or trainers have experience with mobile learning projects. The data strongly indicated that organizations did not have educators or trainers with experience converting existing courses and learning materials to a mobile format. These findings are possibly influenced by the data suggesting that there are only a few leaders emerging who are comfortable with the technology.

Having access to all the information needed when away from their workstations is essential and this is not the case for a significant portion of learners. The finding that the majority of learners do not have a positive perception about using mobile devices for learning in their organization, while troubling, is not a surprise and need to be addressed.

Learners have the most control over the pace of the information being presented, the choice of multimedia presented in various formats, the means to communicate with teachers/instructors and others, and methods of interaction with all relevant content. The investigation results indicate that there are open questions as to whether or not there is a process in place to measure the effectiveness of mobile learning. Similarly, there is doubt about the degree to which the strategy to evaluate mobile learning effectiveness is embedded in the overall training/instructional strategy for organizations. Where the findings indicate the existence of evaluation techniques, the same techniques are used to evaluate the impact of mobile learning as other training programs. The assessment

techniques that are used are course completions, percentage of training completed and as use of survey results. The types of assessment focused course completions, percentage of training completed. The lack of investigations on the effects of mobile learning technology, or the disruptive activities associated with the contextual aspects of time, location, and curriculum suggested that sufficient evaluation strategies are not yet developed.

Organizations have not made substantive changes because of the availability of mobile technologies for learning and training. Changes observed from the learners' perspective after implementing mobile learning were varied with some noting that the organizations efforts were fostering change and others indicating minor, if any, of change. This lack of change is understandable as more than two thirds of respondents hold the belief that mobile learning will become integral to their organizations within two to three years.

Mobile learning is a relatively new approach to learning, and successful use must be driven by factors such as how the mobility of technology, the learner, and ensuring that the learning process is accounted for and supported in the mobile learning environment. The advances in mobile technology capability, acceptance and use are on the rise. As the landscape of mobile technology continues to evolve, the nature of the change will offer challenges and opportunities for those deciding to integrate technology into learning processes. Decisions to use mobile technology for learning must not be driven by the newness of technology, but must be based upon asking the right questions pertaining to how the tools can best achieve the desired training and learning outcomes. Frameworks and guidelines are beginning to emerge that can and must inform this

journey. The best opportunity for successful implementations requires examining and learning from ongoing implementation efforts. Equally important will be the adoption and incorporation of the practices described in published research on proven frameworks and guidelines into organizations planning and instructional design efforts.

Appendix A

IRB Approval from Nova Southeastern University

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

NSU

MEMORANDUM

To: Algernon Corbett

From: Ling Wang, Ph.D.
Institutional Review Board

Date: Feb. 4, 2015

Re: *The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments*

IRB Approval Number: wang02151502

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

3301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: *lingu@nsu.nova.edu* • Web site: www.nova.edu/cwis/ogc

Appendix B

Self-administered Online Questionnaire

Introduction

Welcome to the online questionnaire for Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments.

The past decade has seen a heightened interest in mobile learning emerge that is predicted to substantially influence education and training. Mobile devices ownership is expected to become greater than the number of humans on earth. Mobile technology use is now a part of the everyday lives of nearly everyone and is changing the way that learning can take place. Mobile learning is a relatively new approach to learning driven by factors such as the mobility of technology, the learner, and the learning process. Mobile technology significantly changes when and how information can be accessed making anytime and anywhere learning possible. Feedback from government agencies and departments is critical to this study. Organizations are asked to reflect and comment on their mobile learning use.

Who is conducting the study? My name is Algernon B. Corbett and I am the principal investigator conducting this doctoral study as part of a doctoral dissertation at Nova Southeastern University, Ft. Lauderdale, FL., under the direction of Dr. Gertrude Abramson.

What is this online questionnaire about? This online questionnaire seeks to understand organizations' mobile learning decisions and choices, how organizations have implemented mobile learning initiatives, and how organizations have evaluated mobile learning efforts. The study is intended to increase the understanding of challenges encountered by cabinet-level agencies and departments in pursuing the use of mobile learning. The discoveries will contribute to the understanding of how best to implement mobile learning.

Why are you being asked to participate? We are inviting your participation because cabinet-level agencies and departments are seeking ways to use new technologies to improve operations and your insight on how this is being done is important. Your participation is entirely voluntary and you are free to withdraw from the study at any time. You may also refrain from answering any questions you prefer to omit, without prejudice or consequence. The online questionnaire is being conducted via the web. It should take less than 30 minutes to complete.

Are there any benefits for taking part in this study? There are no direct benefits. A copy of the research results will be available at the conclusion of the investigation from Algernon B. Corbett, 301-908-9704,[REDACTED].

Will I get paid for being in the study**?** You will not be paid for this study.

Will it cost me anything? There are no costs to you or payments made for participating in this study.

How will my privacy be protected? Every effort will be undertaken to maintain your confidentiality as part of this study. The electronic data from this study will be stored on the principal investigator's home computer for a minimum of 36 months from the conclusion of the study as required by the Institution Review Board. Yet, even with such procedures in place, there always remains some risk, however small, of a data breach. All information obtained in this study is strictly confidential unless disclosure is required by law. The following people will be given access to review research records, the IRB and the dissertation chair adviser, Dr. Gertrude Abramson.

Other Considerations: 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.

Points of Contact: Please contact the principal investigator, Algernon B. Corbett, 301-908-9704, [REDACTED]with any questions about this online questionnaire. You may also contact the following individuals:

Co-investigator: Dr. Gertrude Abramson, Professor, Computing Technology in Education Mailing, 3301 College Avenue, DeSantis Building Room 4071, Ft. Lauderdale, FL 33314 Contact phone number: 954-262-2070 Contact e-mail: [REDACTED]

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 [REDACTED]Voluntary

Consent by Participant: Your consent to participate in the online questionnaire will be indicated by your completion of the online questionnaire and its submission online. Your individual responses will be held confidential and anonymous. Even if your organization is not currently involved in mobile learning please complete as many questions as you can. We still want to find out why your organizations is not using mobile learning and plans for using mobile learning in the future.

Please complete the online questionnaire by March 15, 2015.

To begin the online questionnaire please click here
Demographics

The questions in this section are intended to gather the characteristics of the study

participants

1) What is your gender?

- Female
- Male

2) What is your age group?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 and above

3) What is the highest level of education that you have completed?

- Associate's degree
- Bachelor's degree
- Master's degree
- Doctorate degree
- No formal schooling beyond Secondary

4) How many years of experience do you have as a practitioner in the field of education or training?*

- Less than 1 year
- 1 – 3 years
- 4 – 6 years
- 7 – 9 years
- 10 – 15 years
- 16 years or more

5) Which of the following best describes your organization?

- Cabinet Department

- Government Corporation
- Independent Agency
- Regulatory Agency
- Other (Please describe):

6) What is your current job/position title in your organization? (Select all that apply):

- Educator
- Human Performance Technologist
- Instructional Designer
- Instructor/Trainer
- Learning Content Creator
- Manager
- Researcher
- Student
- Other (Please describe):

General Information

The questions in this section are intended to give organizations the opportunity to describe their use of mobile technology.

7) How are mobile devices allowed to be used in your organization?

- Work use only
- Personal use only
- Both work use and personal use
- Mobile devices are not allowed to be used in my organization
- Not sure

8) Does your organization have a policy for mobile device ownership and use?

- Yes
- No

9) Please explain

10) What approach (if any) to mobile device ownership and use do your organization employ? (Select all that apply):

- Here's Your Own Device (HYOD) - Organizations provide the device, the support and specify how the device will be used.
- Choose Your Own Device (CYOD) - Organizations provides devices for users to select from and allow some personal use of the device.
- Bring Your Own Device strategy (BYOB) - Users supply their own personal mobile devices and have wide latitude in how they are used with organizations providing some support.
- Own Your Own Device (OYOD) - Users supply their own devices and organizations provide no controls or support.
- Other (Please describe):

11) Does your organization use mobile learning?

- Yes
- No
- Not sure
- Other (Please describe):

12) Has your organization established an approach for using mobile devices for learning?

- Yes

- No
- Not sure
- Other (Please describe):

13) Please explain the approach

14) When – do you believe – mobile learning will become an integral part of your organization's education and training program?

- In 1 year
- In 2 years
- In 3 years
- In 5 years
- In 10 years
- Not sure
- Never

Environment

The questions in this section are intended to understand what environmental factors influenced approaches for implementing mobile technologies.

15) How do you define mobile learning?

16) How did your organization decide to use mobile learning?

17) How many mobile learning projects has your organization implemented?

- 0
- 1 - 2
- 3 - 4
- 5 - 10
- More than 10

18) What type of mobile technologies does your organization use for learning? Select all that apply:

- Cellular Phones
- E-Book Readers
- MP3 Players
- Personal Digital Assistants
- Phablets
- Smartphones
- Tablets
- Other (Please describe):

19) What activities (if any) are learners allowed to perform on mobile devices? (Select all that apply):

- Browse the Internet

- [ ] Check e-mail
- [ ] Download applications (apps)
- [ ] Download e-books
- [ ] Download / View video files
- [ ] Download / Listen to audio files
- [ ] Other (Please describe):

20) Which of the following activities (if any) do learners use mobile devices for in your organization? (Select all that apply):

- [ ] Accessing communication tools.
- [ ] Accessing instructional material.
- [ ] Accessing social networking websites.
- [ ] Acquiring supplemental content.
- [ ] Assessing their learning progress
- [ ] Collaborating with other learners
- [ ] Creating personalized mobile learning experiences
- [ ] Performing learning assignments.
- [ ] Uploading multimedia content.
- [ ] Other (please describe):

21) What mobile device capabilities (if any) have your organization incorporated into the design or implementation of a mobile learning solution? (Select all that apply):

- [ ] None
- [ ] Camera use (capturing video and images, augmented reality, Quick Response (QR) code reading)
- [ ] Document viewing (eBook, PDF)

- ☐ Geolocation use (GPS, geo-fencing, map)
- ☐ Internal sensors use (accelerometer, barometer, compass, gyroscope, proximity)
- ☐ Media viewer / playback (image, video, audio, podcast)
- ☐ Microphone use (voice recording, podcast)
- ☐ Multimedia Message Service (MMS)
- ☐ Notification (alert, sound, vibrate)
- ☐ Radio Frequency Identification (RFID)
- ☐ Search (discovery, quick-reference, search engine)
- ☐ Short-range communication (Bluetooth, Near Field Communication (NFC), Radio Frequency
- ☐ Near Field Communication (NFC)
- ☐ Text message (Short Message Service (SMS)
- ☐ Touchscreen interaction
- ☐ Voice / phone communications
- ☐ Other (Please describe): ____

22) What is the rate of use for each mobile device capability?

- ○ Very high
- ○ High
- ○ Moderate
- ○ Low
- ○ Very low

23) Mobile learning enables new strategies and methodologies for content development and delivery in my organization.

○ Strongly Agree ○ Agree ○ Neither Agree nor Disagree ○ Disagree ○ Strongly Disagree

Content

The questions in this section are intended to understand how mobile technology and learning content are integrated.

24) What are your organizations plans for developing course materials for use on mobile devices?

- ○ There are no plans to develop course materials for use on mobile devices.
- ○ There are plans to develop course materials for use on mobile devices, but little has been done.
- ○ The organization is now developing course materials only for use on mobile devices.
- ○ The organization is now developing course materials for use on mobile and stationary devices.

25) What mobile devices (if any) are best suited for mobile content delivery in your organization? (Select all that apply):

- ☐ Cellular Phones
- ☐ E-Readers
- ☐ Mobile Digital Media Players
- ☐ MP3 Players
- ☐ Personal Digital Assistants
- ☐ Phablets
- ☐ Smartphones
- ☐ Tablets
- ☐ Other (Please describe): _____

26) Have your organization made changes to content to make it accessible on mobile devices?

- Yes
- No
- Other (please describe):

27) Please describe the changes that were made to content to make it accessible on mobile devices:

28) Which of the following platforms (if any) will content be created for in your organization? (Select all that apply):

- Android
- Blackberry
- iOS
- Palm
- Tizen
- Windows
- Other (Please describe):

29) How did your organization design and develop content for mobile devices? (Select all that apply):

- In-house staff
- External developers
- Other (Please describe):

30) What type of content have learners accessed on their mobile devices in your organization? (Select all that apply):

- [ ] Recorded audio lectures
- [ ] Compliance based courses
- [ ] Development training
- [ ] Mandatory training
- [ ] Performance support checklists
- [ ] Recorded video lectures
- [ ] Other (Please describe):

31) How is a course designed for mobile devices different from a course not using mobile devices in your organization?

32) What changes have your organization observed in learners after implementing mobile content delivery?

33) The instructional design process for mobile learning should be different from the instructional design process for traditional elearning.

- ( ) Strongly Agree
- ( ) Agree
- ( ) Neither Agree nor Disagree
- ( ) Disagree
- ( ) Strongly Disagree

34) If agree or strongly agree, how should the instructional design process for mobile learning be different from the instructional design process for traditional elearning.

Educator/Trainer

The questions in this section are intended to gain an insight of educator / trainer knowledge, experience and proficiency implementing mobile technologies for learning.

35) There is a general understanding within my organization about how and when to use the capabilities of mobile devices for learning?*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

36) What are Educators or Trainers level of experience with mobile learning projects your organization?*

Educators or Trainers in my organization have been involved in mobile learning projects.

Educators or Trainers in my organization have been involved in mobile learning projects(s) outside my organization.

Educators or Trainers in my organization have not had any exposure to mobile learning projects.

Other (Please describe):

37) Educators or trainers in my organization have experience converting existing courses and learning materials to a mobile format.*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

38) The Educators or Trainers in my organization hold views that the latest technology trends and developments in teaching and learning…

Should not have an impact on our teaching and learning strategies or methodologies.

Should have an impact on our teaching, learning strategies and methodologies, but this is currently not the case.

Should be continuously evaluated due to the new affordances that technology can provide.

Should be considered with caution because new technology can bring about unintended changes to teaching and learning strategies and methodologies.

Other (Please describe):

39) How have Educators or Trainers reacted to the use mobile technology for learning and why?*

Learner

The questions in this section are seeking to understand factors affecting students use of mobile technology for learning.

40) Mobile learners have access to all the information they need for learning when they are away from their workstations*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

41) Learners have a positive perception about using mobile devices for learning in your organization?*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

42) Which of the following mobile devices (if any) do learners in your organization select most often? (Select all that apply):

- ☐ Cellular Phones
- ☐ E-Book Readers
- ☐ MP3 Players
- ☐ Personal Digital Assistants
- ☐ Phablets
- ☐ Smartphones
- ☐ Tablets
- ☐ Other (Please describe):

43) Which of the following mobile resources (if any) can learners in your organization control? (Select all that apply):

- ☐ The pace of the information being presented.
- ☐ Access to discussion boards.
- ☐ Methods of interaction with all relevant content.
- ☐ Choice of multimedia presented in various formats (Facebook, YouTube, Twitter, blogs, wiki's).
- ☐ The means to communicate with teachers/instructors and others.
- ☐ The provisions for self-evaluation.
- ☐ Other (Please describe):

44) What changes are observed from the learner perspective when mobile learning has been implemented in your organization?

Assessment

The questions in this section seek to understand how mobile learning implementations are measured.

45) Is there a process in place to measure the effectiveness of mobile learning in your organization?

- Yes
- No
- Not Sure
- Other (Please describe):

46) The strategy to evaluate mobile learning effectiveness is embedded in the overall training / instructional strategy for the organization.*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

47) The same techniques are used to evaluate the impact of mobile learning as other training programs in my organization.*

Strongly Agree Agree Neither Agree nor Disagree Disagree Strongly Disagree

48) What methods does your organization use to measure mobile learning effectiveness? (Select all that apply):

- Content downloads
- Course completions
- Learner registrations
- Number of times content viewed
- Percentage of training completed
- Performance improvement
- Qualitative metrics for pilot programs
- Survey results
- Test scores
- Time spent using mobile devices per course
- Other (Please describe):

49) What changes have your organization made as a result of mobile learning assessments? (Please describe):

Finally

This section is intended to offer the opportunity to provide any additional information that is considered import to the study.

50) What is your organization doing differently as a result of the availability of mobile technologies for learning and training? (Please describe):

51) What should be added in this survey regarding mobile learning at your organization?

Thank you for taking the survey. Your response is very important.

Appendix C

Permission to Use US Naval Academy and Naval Postgraduate School Instrument

Hi Al,

It was very nice talking with you this morning. As noted in our conversation, with your proper citation, we are happy to give you permission to use and revise portions of the instrument created for the Naval Post Graduate School study conducted in 2012 titled “A study of mobile learning trends at the US Naval Academy and the Naval Postgraduate School.”

Your area of inquire is interesting and I am happy to be of any help I can.

With best regards,

Tom

Thomas M. Mastre

Director, CED3
Center for Educational Design, Development, and Distribution
Naval Postgraduate School
411 Dyer Road, Room 106
Monterey, Ca. 93943
Phone: 831.656.1095, Cell: 831.402.9674
Fax: 831.656.3409
email: [REDACTED]
http://www.nps.edu/DL/CED3/index.asp

Appendix D

Permission to use the MoTIF Project Needs Assessment Instrument

From: Haag, Jason [REDACTED]
Sent: Monday, September 8, 2014 10:45 PM
To: Al Corbett
Cc: [REDACTED]
Subject: Re: Permission for use Mobile Learning Research Instrumentation
You have our permission! Looking forward to seeing the results! Sorry for the late reply.

On Sep 1, 2014 7:28 PM, "Al" < [REDACTED]> wrote:
Jason,
In response to your twitter communication on August, 27, I am asking for your permission to reproduce, revise and use your survey instruments for in a dissertation I am pursuing. As indicated in earlier, I am a PhD candidate at Nova Southeastern University and I have a tentative dissertation topic to examine "The State of Mobile Learning Implementation in Government Organization." I will need to provide my dissertation advisor/committee, and eventually the Nova Southeastern University Institution Review Board, copies of letters and e-mails that allow me to use and modify materials belonging to others. Dr. Gertrude Abramson, Professor of Computing Technology in Education, Nova Southeastern University, Fort Lauderdale, Florida, is my committee chair/dissertation advisor.
I am requesting permission to use, revise and print Instruments used in the following research efforts: Berking, P., Birtwhistle, M., Gallagher, S., & Haag, J. (2013). MoTIF mobile learning survey Report. Retrieved from http://www.adlnet.gov/wp-content/uploads/2013/09/MOTIF-SURVEY-REPORT-3.pdf Haag, J. (2011). From eLearning to mLearning: The effectiveness of mobile course delivery. Retrieved from http://www.adlnet.gov/resources/from-elearning-to-mlearning-the-effectiveness-of-mobile-course-delivery?type=research_paper
As with research articles published by ADL and others, attribution will be cited for the use of the material. Specifically I would like to use, revise and print your surveys under the following conditions:
1. I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
2. I will include the copyright statement on all copies of the instrument.
3. I will send my research study and one copy of reports, articles, and the like that make use of these survey data promptly to your attention.
If these are acceptable terms and conditions of use, please indicate your grant of approval in a response to this email
Kindest regards,
Al Corbett
(301) 908-9704

Appendix E

Permission to use the Ally and Palalas Mobile Learning Survey Instrument

From: Mohamed Ally < [REDACTED]>
Sent: Monday, September 29, 2014 9:18 PM
To: Algernon Corbett
Subject: Re: Permission to Use Survey
Dear Algernon,
I hereby give you permission to reproduce and revise the survey instrument used for the "State of Mobile Learning in Canada and Future Directions" study. I agree to the conditions you stated in your email below (copied in the email).
Conditions:
-I will use this survey only for my research study and will not sell or use with any compensated or curriculum development activities.
-I will include the copyright statement on all copies of the instrument.
-I will send my research study and one copy of reports, articles, and the like that make use of these survey data promptly to your attention.

Dr. Mohamed Ally
Professor, Centre for Distance Education Researcher, Technology Enhanced Knowledge Research Institute (TEKRI) Athabasca University Canada

----- Original Message -----
From: "Algernon Corbett" < [REDACTED]>
To: [REDACTED]
Cc: [REDACTED]
Sent: Monday, September 29, 2014 5:52:19 PM GMT -07:00 US/Canada Mountain
Subject: Permission to Use Survey
September 29, 2014
Dr. Mohamed Ally, Professor
Centre for Distance Education Researcher, Technology Enhanced Knowledge Research Institute (TEKRI)
Athabasca University, Canada

Dear Dr. Ally,

I am a doctoral student at Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, Florida 33314-7796, United States of America. I am writing my dissertation, tentatively titled "The State of Mobile Learning in United States Cabinet-level organizations, under the direction of my dissertation committee, chaired by Dr. Gertrude Abramson, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, Florida 33314-7796, United States of America.

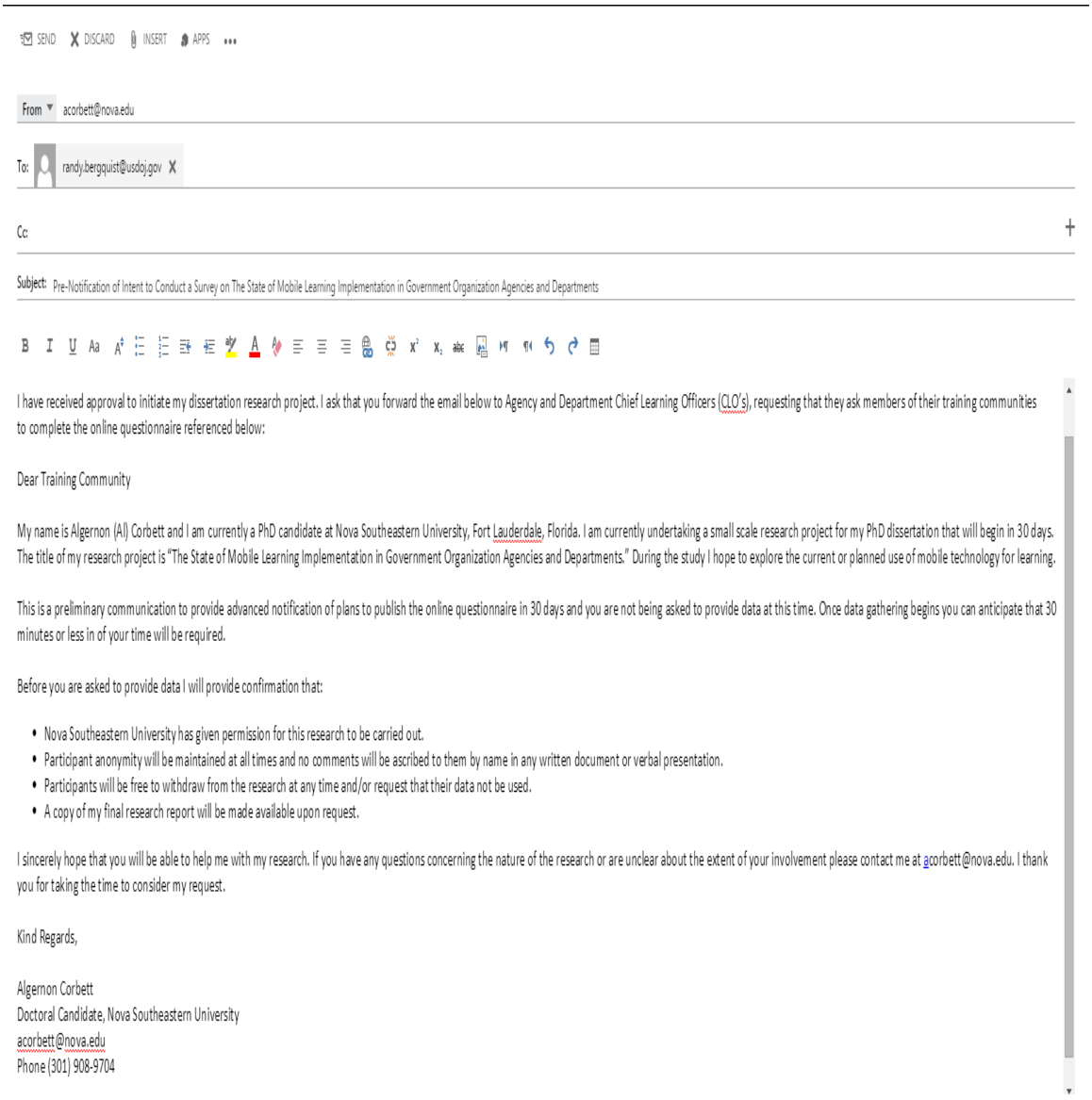
I would like your permission to reproduce, revise and use your survey instrument used for "State of Mobile Learning in Canada and Future Directions" in my research study. I would like to use and print your survey instrument under the following conditions:

-I will use this survey only for my research study and will not sell or use with any compensated or curriculum development activities.
-I will include the copyright statement on all copies of the instrument.
-I will send my research study and one copy of reports, articles, and the like that make use of these survey data promptly to your attention.
If these are acceptable terms and conditions, please indicate your grant of approval in a response to this email

Sincerely,
Algernon B. Corbett
13208 Ailesbury Court
Upper Marlboro, Maryland 20772
United States
Doctoral Candidate
[REDACTED]
--

Appendix F

Pre-Notification E-mail



SEND DISCARD INSERT APPS •••

From acorbett@nova.edu

To: randy.bergquist@usdoj.gov

Cc:

Subject: Pre-Notification of Intent to Conduct a Survey on The State of Mobile Learning Implementation in Government Organization Agencies and Departments

I have received approval to initiate my dissertation research project. I ask that you forward the email below to Agency and Department Chief Learning Officers (CLO's), requesting that they ask members of their training communities to complete the online questionnaire referenced below:

Dear Training Community

My name is Algernon (Al) Corbett and I am currently a PhD candidate at Nova Southeastern University, Fort Lauderdale, Florida. I am currently undertaking a small scale research project for my PhD dissertation that will begin in 30 days. The title of my research project is "The State of Mobile Learning Implementation in Government Organization Agencies and Departments." During the study I hope to explore the current or planned use of mobile technology for learning.

This is a preliminary communication to provide advanced notification of plans to publish the online questionnaire in 30 days and you are not being asked to provide data at this time. Once data gathering begins you can anticipate that 30 minutes or less in of your time will be required.

Before you are asked to provide data I will provide confirmation that:

- Nova Southeastern University has given permission for this research to be carried out.
- Participant anonymity will be maintained at all times and no comments will be ascribed to them by name in any written document or verbal presentation.
- Participants will be free to withdraw from the research at any time and/or request that their data not be used.
- A copy of my final research report will be made available upon request.

I sincerely hope that you will be able to help me with my research. If you have any questions concerning the nature of the research or are unclear about the extent of your involvement please contact me at acorbett@nova.edu. I thank you for taking the time to consider my request.

Kind Regards,

Algernon Corbett
Doctoral Candidate, Nova Southeastern University
acorbett@nova.edu
Phone (301) 908-9704

Appendix G

E-mail Announcing the Launch of Online Questionnaire

SEND DISCARD INSERT APPS •••

From acorbett@nova.edu

To: randy.bergquist@usdoj.gov

Cc:

Subject: E-mail Announcing the Launch of Online Questionnaire

Randy,

I am launching my dissertation research project. I ask that you forward the email below to Agency and Department Chief Learning Officers, requesting that the members of their training communities complete the online questionnaire referenced below:

Dear Training Community Research Participant

My name is Algernon (Al) Corbett and I am currently a PhD candidate at Nova Southeastern University, Fort Lauderdale, Florida. I am currently undertaking a small scale research project for my PhD dissertation. The title of my research project is "The State of Mobile Learning Implementation in Government Organization Agencies and Departments." The goal of the research is to examine and build an expanded picture of current or planned use of mobile technology for learning. The final report will present a picture of the approaches used to implement mobile learning and will contribute to the understanding of experiences in mobile learning use.

This email is a request for you to participate in this very important research effort which should be 30 minutes or less in duration. Your consent to participate in the online questionnaire will be indicated by your completion of the online questionnaire and its submission online. Your individual responses will be held confidential and anonymous. Even if your organization is not currently involved in mobile learning please complete as many questions as you can. We still want to find out why your organizations is not currently using mobile learning and any plans for using mobile learning in the future. Please complete the online questionnaire by March 15, 2015.

If you have any questions or concerns please do not hesitate to contact me. I thank you for agreeing to participate in my doctoral study, The State of Mobile Learning Implementation in Government Cabinet-Level Agencies and Departments.

To begin the online questionnaire please click here.

Kind Regards,

Algernon Corbett
Doctoral Candidate, Nova Southeastern University
acorbett@nova.edu
Phone (301) 908-9704

Appendix H

Reminder E-mail Announcing Five Days Remaining

SEND DISCARD INSERT APPS •••

From acorbett@nova.edu

To: randy.bergquist@usdoj.gov

Cc:

Subject: E-mail Announcing Five Days Remaining

Randy,

This is a reminder that data collection of my dissertation research project will come to an end in five day. I ask that you forward the email below to Agency and Department Chief Learning Officers, requesting that the members of their training communities complete the online questionnaire referenced below:

Dear Training Community Research Participant

This is a reminder that data collection of my dissertation research project "The State of Mobile Learning Implementation in Government Organization Agencies and Departments" will come to an end in five days.

Your participation in this online questionnaire is very important and there is still time for you to contribute. I know that you have a very busy schedule but I ask you to please take the 30 minutes (or less) that is needed to provide information that will make it possible to construct a more complete picture of effective use of mobile technology for learning.

Thank you for participating in this very important research.

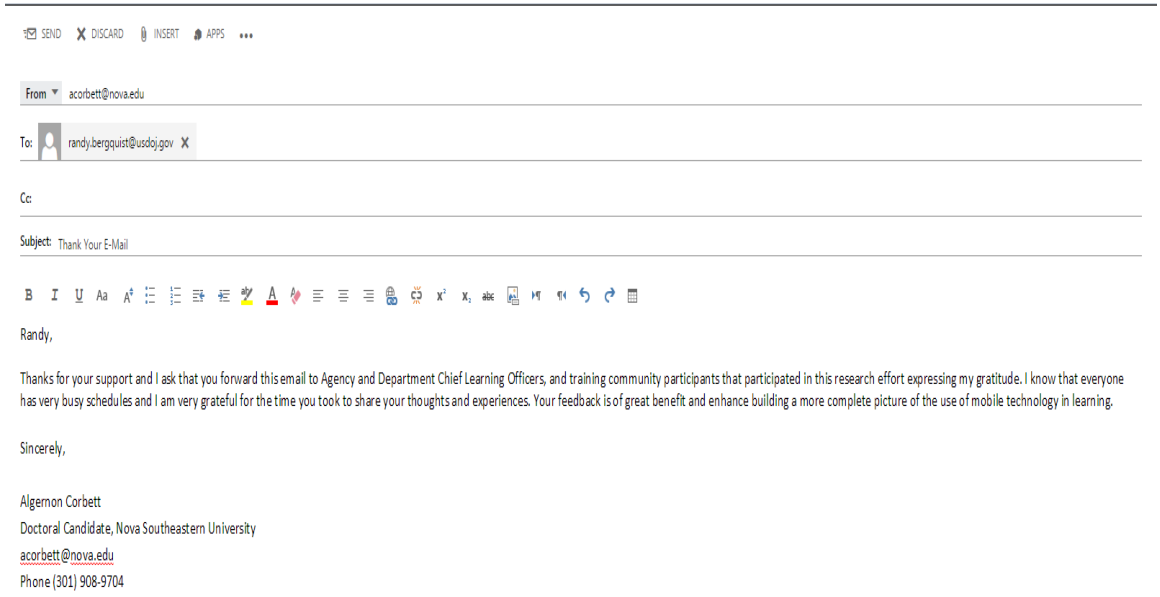
To begin the online questionnaire please click here.

Sincerely,

Algernon Corbett
Doctoral Candidate, Nova Southeastern University
acorbett@nova.edu
Phone (301) 908-9704

Appendix I

Thank You E-mail



SEND DISCARD INSERT APPS •••

From acorbett@nova.edu

To: randy.bergquist@usdoj.gov

Cc:

Subject: Thank Your E-Mail

Randy,

Thanks for your support and I ask that you forward this email to Agency and Department Chief Learning Officers, and training community participants that participated in this research effort expressing my gratitude. I know that everyone has very busy schedules and I am very grateful for the time you took to share your thoughts and experiences. Your feedback is of great benefit and enhance building a more complete picture of the use of mobile technology in learning.

Sincerely,

Algernon Corbett
Doctoral Candidate, Nova Southeastern University
acorbett@nova.edu
Phone (301) 908-9704

Appendix J

Expert Instrument Review Feedback

J-1 Expert Instrument Reviewer Identification and Initial Contact

Gertrude Abramson [REDACTED]
Wed 9/17/2014 1:09 PM
Inbox
Hello, Antonio, Mark G., Dave and Mark H.,

The subject of Al Corbett's dissertation initiative is Critical Factors in Implementing Mobile Learning in Government Organizations. I have suggest each of you as someone who would be interested in helping him validate his survey.

With this message, I am supplying him with the most current email I have for each of you. He will be in touch with specifics. Please take this message as an indication of how highly I value your expertise.
FYI, Antonio is a committee member of Al's but that does not create a conflict of interest.
Best wishes to everyone.
Trudy

Dr. Gertrude (Trudy) Abramson,
Professor of the Year, 2011-2012
Graduate School of Computer and Information Sciences
Nova Southeastern University
3301 College Avenue
Fort Lauderdale FL 33314-7796
http://www.scis.nova.edu/~abramson
[REDACTED]
Executive Editor, The Journal of Applied Learning Technology

From: Algernon Corbett
Sent: Sunday, September 28, 2014 8:51 PM
To: Givens, Mark - CNTR; Mark; Dave Mylott
Cc: Gertrude Abramson
Subject: Validating Survey

Hello everyone,
As indicated by Dr. Abramson in an earlier email, I am asking for your assistance and expertise in validating the attached survey. The survey is one that I intend to use to conduct a case study that examine approaches used by United States government cabinet-level organizations in mobile learning implementation efforts.

While the survey provides an overview of the research objects and associated questions, I will reach out to you individually to discuss this request, provide additional information and answer any questions you have. You can reach me by replying to this email. I offer my thanks in advance for your willingness to support me in this effort.
Respectfully, Algernon Corbett

J-2 Dr. Mark Givens Instrument Review Feedback

Algernon Corbett

Tue 9/30/2014 12:28 PM
Dr. Givens, Thank your very much for your assistance and expertise. I will review the documents and get back with you should I have questions.
Regards, Al

Givens, Mark - CNTR <mark.givens

Tue 9/30/2014 12:26 PM
Inbox
To:
Algernon Corbett;
Cc:
Gertrude Abramson;
[REDACTED]
You replied on 9/30/2014 12:28 PM.

Initial Draft Survey Draft 9-28_2014 – Givens.docx
Al,
attached are two documents. I added comments / concerns in your survey and the other attachment reiterates the comments too. Please review both. Hopefully my thoughts are clear and articulate my points. If you have any questions, please contact me.
Thank you for asking me to review your instruments.
MAG
Best regards,
Dr. Mark A. Givens (CISSP)
Information Assurance Officer

Dr. Givens - Notes

Substantive Notes

1. The Research objectives do not stand out as clearly as the research questions and the five dimensions you mention. What are the research objectives? If the objectives are the research questions or dimensions, then you will need to utilize one adjective and remain consistent throughout the survey.
2. I noticed an overall trend that cites which research question will be addressed but then the question seems to ask for personal observation and not the organizations perspective. This needs to be corrected since the research questions involve the organization and some questions ask for personal opinion. Further, I understand the need to collect demographics and ask for personal experience (as in the general information section), but some of the questions in the General Information section ask personal questions and some ask organizational questions. Maybe there should be a section that includes the organizational questions that pertain to RQ#1. This will remove them from the general information section.
3. Review grammar / sentence structure for entire instrument / document.

Administrative Notes

1. Will you include the Question Type; Research Objective on the final instruments or is this for the validator? These make the questions difficult to read. [[No]]
2. Suggest you use an online survey tool such as SurveyMonkey or other to administer the tools. The cost is minimal compared to the professional and quality appearance and statistical reporting. And some responders actually prefer this method.
3. Question 6 in Demographics is very similar to Question 7 in General Information. Suggest you switch the two questions as Question 7 is more absolute and it seems better placed in the Demographic section. If you do this, revise Question 6 so it is not near verbatim. I say this since many professionals are hired for a certain position, but then do collateral assignments. This is very common in the US government.
4. Consider moving Question 8 to Demographics.
5. Questions 10 and 17 are similar and will probably provide the same result.
6. You should probably provide examples for Question 31 as you did in Question 30.
7. The choices in Question 39 should all begin with a capital letter. This adds consistency as compared to the other questions / choices. Ensure all Questions / choices adhere to this.
8. Question 41 aligns with a learning institutions accreditation. I imagine that SACS will best address this question.
9. Questions 37 and 46 are very similar. Consider revising 46 to differentiate.

J-3 Dr. Mark Harris Instrument Review Feedback

Algernon Corbett

Wed 10/8/2014 2:03 PM
Sent Items
To:
[REDACTED]>;
Cc:
Gertrude Abramson;
Dr. Harris,

I am deeply appreciative and thank you very much for taking the time to review and comment on the draft survey. I also thank you for the well wishes. The journey continues.

Kindest regards,
All

Mark [REDACTED]

Tue 10/7/2014 12:03 AM
Al,
My comments are attached. Overall it's a good survey. I think you'll have a big challenge (as I did) getting people to commit a half hour. Also, keep in mind that some federal agencies tell their employees to NOT fill non-agency-approved surveys at the surveys at the office or during work hours. Sometimes that guidance applies only to commercial (marketing) surveys, but employees may not know that. If you can solicit through professional associations, you may bump up your responses, but you'll need a filtering question up front to get your target population.

I wasn't looking for grammatical issues, but I addressed any I happened to see.

Best to you in your research. It's a huge effort, but you will thank yourself for completing it.

Mark

Algernon Corbett

Mon 9/29/2014 11:59 AM
Sent Items
Dr. Harris,
Thanks a ton
Regards,
Al.

Mark Harris <mark.cameron.harris

Mon 9/29/2014 11:54 AM
Inbox
No problem. I have a meeting tonight, but should get to review and comment this week.

Algernon Corbett

Mon 9/29/2014 9:28 AM
Sent Items
Dr. Cameron,

Last night I forwarded the draft instrument that I intend to use in my study of mobile learning implementation in United States government cabinet level agencies and departments.

If you would like to discuss the survey or wish for me to provide additional information please let me know. I can be reached by responding to this email or at the phone number listed below.

Thanks in advance for your willingness to offer your expertise in validating the instrument.
Respectfully,

Algernon Corbett

Mark <mark.cameron.harris

Wed 9/17/2014 2:47 PM
Looking forward to it. -- Mark

Algernon Corbett

Wed 9/17/2014 2:34 PM
Mark, 5:00 pm MDT (7:00 pm EDT) is perfect. I'll give you a call at that time. Again thanks for the support.
Kindest regards,
Al

Mark <mark.cameron.harris

Wed 9/17/2014 2:30 PM
I'll be available today at 5:00 pm, MDT (7:00 pm EDT). Is that convenient?
Sent

Algernon Corbett

Wed 9/17/2014 2:24 PM
Sent Items
Mark,

Thanks for the quick response and your willingness to assist in this matter. What is a good time to call you?

Regards,
Al

Mark cameron.harris

Wed 9/17/2014 2:20 PM
Inbox
Trudy,
I'm pleased to assist. Al can contact me at this email address
Mark Harris

J-4 Dr. Dave Mylott Instrument Review Feedback

Algernon Corbett

Tue 10/21/2014 4:05 PM
Sent Items
To:
davemylott;
Cc:
Gertrude Abramson;

Dr. Mylott,
Thanks for your support and the excellent comments on the draft survey. I understand that the review was a significant draw on your time and I deeply appreciate your willingness to share your expertise and guidance with me.
Kindest regards,
Algernon

Mon 10/20/2014 10:12 PM
Inbox
Hello Algernon
Attached please find my feedback. Overall I like the direction of the survey instrument. I have provided a lot of small suggestions to help make is easier to understand. There are also a couple of general statements I would like to share.

While there are some very good questions in the document, the organization was not easy to follow. The questions in each group should very clearly belong there. There were a lot of repeated questions. If a question seems to belong in more than 1 category than choose the most appropriate based on the intent of your dissertation. It is important that all of the questions serve a purpose. You should ask yourself “does the answer of this question somehow support the research objectives?” Although I do not know all of the background to what has led you to this survey, I found it a little difficult to understand what the some of the survey questions were trying to achieve. I recommend that you take some time to think about what you will do with the data you get from the respondents. This should help you to more clearly organize the questions.

Algernon Corbett

Thu 9/18/2014 12:26 PM
Dave, Thanks for kind words of encouragement and the quick response. I really appreciate your willingness to support me on this effort. I am making some final tweaks to the instrument and should have something for you to look at within a week. If you like,

Algernon Corbett

Fri 10/17/2014 9:54 AM
Sent Items
Dr. Mylott,
Thanks for your support on this effort. I look forward to your comments.
Regards, Algernon

Dave Mylott<davemylott

Thu 10/9/2014 10:49 PM
Inbox
Hello Algernon

It has taken me slightly longer than I had hoped to review your survey instrument. Since I know what its like to be on the other end of the process I wanted to provide a quick update. I have finished the review of the document and just need a couple of days to get my notes typed up to send you.

Best regards
Dave

Dave Mylott

Thu 9/18/2014 12:09 PM
Inbox
Hi Al

Congratulations on getting to this point in your doctoral pursuit and best of luck with the rest of the process.

I am happy to help. Please let me know what I can do. I can be reached through this email

Look forward to hearing from you.
Dave

Dave Mylott
I think you are moving in a very good direction. A few tweaks and you should have a solid document that will help you capture valuable data for your research.
Best Regards
Dave

J-5 Dr. Antonio Rincon Instrument Review Feedback

Rincon, Antonio

Mon 10/6/2014 10:36 AM
Algernon, It is my pleasure to work with you and Dr Abramson. I work hard to find the time as I truly appreciate the opportunity and I know how it feels to be on your side working hard to complete your work.
Antonio

Algernon Corbett

Fri 10/3/2014 1:41 PM
Sent Items
To:
Rincon, Antonio;
Cc:
Gertrude Abramson;

Dr. Rincon,

I know that with the recent merger your time is extremely limited and I am deeply grateful to you for taking the time to review and comment on the survey.
I wish you great success as you take on the new challenge.

Regards,
Algernon

gscisweb.scis.nova.edu/studentdts/
Post No. 200
Author: [REDACTED]
Date/Time: October 3, 2014 7:59 AM
Attachment: Survey Comments RinconA.docx
Subject: Survey Review
Comment:
Trudy,
I have completed the survey review for Algernon. I have included it for your review and dissemination as you see fit. Thank you. Hope all is well.

Antonio

Subject: Review of file "ACorbett_Initial_Draft_Survey_ 9_28_2014"
Author: Antonio Rincon
Date: 10/3/2014

Overall:

1. Is there a way to reduce the number of questions? For example, questions 25, 26, and 29 provide similar answers for questions 46 and 47. Could there be questions grouped and distributed by someone's role in an organization?

General Information Section:

Question 7: Can this be removed as a similar "what is your job" question exists as question 6?

Question 10/11: Can you provide examples for the individual as they might not know how to articulate what you are asking?

- Question 14: This question is a bit confusing to me as to what you are trying to find out here. Not every person surveyed would know if OTHER programs are using mobile learning techniques?

Question 16: I don't feel comfortable with your use of the word "incentive" in this question as your survey relates to government work. Could you replace the meaning of it with something such as: "what kind of approaches were used for you …."

Learner:

Question 18: Could this be removed as a question and replaced as a title for questions 19-23 as you did for the entry before Question 40 (just to reduce the number of total questions from 95 to 94 ☺)

Question 23: Recommend removing last "mobile" in sentence.

Question 24: Confused as to how "study" differs from several of the other options. Recommend updating or removing.

Environment:

Question 40: Recommend removing "considered".

- Question 41: Should this be two questions? One for "strategy" and one for "instructional design" as they are not mutually inclusive.

Algernon Corbett

Mon 9/29/2014 11:15 AM
Sent Items
ACorbett_Initial_Draft_Survey_9_28_2014
Dr. Rincon,
I have attached the survey. Thanks for the quick response.
Regards,
Al

Rincon, Antonio

Mon 9/29/2014 11:07 AM
Inbox
Algernon,

My pleasure and I truly enjoy working with Ms. Abramson and her wonderful students. BTW, could you send me the survey when you get a chance as I still have not received it. These are the emails I am currently using:

Thank you.
Antonio

From: Algernon Corbett [REDACTED]
Date: September 29, 2014 at 9:16:50 AM EDT
To:
Subject: Survey Validation

Dr. Rincon,

Last night I forwarded the draft instrument that I intend to use in my study of mobile learning implementation in United States government cabinet level agencies and departments.

If you would like to discuss the survey or wish for me to provide additional information please let me know. I can be reached by responding to this email

I trust that the recent merger of your company went well.

Thanks for agreeing to serve on my dissertation committee and for your willingness to support me on this journey.

Respectfully,

Algernon Corbett

Rincon, Antonio

Mon 10/6/2014 10:36 AM
Inbox
To:
Algernon Corbett;
Cc:
Gertrude Abramson;
Algernon,

It is my pleasure to work with you and Dr Abramson. I work hard to find the time as I truly appreciate the opportunity and I know how it feels to be on your side working hard to complete your work.
Antonio

Algernon Corbett

Fri 10/3/2014 1:41 PM
Sent Items
Dr. Rincon,

I know that with the recent merger your time is extremely limited and I am deeply grateful to you for taking the time to review and comment on the survey.
I wish you great success as you take on the new challenge.
Regards,
Algernon

Algernon Corbett

Mon 9/29/2014 11:15 AM
Sent Items
ACorbett_Initial_Draft_Survey_9_28_2014
Dr. Rincon,

I have attached the survey. Thanks for the quick response.
Regards,
Al

Rincon.Antonio

Mon 9/29/2014 11:07 AM
Inbox
Algernon,
My pleasure and I truly enjoy working with Ms. Abramson and her wonderful students. BTW, could you send me the survey when you get a chance as I still have not received it. Thank you.
Antonio

From: Algernon Corbett [REDACTED]
Date: September 29, 2014 at 9:16:50 AM EDT
To:
Subject: Survey Validation

Dr. Rincon,
Last night I forwarded the draft instrument that I intend to use in my study of mobile learning implementation in United States government cabinet level agencies and departments.

If you would like to discuss the survey or wish for me to provide additional information please let me know. I can be reached by responding to this email.

I trust that the recent merger of your company went well.

Thanks for agreeing to serve on my dissertation committee and for your willingness to support me on this journey.

Respectfully,

Algernon Corbett

References

Allen, W. C. (2006). Overview and evolution of the ADDIE training system. *Advances in Developing Human Resources*, *8*(4), 430-441.

Ally, M., Grimus, M., & Ebner, M. (2014). Preparing teachers for a mobile world, to improve access to education. *Prospects*, *44*(1), 43-59.

Ally, M., & Palalas, A. (2011). State of mobile learning in Canada and future directions Retrieved from http://s3.amazonaws.com/zanran_storage/www.rogersbiz resources.com/ContentPages/2543269200.pdf

Ally, M., & Tsinakos, A. (2014). Increasing access through mobile learning. Retrieved from http://oasis.col.org/handle/11599/558

Altalbe, A. A. (2013). Do new mobile devices in enterprises pose a serious security threat? *Advanced Computing*, *4*(1).

Anderson, M. (2015). Technology device ownership: 2015. Retrieved December 8, 2015, from http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015/

Ambient Insight Research. (2011). *Ambient Insight Comprehensive Report: The US market for mobile learning products and services: 2010-2015 Forecast and Analysis*. Retrieved from http://www.ambientinsight.com/Resources/Documents/ Ambient-Insight-2010-2015-US-Mobile-Learning-Market-Executive-Overview.pdf. Monroe, WA: Adkins, S. S.

Arabo, A., & Pranggono, B. (2013). Mobile malware and smart device security: Trends, challenges and solutions. In *Control Systems and Computer Science, 2013 19th International Conference,* 526-531.

Archibald, T., Brown, J., Haag, J., & Hahn, S. (2011). Mobile learning: The current landscape in the Department of Defense (DoD). Retrieved from http://www.adlnet.gov/wp-content/uploads/2011/08/Mobile-Survey-v1.0_20110822.pdf

Arrigo, M., Kukulska-Hulme, A., Arnedillo-Sánchez, I., & Kismihok, G. (2013). Meta-analyses from a collaborative project in mobile lifelong learning. *British Educational Research Journal*. (39)2, 222-247.

Attalla, S. M., El-Sherbiny, R., Mokbel, W. A., El-Moursy, R. M., & Abdel-Wahab, A. G. (2012). Screening of students' intentions to adopt mobile - learning: A case from Egypt. *International Journal of Online Pedagogy and Course Design, 2*(1), 65-82.

Bakla, A., Çekiç, A., & Köksal, O. (2013). Web-based surveys in educational research. *International Journal of Academic Research*, *5*(1).

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning. *Educational Researcher, 32* (1), 21-24.

Baran, E., (2014). A Review of research on mobile learning in teacher education. *Journal of Educational Technology & Society*, *17*(4), 17–32. Retrieved from http://www.jstor.org/stable/jeductechsoci.17.4.17

Barbosa, E. F. (2013). A requirements catalog for mobile learning environments. In *Proceedings of the 28th Annual ACM Symposium on Applied Computing* (pp. 1266-1271).

Bauer, M. W. (2000). Classical content analysis: A review. *Qualitative researching with text, image and sound*, 131-151.

Berge, Z. L., Muilenburg, L. Y., & Crompton, H. (2013). *Handbook of mobile learning* (pp.3-14). New York: Routledge.

Bergquist, R. (2015). Chief Learning Officers Council Charter 2015. Retrieved from http://clo.knowledgeportal.us/minutes/8th-annual-chief-learning-officer-council-strategic-planning-meeting-1/cloc-charter-2015/view

Berking, P., Haag, J., Archibald, T., & Birtwhistle, M. (2012). Mobile learning: Not just another delivery method. *Interservice/Industry Training, Simulation, and Education Conference, 2012*(1).

Berking, P., Birtwhistle, M., Gallagher, S., & Haag, J. (2013). MoTIF project: Needs assessment report. Retrieved from http://www.adlnet.gov/wp-content/uploads/2014/09/MOTIF-NEEDS-ASSESSMENT-FINAL.pdf

Bhattacharya, P., Yang, L., Guo, M., Qian, K., & Yang, M. (2014). Learning mobile security with labware. *Security & Privacy, IEEE*, *12*(1), 69-72.

Bibby, S. (2011). Do students wish to go mobile: An investigation into student use of pcs and cell phones. *International Journal of Computer-Assisted Language Learning and Teaching, 1*(2), 43-54.

Blaikie, N. (2003). Data Reduction: Preparing to Answer Research Questions. In *Analyzing Quantitative Data*. London: SAGE.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*, *9*(2), 27-40.

Boyles, J. L., Smith, A., & Madden, M. (2012). Privacy and data management on mobile devices. *Pew Internet & American Life Project.* Retrieved from http://www.privacylives.com/wp-content/uploads/2012/09/PIP_MobilePrivacyManagement-092012.pdf

Campbell, J., McDonald, C., & Sethibe, T. (2010). Public and private sector IT governance: Identifying contextual differences. *Australasian Journal of Information Systems, 16*(2).

Chan, S. R., Torous, J., Hinton, L., & Yellowlees, P. (2014). Mobile tele-mental health: Increasing applications and a move to hybrid models of care. In*Healthcare* (Vol. 2, No. 2, pp. 220-233).

Chang, A. Y., Littman-Quinn, R., Ketshogileng, D., Chandra, A., Rijken, T., Ghose, S., . . . Kovarik, C. L. (2012). Smartphone-based mobile learning with physician trainees in Botswana. *International Journal of Mobile and Blended Learning (IJMBL), 4*(2), 1-14.

Chao, L. (2012). Deployment of Mobile Learning Course Materials to Android Powered Mobile Devices. *International Journal of Distance Education Technologies (IJDET), 10*(3), 1-16.

Cheung, S. K. (2015). A case study on the students' attitude and acceptance of mobile learning. In *Technology in Education. Transforming Educational Practices with Technology* (pp. 45-54). Berlin Heidelberg: Springer.

Chi, H., & Lai, Y. (2015). The Influence of 4G Mobile Value Added Services on Usage Intention: The Mediating Effect of Perceived Value of Smartphone and Phablet. *International Journal of Marketing Studies*, *7*(6), 50.

Chong, J. L., Chong, A. Y., Ooi, K., & Lin, B. (2011). An empirical analysis of the adoption of m-learning in Malaysia. *International Journal of Mobile Communications, 9*(1), 1-18.

Christ, T. W. (2013). The worldview matrix as a strategy when designing mixed methods research. *International Journal of Multiple Research Approaches, 7*(1), 110.

Ciampa, K. (2014). Learning in a mobile age: An investigation of student motivation. *Journal of Computer Assisted Learning*, *30*(1), 82-96.

Clarke, A., & Dawson, R. (1999). Methods of Data Collection. In *Evaluation Research* (pp. 65-93). London, England: SAGE Publications.

Cochrane, T. D. (2011). Reflections on 4 years of mlearning implementation (2007-2010). *International Journal of Mobile and Blended Learning, 3*(3), 1-22.

Cochrane, T. D. (2012). Secrets of mlearning failures: Confronting reality. *Research in Learning Technology, 20*.

Collingridge, D. S. (2013). A primer on quantitized data analysis and permutation testing. *Journal of Mixed Methods Research, 7*(1), 81-97.

Conde, M. Á., García-Peñalvo, F. J., Alier, M., & Piguillem, J. (2013). The implementation, deployment and evaluation of a mobile personal learning environment. *Journal of Universal Computer Science, 19*(7), 854-872.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches 2nd ed.* Thousand Oaks, CA: Sage.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (Revised/Expanded ed.). Thousand Oaks: SAGE.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. (3rd ed.). Thousand Oaks, CA: SAGE.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, California: SAGE.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: SAGE.

Cruz, T. D. L., Schmunk, C., Durkins, E., Ewing, C., Shearer, S., Corley, W., . . . Hooper, D. (2010). Mobile learning Survey. Naval Post Graduate School. Retrieved from http://eddy.nps.edu/IDDR/download/documents/Mobile_Learning_Survey_Final_Report.pdf

Dabbagh, N., Clark, K., Dass, S., Al Waaili, S., Byrd, S., Conrad, S., . . . Turner, J. (2011). LATIST: A performance support tool for integrating technologies into Defense Acquisition University learning assets. Retrieved from http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA546313

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci, 4*(1), 50.

Darke, P., Shanks, G., & Broadbent, M. (1998). Successfully completing case study research: Combining rigour, relevance and pragmatism. *Information Systems Journal, 8*(4), 273-289.

Davies, B. S., Rafique, J., Vincent, T. R., Fairclough, J., Packer, M. H., Vincent, R., & Haq, I. (2012). Mobile medical education (MoMEd)-how mobile information resources contribute to learning for undergraduate clinical students-a mixed methods study. *BMC Medical Education*, *12*(1), 1.

Deegan, R. (2015). Complex mobile learning that adapts to learners' cognitive load. *International Journal of Mobile and Blended Learning (IJMBL)*, *7*(1), 13-24.

de Leeuw, E., & Hox, J. 9 Mixing Data Collection Methods: Lessons from social survey research1, 2. (2008). In *Advances in Mixed Methods Research: Theories and Applications* (pp. 138-150). London: SAGE Publications Ltd.

Denham, A. R., Gonzalez-Sanchez, J., Chavez-Echeagaray, M. E., & Atkinson, R. K. (2012). Mobile applications as tools to support embodied learning: Current practice and future directions. *International Journal of Cyber Behavior, Psychology and Learning (IJCBPL)*, *2*(4), 1-16.

Denham, A. R., Quick, J. M., & Atkinson, R. K. (2012). Mlearning: An embodied approach. *International Journal of Cyber Behavior, Psychology, and Learning, 2*(3), 1-14.

Disterer, G., & Kleiner, C. (2013). Using mobile devices with byod. *International Journal of Web Portals (IJWP)*, *5*(4), 33-45.

Doorewaard, H. (2010). Research framework. In *Encyclopedia of Case Study Research* (pp. 814-817). Thousand Oaks: SAGE Publications.

Ekanayake, S., & Wishart, J. (2011). Identifying the potential of mobile phone cameras in science teaching and learning: A case study undertaken in Sri Lanka. *International Journal of Mobile and Blended Learning (IJMBL)*, *3*(2), 16-30.

Elias, T. (2011). Universal instructional design principles for mobile learning. *The International Review of Research In Open And Distance Learning, 12*(2), 143-156. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/965/1675

El-Sofany, H. F., El-Seoud, S. A., Al-Turki, T., El-Howimel, H., & Al-Sadoon, A. (2013). Improving educational outcomes by providing educational services through mobile technology. *International Journal of Interactive Mobile Technologies (iJIM)*, *7*(1), 25.

Eom, S. J., & Kim, J. H. (2014). The adoption of public smartphone applications in Korea: Empirical analysis on maturity level and influential factors. *Government Information Quarterly*.

Exec. Order No. 13111, 3 C.F.R. 2793 (1999). Using technology to improve training opportunities for federal government employees, *12 reprinted as amended in* 3 U.S.C. 301 app. at 404-07 (1994).

Exec. Order No. 13571, 3 C.F.R. 24339 (2011). Streamlining service delivery and improving customer service, reprinted as amended in 3 U.S.C. 301 app. at 404-07 (1994).

Fan, W., & Yan, Z. (2010). Factors affecting response rates of the web survey: A systematic review. *Computers in Human Behavior, 26*(2), 132-139.

Farley, H., Murphy, A., Johnson, C., Carter, B., Lane, M., Midgley, W., Hafeez-Baig, A., & Koronios, A. (2015). How do students use their mobile devices to support learning? A case study from an Australian regional university. *Journal of Interactive Media in Education, 2015*.

Farley, H., Murphy, A., Todd, N. A., Lane, M., Hafeez-Baig, A., Midgley, W., & Johnson, C. (2015). Moving towards the effective evaluation of mobile learning initiatives in higher education institutions. In A. Murphy & Y. Zhang (Eds.), *Handbook of Mobile Teaching and Learning* (pp. 721-740). Berlin: Springer.

Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of mixed methods research, 4*(1), 6-16.

Ferreira, J. B., Klein, A. Z., Freitas, A., & Schlemmer, E. (2013). Mobile learning: definition, uses and challenges. *Cutting-edge Technologies in Higher Education, 6*, 47-82.

Fielding, N. G. (2012). Triangulation and mixed methods designs: Data integration with new research technologies. *Journal of Mixed Methods Research, 6*(2), 124-136.

Fink, A. (2013). *How to conduct surveys: A step-by-step guide* (5th ed.). Thousand Oaks, Calif.: SAGE Publications.

Fletcher, J., D., Tobias, T., & Wisher, R., A. (2007). Learning anytime, anywhere: Advanced distributed learning and the changing face of education. *Educational Researcher, 36,* 96-102.

Flood, D., Harrison, R., Iacob, C., & Duce, D. (2012). Evaluating mobile applications: A spreadsheet case study. *International Journal of Mobile Human Computer Interaction, 4*(4), 37-65.

Flyvbjerg, B. (2006). Five Misunderstandings about case-study research. *Qualitative Inquiry, 12,* 219-245.

Foulonneau, M., Martin, S., & Turki, S. (2014). How Open Data Are Turned into Services? In *Exploring Services Science*, 31-39.

Fowler, F. J. (2002). *Survey research methods.* Thousand Oaks, CA: Sage.

Free, C., Phillips, G., Galli, L., Watson, L., Felix, L., Edwards, P., Patel, V & Haines, A. (2013). The effectiveness of mobile-health technology-based health behaviour change or disease management interventions for health care consumers: A systematic review. *PLoS medicine*, *10*(1), e1001362.

Friedman, J., & Hoffman, D. V. (2008). Protecting data on mobile devices: A taxonomy of security threats to mobile computing and review of applicable defenses. *Information, knowledge, systems management*, *7*(1), 159-180.

Fritschi, J., Wolf, M. A., Nakashima, D., Galloway McLean, K., Thulstrup, H., Ramos Castillo, A., . . . & Engida, T. (2012). Mobile learning for teachers in North America: Exploring the potential of mobile technologies to support teachers and improve practice. Retrieved from http://unesdoc.unesco.org/images/0021/002160/216084E.pdf

Frohberg, D., Göth, C. & Schwabe, G. (2009). Mobile learning projects: A critical analysis of the state of the art. *Journal of Computer Assisted Learning, 25*, 307-331.

Garcia, A. (2012). EERE Weatherization and intergovernmental programs office activities: National Training and Education Resource. Retrieved from http://www.energy.gov/articles/factsheet-energy-department-launches-open-source-online-training-resource-help-students

Ghosh, A., Gajar, P. K., & Rai, S. (2013). Bring your own device (BYOD): Security Risks and mitigating strategies. *Journal of Global Research in Computer Science*, *4*(4), 62-70.

Glahn, C., & Specht, M. (2011). Structuring mobile and contextual learning. *10th World Conference on Mobile and Contextual Learning*. Bejing, China, 18-21 October 2011.

Glazatov-Sponsor, T. R. (2012). Applying instructional design system theory to mobile learning environments. *Journal of Applied Learning Technology*, *2*(2).

Gómez, S., & Fabregat, R. (2012). Context-aware and adaptive units of learning in mlearning. *International Journal of Handheld Computing Research (IJHCR)*, *3*(2).

Greene, J. (2005). Context. In S. Mathison (Ed), *Encyclopedia of Evaluation*, Thousand Oaks, CA: Sage., 83-85

Grimus, M., & Ebner, M. (2015). Learning and teaching with mobile devices: An approach in higher secondary education in Ghana. *International Journal of Mobile and Blended Learning (IJMBL), 7*(2), 17-32.

Haag, J. (2011). From eLearning to mLearning: The effectiveness of mobile course delivery. Retrieved from http://www.adlnet.gov/resources/from-elearning-to-mlearning-the-effectiveness-of-mobile-course-delivery?type=research_paper

Haanstra, T. M., Hanson, L., Evans, R., Van Nes, F. A., De Vet, H. C. W., Cuijpers, P., & Ostelo, R. W. J. G. (2013). How do low back pain patients conceptualize their expectations regarding treatment? Content analysis of interviews. *European Spine Journal, 22*(9), 1986-1995.

Hargis, J., Cavanaugh, C., Kamali, T., & Soto, M. (2013). Measuring the difficult to measure: Teaching and learning with an iPad. *International Journal of Mobile and Blended Learning (IJMBL), 5*(2), 60-77.

Harvey, M. J., & Harvey, M. G. (2014). Privacy and security issues for mobile health platforms. *Journal of the Association for Information Science and Technology*.

Hashemi, M., Azizinezhad, M., Najafi, V., & Nesari, A. J. (2011). What is mobile learning? Challenges and capabilities. *Procedia-Social and Behavioral Sciences*, *30*, 2477-2481.

Hashim, K. F., Tan, F. B., & Rashid, A. (2015). Adult learners' intention to adopt mobile learning: A motivational perspective. *British Journal of Educational Technology*, *46*(2), 381-390.

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education, 90*, 36-53.

Hesse-Biber, S., & Griffin, A. J. (2013). Internet-mediated technologies and mixed methods research problems and prospects. *Journal of Mixed Methods Research*, *7*(1), 43-61.

Hsu, Y. C., & Ching, Y. H. (2015). A review of models and frameworks for designing mobile learning experiences and environments. *Canadian Journal of Learning and Technology*.

Hsu, Y. C., Ching, Y. H., & Snelson, C. (2014). Research priorities in mobile learning: An international delphi study. *Canadian Journal of Learning and Technology*.

Hung, J. L., & Zhang, K. (2012). Examining mobile learning trends 2003-2008: A categorical meta-trend analysis using text mining techniques. *Journal of Computing in Higher Education*, *24*(1), 1-17.

Iqbal, S., & Qureshi, L. A. (2012). M-Learning adoption: A perspective from a developing country. *The International Review of Research in Open and Distance learning, 13*(3), 147-164.

Irby, T., & Strong, R. (2015). Instructional competencies needed to develop instructional strategies for mobile learning in fields of agricultural education. *Quarterly Review of Distance Education*, *16*(3), 77.

Ismail, I., Azizan, S. N., & Azman, N. (2013). Mobile phone as pedagogical tools: Are teachers ready? *International Education Studies*, *6*(3), 36-47.

Jeanty, G. C., & Heibel, J. (2011). Mixed methods research of adult family care home residents and informal caregivers. *The Qualitative Report 16*(3), 635-656.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112-133.

Jones, Y. D. (2012). Federal training investments. Office of personnel management and agencies can do more to ensure cost-effective decisions GAO-12-878. Retrieved from http://gao.gov/products/GAO-12-878.

Jones, A. C., Scanlon, E., & Clough, G. (2013). Mobile learning: Two case studies of supporting inquiry learning in informal and semiformal settings. *Computers & Education, (61)*, 21–32.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology, 20*.

Keengwe, J., & Bhargava, M. (2013). Mobile learning and integration of mobile technologies in education. *Education and Information Technologies*, 1-10.

Kim, D., Rueckert, D., Kim, D. J., & Seo, D. (2013). Students' perceptions and experiences of mobile learning. *Language, Learning & Technology*, *17*(3), 52.

Kissinger, J. S. (2013). The social & mobile learning experiences of students using mobile e-books. *Journal of Asynchronous Learning Networks*, *17*(1).

Korucu, A. T., & Alkan, A. (2011). Differences between m-learning (mobile learning) and e-learning, basic terminology and usage of m-learning in education. *Procedia Social and Behavioral Sciences, (15)*, 1925–1930.

Koszalka, T. A., & Ntloedibe-Kuswani, G. S. (2010). Literature on the safe and disruptive learning potential of mobile technologies. *Distance Education*, *31*(2), 139-157.

Krishna, R. S., Sayi, T. J. V. R. K., Mukkamala, R., & Baruah, P. K. (2012). Privacy-preserving data management in mobile environments: A partial encryption approach. In *Mobile Data Management (MDM), 2012 IEEE 13th International Conference on* (pp. 167-175). IEEE.

Kuhn, E., Greene, C., Hoffman, J., Nguyen, T., Wald, L., Schmidt, J., Ramsey, K. M. & Ruzek, J. (2014). Preliminary evaluation of PTSD coach, a smartphone app for post-traumatic stress symptoms. *Military Medicine*, *179*(1), 12-18.

Kukulska-Hulme, A. (2010). Mobile learning as a catalyst for change. *Open Learning: The Journal of Open and Distance Learning. 25*(3), 181-185.

Kukulska-Hulme, A., Pettit, J., Bradley, L., Carvalho, A., Herrington, A., Kennedy, D., & Walker, A. (2011). Mature students using mobile devices in life and learning. *International Journal of Mobile and Blended Learning, 3*(1), 18-52.

La Polla, M., Martinelli, F., & Sgandurra, D. (2013). A survey on security for mobile devices. *Communications Surveys & Tutorials, IEEE*, *15*(1), 446-471.

Lavrakas, P. (2008). *Encyclopedia of survey research methods*. Thousand Oaks, CA: SAGE.

Levene, J., & Seabury, H. (2014). Evaluation of mobile learning: Current research and implications for instructional designers. *TechTrends*, *59*(6), 46-52.

Li, K. W., & Goos, M. (2015). A study on students' attitudes towards teacher's intervention in statistical computing laboratory. *Communications in Computer and Information Science Technology in Education. Transforming Educational Practices with Technology* (pp. 116-126). Berlin: Springer.

Lin, Y. D., Huang, C. Y., Wright, M., & Kambourakis, G. (2014). Mobile application security. *Computer*, *47*(6), 21-23.

Lin, C., Ma, Z., & Lin, R. C. (2011). Re-examining the critical success factors of e-learning from the EU perspective. *International Journal of Management in Education*, *5*(5), 44-62.

Liu, Y., Han, S., & Li, H. (2010). Understanding the factors driving the adoption of m-learning: A literature review. *Campus Wide Information Systems, 27*(4), 210-226.

Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study. *Journal of Computers & Education, 55,* 1211-1219.

Lorenzi, D., Vaidya, J., Chun, S., Shafiq, B., & Atluri, V. (2014). Enhancing the government service experience through QR codes on mobile platforms. *Government Information Quarterly*, *31*(1), 6-16.

Lukowski, G. (2013). Data analysis & documentation federal employment reports. Retrieved from http://www.opm.gov/policy-data-oversight/data-analysis-documentation/federal-employment-reports/reports-publications/full-time-permanent-age-distributions/

Luna-Reyes, L. F., Bertot, J. C., & Mellouli, S. (2014). Executive Order 13111, open data and digital government. *Government Information Quarterly 31*(1), 4–5.

Macdonald, I., & Chiu, J. (2011). Evaluating the viability of mobile learning to enhance management training. *Canadian Journal of Learning and Technology, 37*(1), 1-12.

MacDonald, J. E., Foster, E. M., Divina, J. M., & Donnelly, D. W. (2011). Mobile interactive training - Tablets, readers, and phones? Oh, My! *Proceedings of the Interservice/Industry Training, Simulation and Education Conference*. *Orlando, Florida, USA*, 1–9.

Martin, F., & Ertzberger, J. (2013). Here and now mobile learning: An experimental study on the use of mobile technology. *Computers & Education*, *68*, 76-85.

Martin, F., Pastore, R., & Snider, J. (2012). Developing mobile based instruction. *TechTrends*, *56*(5), 46-51.

Matias, A., & Wolf, D. F. (2013). Engaging students in online courses through the use of mobile technology. *Cutting-edge Technologies in Higher Education*, *6*, 115-142.

McKee, M. R., Allen, J. M., & Tamez, R. (2014). The effect of mobile support devices on the anxiety and self-efficacy of hospital float staff. *Performance Improvement Quarterly*, *27*(2), 59-81.

Mergel, I. (2013a). A framework for interpreting social media interactions in the public sector. *Government Information Quarterly*, *30*(4), 327-334.

Mergel, I. (2013b). Social media adoption and resulting tactics in the US federal government. *Government Information Quarterly*, *30*(2), 123-130.

Mertens, D. M. (2007). Transformative paradigm mixed methods and social justice. *Journal of mixed methods research*, *1*(3), 212-225.

Miles, M., & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Miles, M., Huberman, A., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3.rd ed.). Thousand Oaks, CA: SAGE.

Mileva, N. N. (2011). The effectiveness of mobile learning in the form of performance support systems in higher education. *Internal Journal of Interactive Mobile Technologies, 5*(4), 17-21.

Miller, K. W., Voas, J., & Hurlburt, G. F. (2012). BYOD: Security and privacy considerations. *It Professional, 14*(5), 0053-55.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-Learning, online learning, and distance learning environments: Are they the same?. *The Internet and Higher Education*, *14*(2), 129-135.

Moran-Ellis, J., Alexander, V. D., Cronin, A., Dickinson, M., Fielding, J., Sleney, J., & Thomas, H. (2006). Triangulation and integration: processes, claims and implications. *Qualitative Research, 6*(1), 45-59.

Morrell, J., & Lane, K. (2014). Benefits gone mobile. *Benefits Magazine*, 26-30.

Morton, L. B. (2011). TRADOC pamphlet 525-8-2: The US Army learning concept for 2015. Retrieved from http://www-tradoc.army.mil/tpubs/pams/tp525-8-2.pdf

Mulieri, C. (2013). FDA takes a responsive approach to mobile. Retrieved from http://blogs.fda.gov/fdavoice/index.php/2013/11/fda-takes-a-responsive-approach-to-mobile-web/

Mykowska, A., Kostrzewa, I., & Orda, M. (2014). Crucial factors of implementing mobile learning in sector of VET organisations in Poland. In*Mobile as a Mainstream–Towards Future Challenges in Mobile Learning* (pp. 205-211). Springer International Publishing.

Ng, W. (2013). Conceptualising mlearning literacy. *International Journal of Mobile and Blended Learning (IJMBL)*, *5*(1), 1-20.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education, 33*(3), 301-314.

Obama, B. (2012). Memorandum on building a 21st century digital government. Retrieved from http://www.gpo.gov/fdsys/pkg/DCPD-201200417/pdf/DCPD-201200417.pdf

O'Hara, S., & Pritchard, R. (2013). Learning to integrate new technologies into teaching and learning through a design-based model of professional development. *Journal of Technology and Teacher Education*, *21*(2), 203-223.

Onwuegbuzie, A. J., Johnson, R. B., & Collins, K. M. T. (2009). Call for mixed analysis: A philosophical framework for combining qualitative and quantitative approaches. *International Journal of Multiple Research Approaches, 3*(2), 114-139.

Onwuegbuzie, A. J. & Leech, N. L. (2006). Linking research questions to mixed methods data analysis. Retrieved from http://www.nova.edu/ssss/QR/QR11-3/onwuegbuzie.pdf

Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), Handbook of mixed methods in social and behavioral research (pp. 351-383). Thousand Oaks, CA: Sage.

Ozdamli, F., & Cavus, N. (2011). Basic elements and characteristics of mobile learning. *Procedia – Social and Behavioral Sciences, 28*, 937-942.

Palalas, A. (2013). Preparing mobile learning strategy for your institution. *QScience Proceedings*. Retrieved from http://www.qscience.com/doi/pdfplus/10.5339/qproc.2013.mlearn.32

Pandey, K. & Singh, N. (2015). *Handbook of Mobile Teaching and Learning* (pp. 107-132). Mobile learning: Critical pedagogy to education for all. Berlin: Springer

Park, Y (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *The International Review of Research in Open and Distance Learning*, *(12)*2.

Park, Y., & Jung, Y. J. (2013). Exploring the meaning of mobile learning for informal learning: Preliminary and exploratory study. *International Journal of Knowledge Society Research (IJKSR)*, *4*(2), 75-83.

Passey, D. (2010). Mobile learning in school contexts: Can teachers alone make it happen. *Learning Technologies, IEEE Transactions on*, *3*(1), 68-81.

Passey, D. (2012). Educational technologies and mathematics: Signature pedagogies and learner impacts. *Computers in the Schools*, *29*(1-2), 6-39.

Patton, M.Q. (1990). *Qualitative research and evaluation methods. 3rd ed.* Newbury Park, CA: Sage.

Pereira, O. R., & Rodrigues, J. J. (2013). Survey and analysis of current mobile learning applications and technologies. *ACM Computing Surveys (CSUR)*, *46*(2), 27.

Pollara, P., & Broussard, K. K. (2011). Mobile technology and student learning: What does current research reveal? *International Journal of Mobile and Blended Learning (IJMBL), 3*(3), 34-42.

Rainie, L. & Maniam, S. (2016). Americans feel the tensions between privacy and security concerns. Retrieved from: http://www.pewresearch.org/fact-tank/2016/02/19/americans-feel-the-tensions-between-privacy-and-security-concerns/

Regan, D., Twitchell, D., Archibald, T., & Marvin, D. (2012). Sharing learning content: Beyond the technology. *Proceeding of the Interservice/Industry Training, Simulation, and Education Conference*. Orlando, Florida, USA, 1–7.

Reger, G. M., Hoffman, J., Riggs, D., Rothbaum, B. O., Ruzek, J., Holloway, K. M., & Kuhn, E. (2013). The pe coach smartphone application: An innovative approach to improving implementation, fidelity, and homework adherence during prolonged exposure. *Psychological Services, 10*(3), 342-349.

Rikala, J., Hiltunen, L., & Vesisenaho, M. (2014). Teachers' attitudes, competencies, and readiness to adopt mobile learning approaches. In *Frontiers in Education Conference (FIE), 2014 IEEE* (pp. 1-8).

Robson, L. (2015). Accessibility challenges in mobile learning. In A. Murphy & Y. Zhang (Eds.), *Handbook of Mobile Teaching and Learning* (pp. 337-350). Berlin: Springer.

Ruth, D. M., Mastre, T., & Fricker, R. D. (2012). A study of mobile learning trends at the US Naval Academy and the Naval Postgraduate School. Retrieved from http://faculty.nps.edu/rdfricke/docs/NPSUSNA%20Mobile%20Learning%20Study.pdf

Saccol, A. Z., Barbosa, J. L., Schlemmer, E., & Reinhard, N. (2011). Mobile learning in organizations: Lessons learned from two case studies. *International Journal of Information and Communication Technology Education, 7*(3), 11-24.

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). Los Angeles, CA: SAGE Publications.

Saleem, T. A. (2011). Mobile learning technology: A new step in e-learning. *Journal of Theoretical and Applied Information Technology, 34*(2), 125-137.

Sallas, B., Lane, S., Mathews, R., Watkins, T., & Wiley-Patton, S. (2006). An iterative assessment approach to improve technology adoption and implementation decisions by healthcare managers. *Information Systems Management, 24*(1), 43-57.

Santa-Ana, E. J., Stallings, D. L., Rounsaville, B. J., & Martino, S. (2013). Development of an in-home telehealth program for outpatient veterans with substance use disorders. *Psychological services*, *10*(3), 304.

Santos, I, & Ali, N. (2012). Exploring the uses of mobile phones to support informal learning. *Education and Information Technologies*, *17*(2), 187-203.

Sarrab, M., Elgamel, L., & Aldabbas, H. (2012). Mobile learning (m-learning) and educational environments. *International Journal of Distributed and Parallel Systems*, *3*(4), 31-38.

Schultz, T., & Correia, A. P. (2015). Organizational support in online learning environments: Examination of support factors in corporate online learning implementation. *International Journal on E-Learning*, *14*(1), 83-95.

Scolari, C. A., Aguado, J. M., & Feij, C. (2012). Mobile media: Towards a definition and taxonomy of contents and applications. *International Journal of Interactive Mobile Technologies*, *6*(2), 29.

Scott, M., Collins, E., & Wicks III, A. (2013). Curbside intercity bus Industry: Research of transportation policy opportunities and challenges. Retrieved from http://www.ipa.udel.edu/publications/intercity-bus-report-2013_08-26.pdf

Seale, C. (2012). *Researching society and culture* (3rd ed.). London: Sage Publications.

Seo, S. H., Gupta, A., Mohamed-Sallam, A., Bertino, E., & Yim, K. (2014). Detecting mobile malware threats to homeland security through static analysis. *Journal of Network and Computer Applications*, *38*, 43-53.

Shahzad, F., Akbar, M. A., & Farooq, M. (2012). A survey on recent advances in malicious applications analysis and detection techniques for smartphones. *National University of Computer & Emerging Sciences, Islamabad, Pakistan, Tech. Rep*. Retrieved from http://nexginrc.org/Publications/pub_files/TR-65-Farrukh.pdf

Sharp, J., L., Mobley, C., Hammond, C., Withington, C., Drew, S., Stringfield, S., & Stipanovic, N. (2012). A mixed methods sampling methodology for a multisite case study. *Journal of Mixed Methods Research, 6*, 34-54.

Sharples, M. (2013). Mobile learning: Research, practice and challenges. *Distance Education in China*, *3*(5), 5-11. Retrieved from http://oro.open.ac.uk/37510/2/sharples.pdf

Shuler, C., Winters, N., & West, M. (2013). UNESCO/Nokia The future of mobile learning report: Implications for policymakers and planners. Retrieved from http://unesdoc.unesco.org/images/0021/002196/219637E.pdf

Smith, A. (2012). The best and worst of mobile connectivity. *Pew Internet & American Life Project*. Retrieved from http://www.pewinternet.org/files/old-media//Files/Reports/2012/PIP_Best_Worst_Mobile_113012.pdf

Smith, A. (2014). Mobile technology fact sheet. *Pew Research Center's Internet & American Life Project*. Retrieved from http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/

Smith-Heimbrock, S. (2013, September 13). Training and Development Policy Wiki. Retrieved December 5, 2015, from http://www.opm.gov/wiki/training/Index.aspx

Snead, J. T. (2013). Social media use in the US executive branch. *Government Information Quarterly, 30*(1), 56-63.

Sølvberg, A., M. & Rismark, M. (2012). Learning spaces in mobile learning environments. *Active Learning in Higher Education, 13*(1), 23-33.

Sostak, B. (2012). Applying serious game principles to U.S. military training. *Journal of Applied Learning Technology, 2*(1), 19-22.

Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Journal of Leadership and Organizational Studies, 17,* 129-142.

Sue, V., & Ritter, L. (2012). *Conducting online surveys*. Thousand Oaks, California: Sage.

Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education, 94*, 252-275.

Sung, E., & Mayer, R. E. (2012). Students' beliefs about mobile devices vs desktop computers in South Korea and the United States. *Computers and Education, 59*(4), 1328-1338.

Suter, W. (2012). *Introduction to educational research: A critical thinking approach* (2nd ed.). Thousand Oaks, Calif.: SAGE.

Tabuenca, B., Kalz, M., Drachsler, H., & Specht, M. (2015). Time will tell: The role of mobile learning analytics in self-regulated learning. *Computers & Education, 89*, 53-74.

Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social & behavioral research*. Thousand Oaks, Calif.: SAGE Publications.

Tashakkori, A. & Teddlie, C. (2010). *Sage handbook of mixed methods in social & behavioral research* (2nd ed.). Los Angeles, Calif.: SAGE Publications.

Teall, E., Wang, M. & Callaghan, V. (2011). A synthesis of current mobile learning guidelines and frameworks. *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education. Chesapeake, VA,* 443-451.

Teall, E., Wang, M., Callaghan, V., & Ng, J. W. (2014). An exposition of current mobile learning design guidelines and frameworks. *International Journal on E-Learning*, *13*(1), 79-99.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Los Angeles: SAGE.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling a typology with examples. *Journal of mixed methods research*, *1*(1), 77-100.

Tellis, W. (1997). Results of a case study on information technology at a university. *The Qualitative Report*, *3*(3).

Terras, M. M., & Ramsay, J. (2012). The five central psychological challenges facing effective mobile learning. *British Journal of Educational Technology, (43),* 820-832.

Thaanum, J. D. (2013). Threats to cyber security: The dangers of malicious mobile code, users, and the iphone. *Journal of Applied Security Research*, *8*(4), 490-509.

Thinley, P., Geva, S., & Reye, J. (2014). Tablets (ipad) for m-learning in the context of social constructivism to institute an effective learning environment. *International Journal of Interactive Mobile Technologies*, *8*(1), 16.

Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse and structure. *Qualitative Inquiry, 17,* 5111-521.

Ting, Y. L. (2012). The pitfalls of mobile devices in learning: A different view and implications for pedagogical design. *Journal of Educational Computing, 4*6(1), 119-134.

Ting, Y. L. (2013). Using mobile technologies to create interwoven learning interactions: An intuitive design and its evaluation. *Computers & Education*, *60*(1), 1-13.

Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. *Computers & Education*, *94*, 134-150.

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ. *The International Review of Research in Open and Distance Learning, 8*(2).

Traxler, J. (2010). Distance education and mobile learning: Catching up, taking stock. *Distance Education, 31*(2), 129-138.

Traxler, J. (2011). Mobile learning: Starting at the right place, going in the right direction. *International Journal of Mobile and Blended learning, 3*(2), 57-67.

Traxler, J., & Vosloo, S. (2014). Introduction: The prospects for mobile learning. *Prospects*, *44*(1), 13-28.

Traxler, J., & Wishart, J. (2011). Making mobile learning work: Case studies of practice. Retrieved from http://escalate.ac.uk/downloads/8250.pdf

Tucker, J. (2010). Mobile learning approaches for U.S. army training. Retrieved from http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA528742

Uosaki, N., Ogata, H., Li, M., Hou, B., & Mouri, K. (2013). Guidelines on implementing successful seamless learning environments. *International Journal of Interactive Mobile Technologies, 7*(2).

VanRoekel, S. (2012a). Digital government. Building a 21st century platform to better serve the American people. Retrieved from http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government-strategy.pdf

VanRoekel, S. (2012b). Government use of mobile technology: Barriers, opportunities, and gap analysis. Retrieved from: https://cio.gov/wp-content/uploads/downloads/2012/12/Government_Mobile_Technology_Barriers_Opportunities_and_Gaps.pdf

VanRoekel, S. (2013). Digital government deliverables. Retrieved September 3, 2013, from https://www.whitehouse.gov/digitalgov/deliverables

VanRoekel, S. (2013a). Adoption of commercial mobile applications within the federal government: Digital government strategy milestone 5.4. Retrieved from https://cio.gov/wp-content/uploads/downloads/2013/05/Commercial-Mobile-Application-Adoption-DGS-Milestone-5.4.pdf

VanRoekel, S. (2013b). Government mobile and wireless security baseline. Retrieved from https://cio.gov/wp-content/uploads/downloads/2013/05/Federal-Mobile-Security-Baseline.pdf

VanRoekel, S., & Park, T. (2013). Digital strategy: Delivering better results for the public. *The White House*. Retrieved July 29, 2014, from http://www.whitehouse.gov/blog/2013/05/23/digital-strategy-delivering-better-results-public

Vavoula, G., & Sharples, M. (2009). Meeting the challenges in evaluating mobile learning: A 3-level evaluation framework. *International Journal of Mobile and Blended Learning (IJMBL), 1*(2), 54-75.

Vogt, W., Gardner, D., & Haeffele, L. (2012). *When to use what research design*. New York, New York: Guilford Press.

Vosloo, S. (2012). Mobile learning and policies: Key issues to consider. Retrieved from http://unesdoc.unesco.org/images/0021/002176/217638E.pdf

Wang, Y., Tang, S., & Zhou, Y. (2012). A preliminary study on instructional design model in m-learning. In *Consumer Electronics, Communications and Networks (CECNet), 2012 2nd International Conference on* (pp. 3070-3073).

Ward, M. A., & Mitchell, S. (2004). A comparison of the strategic priorities of public and private sector information resource management executives. *Government Information Quarterly*, *21*(3), 284-304.

West, D. M., & Valentini, E. (2013). How mobile devices are transforming disaster relief and public safety. *Issues in Technology Innovation.* Retrieved from http://www.brookings.edu/~/media/research/files/papers/2013/07/16-mobile-technology-disaster-relief/west_valentini_mobile-technology-disaster-relief_v20.pdf

West, M., & Vosloo, S. (2013). UNESCO policy guidelines for mobile learning. *Retrieved from http://unesdoc.unesco.org/images/0021/002196/219641E.pdf*

White, M. J., Judd, M. D., & Poliandri, S. (2012). Illumination with a dim bulb? What do social scientists learn by employing qualitative data analysis software in the service of multimethod designs. *Sociological Methodology*, *42*(1), 43-76.

Wilkin, C. L., Rubino, C., Zell, D., & Shelton, L. M. (2013). Where technologies collide: A technology integration model. *Cutting-edge Technologies in Higher Education*, *6*, 81-106.

Wingkvist, A., & Ericsson, M. (2011). A survey of research methods and purposes in mobile learning. *International Journal of Mobile and Blended Learning (IJMBL), 3*(1), 1-17.

Wong, K., Wang, F. L., Ng, K. K., & Kwan, R. (2015). Investigating acceptance towards mobile learning in higher education students. In *Technology in Education. Transforming Educational Practices with Technology* (pp. 9-19). Berlin Heidelberg: Springer.

Woodill, G. (2011). *The mobile learning edge: Tools and technologies for developing your teams*. New York: McGraw-Hill.

Wu, W. H., Wu, Y. J., Chen, C. Y., Kao, H. Y., Lin, C. H., & Huang, S. H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers & Education*, 59(2), 817-827.

Yadegaridehkordi, E., & Iahad, N. A. (2012). Influences of demographic information as moderating factors in adoption of m-learning. *International Journal of Technology Diffusion*, *3*(1), 8-21.

Yin, R. K. (1994). *Case study research: Design and methods* (2nd ed.). Thousand Oaks, CA: Sage.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Zarei, A., Mohd-Yusof, K., Daud, M. F., & Hamid, D. T. A. (2015). Mobile Multimedia Instruction for Engineering Education: Why and How. Retrieved from http://tree.utm.my/wp-content/uploads/2015/08/AJEE-2014-0021.pdf

Zavattaro, S. M., & Sementelli, A. J. (2014). A critical examination of social media adoption in government: Introducing omnipresence. *Government Information Quarterly*. *31*(2), 257-264.

Zickuhr, K., & Smith, A. (2012). Digital differences. *Pew Internet & American Life Project, 13*. Retrieved from http://www.pewinternet.org/files/old-media//Files /Reports/2012/PIP_Digital_differences_041312.pdf