INVESTIGATION OF PRE-SERVICE TEACHERS' MOBILE LEARNING READINESS LEVELS AND MOBILE LEARNING ACCEPTANCE LEVELS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

AHMET İLÇİ

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
COMPUTER EDUCATION AND INSTRUCTIONAL TECHNOLOGY

FEBRUARY 2014

Approval of the thesis:

INVESTIGATION OF PRE-SERVICE TEACHERS' MOBILE LEARNING READINESS LEVELS AND MOBILE LEARNING ACCEPTANCE LEVELS

Submitted by **AHMET İLÇİ** in partial fulfillment of the requirements for the degree of **Master of Science in Computer Education and Instructional Technology Department, Middle East Technical University** by,

Prof. Dr. Canan ÖZGEN _____
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. Soner YILDIRIM _____
Head of Department, **Computer Education and Instructional Technology**

Prof. Dr. Zahide YILDIRIM _____
Supervisor, **Computer Edu. and Inst. Tech. Dept., METU**

Assoc. Prof. Dr. Erman YÜKSELTÜRK _____
Co-Supervisor, **Computer Edu. and Inst. Tech. Dept., Kırıkkale University**

Examining Committee Members:

Assoc. Prof. Dr. Özgül YILMAZ TÜZÜN _____
Elementary Education Dept., METU

Prof. Dr. Zahide YILDIRIM _____
Computer Edu. and Inst. Tech. Dept., METU

Assoc. Prof. Dr. Ömer DELİALİOĞLU _____
Computer Edu. and Inst. Tech. Dept., METU

Assist. Prof. Dr. Cengiz Savaş AŞKUN _____
Computer Edu. and Inst. Tech. Dept., METU

Assist. Prof. Dr. S. Tuğba TOKEL _____
Computer Edu. and Inst. Tech. Dept., METU

Date: 7.02.2014

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name and Surname: Ahmet İLÇİ

Signature :

ABSTRACT

INVESTIGATION OF PRE-SERVICE TEACHERS' MOBILE LEARNING READINESS LEVELS AND MOBILE LEARNING ACCEPTANCE LEVELS

İlçi, Ahmet

M.S., Department of Computer Education and Instructional Technology

Supervisor: Prof. Dr. Zahide Yıldırım

Co-Supervisor: Assoc. Prof. Dr. Erman Yükseltürk

February 2014, 135 pages

Developments in information technologies have increased the use of mobile devices in the educational environments. The purpose of this study is to investigate mobile learning readiness level and mobile learning acceptance level of pre-service teachers in Faculty of Education in Middle East Technical University with respect to Unified Theory of Acceptance Model.

Sequential explanatory mixed method research design was employed. Quantitative data for study were collected from 561 undergraduate students from seven different departments: Physics Education, Chemistry Education, Foreign Languages Education, Elementary Mathematics Education, Early Childhood Education and Elementary Science Education and Computer Education and Instructional Technology in Faculty of Education at Middle East Technical University in 2012-2013 Spring Semester. Qualitative Data for study was collected from 14 undergraduate students from seven different departments. In this study, three main instruments were used to collect data: mobile learning readiness questionnaire and

mobile learning acceptance questionnaire in the quantitative phase and an interview guide in the qualitative phase.

The result of the study indicated that pre-service teachers' mobile learning acceptance levels and mobile learning readiness levels were average level. This means that they were eager to use mobile learning and its devices. Although most of students prefer to use mobile learning instead of conventional learning, infrastructure of university and instructors were not ready to use for mobile learning and its devices according to the students' perceptions.

Key words: Mobile learning, mobile learning readiness, mobile learning acceptance.

ÖZ

ÖĞRETMEN ADAYLARININ MOBİLE ÖĞRENME HAZIR BULUNUŞLUK VE MOBİL ÖĞRENME KABUL EDİŞLİK DÜZEYLERİNİN ÖLÇÜLMESİ

İlçi, Ahmet
Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü
Tez Yöneticisi: Prof. Dr. Zahide Yıldırım
Ortak Tez Yöneticisi: Doç.Dr. Erman Yükseltürk

Şubat 2014, 135 sayfa

Bilişim teknolojileri alanında yaşanan gelişmeler mobil araçların eğitim ortamlarında ki kullanımını arttırmıştır.Bu çalışmanın amacı Orta Doğu Teknik Üniversitesi Eğitim Fakültesindeki öğretmen adaylarının mobil öğrenme hazır bulunuşluk ve mobil öğrenme kabul edişlik düzeylerinin incelenmesi araştırılmaktadır.

Araştırmada karma yöntem desenlerinden aşamalı açıklama deseni kullanılmıştır. Nicel veriler eğitim fakültesi içerisinde bulunan yedi farklı bölümde (fizik eğitimi, kimya eğitimi, yabancı diller eğitimi, ilköğretim matematik eğitimi,ilköğretim fen bilgisi eğitimi, okul öncesi eğitimi ve bilgisayar ve öğretim teknolojileri eğitimi) bulunan 561 lisans öğrencisinden 2012-2013 öğretim yılı ilkbahar döneminde toplanmıştır. Araştırmada bulunan nitel veriler ise toplam 14 öğrenci ile yarı yapılandırılmış görüşmeler sonucu toplanmıştır.

Çalışma sonucunda öğretmen adaylarının mobil öğrenme kabul edişlik ve mobil öğrenme hazırbulunuşluk seviyelerinin orta düzeyde olduğu saptanmıştır. Öğretmen adaylarının mobil araçları ve mobil eğitimi kullanma eğilimleri ise yüksektir. Birçok öğretmen adayının mobil öğrenmeyi geleneksel eğitim yöntemlerine tercih

etmelerine rağmen, üniversite altyapısının ve öğretim elemanlarının mobil öğrenmeye hazır bulunuşluk düzeylerinin henüz düşük olduğunu belirtilmektedir.

Anahtar Kelimeler: Mobil öğrenme, mobil öğrenme hazır bulunuşluk, mobil öğrenme kabul edişlik

ACKNOWLEDGEMENTS

I want to express my sincerest appreciation to my advisor Prof. Dr. Zahide Yıldırım for his kind supervision, guidance, suggestions, and friendly attitude throughout this study. Her guidance helped me in all the time of research and writing of this thesis.

I would like to express my deep gratitude and respect to Assoc. Prof. Dr. Erman Yükseltürk whose advices and insight was invaluable to me. His attitude to research inspired me to continue to a PhD program and want to be a member of the academic family.

I would like to express my appreciation to the committee members, Assoc. Prof. Dr. Ömer Delialioğlu, Assoc. Prof. Dr. Özgül Yılmaz Tüzün, Asst. Prof. Dr. Cengiz Savaş Aşkun, and Asst. Prof. Dr. Saniye Tuğba Tokel for their valuable feedback, suggestions and comments.

I would like to thank to Res. Asst. Cansel Kadıoğlu and Res. Asst. Sevim Sevgi for his valuable suggestions, comments and support during the study.

I would also like to express my thanks to Mustafa Şat for his help, comments, encouragement through the hard times during the study, and for his friendship.

I would like to thank my family, especially my mother Fikriye İlçi, my father Halil Ensar İlçi and my sister Hatice İlçi for always believing in me, for their continuous love and their supports in my decisions. Without whom I could not have made it here.

At the end, last but not least, I would like express appreciation to my love Merve Çelen who was always my support in the moments when I lost my motivation. All the beauties, values and happiness she brings to my life and the love she gives to me without any expectations make me the luckiest person in the world.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Mobile learning is an emerging educational trend and provides many opportunities for both instructors and learners. The several attractive mobile learning tools have been designed and developed by integrating with the emerging technologies (Lee, 2011). There are many applications for mobile devices and these applications can be used for different instructional purposes. Many different types of technologies have been added to the popularity of the mobile devices changing the educational landscape and programs of colleges and universities. With the emerging mobile applications , social web sites (blogs, wikis, Twitter, YouTube) that are used Web 2.0 technologies or social networking sites (Facebook and MySpace), mobile devices would be more usable and also have more instructional potential (Park, 2011).

Mobile learning is an emerging research field in the world. Mobile learning becomes popular among university students in Turkey. The increasing number of students and teachers have perceived and taken advantages of mobile learning (Lam, Yau & Cheung, 2010). A quick search on LexisNexis revealed more than one hundred related articles ranging from a news on recent Mobile Learning Conferences to stories on its popularity in Turkey, Korea, India, Nigeria, Thailand, and many others (McConatha, Praul & Lynch, 2008). This trend is expected to continue and expand as the price of smart phones and telecommunication costs has decreased. Therefore, it is necessary to conduct research that deals more intensively with university students' intention to use mobile learning in order to provide basic information for establishing mobile learning support systems for learners. When students become more confident and capable of learning with mobile learning and its derivatives such as blended learning environments, they will likely expect more benefits from the use of these

environments, foster positive learning climate, and, overall, be more satisfied with the learning (Her Wu, Tennyson & Hsia, 2010).

While the opportunities provided by mobile learning are new, there are several challenges facing from hardware viewpoint, software viewpoint, compatibility viewpoint and psychological viewpoint (Wang, Wu & Wang., 2009; Terras & Ramsay, 2012). Small screens, low resolutions, inadequate memory size and short battery life are the major limitations of mobile devices (Shudong and Higgins, 2005; Corlett et al., 2005). While small screens and low resolutions cause for tired of people' eyes, inadequate memory size and short battery life cause for not holding course materials such as PDF, media files, software, games and music files (Bryan, 2004; Kukulska-Hulme, 2007). Another challenge is the software limitations. Software limitations consist of difficulty of adding applications to mobile devices, a lack of build in functions, challenges during learning how to use applications and differences between applications (Park, 2011). Compatibility limitation is another problem of mobile devices. Most of web pages are designed for laptop and personal computer, a lot of multimedia lost when they are viewed on mobile devices (Shudong & Higgins, 2005). In addition to these challenges, psychological challenges are the limitations of mobile learning. Learners must have psychological infrastructure to enhance mobile learning and they should be conscious of their learning styles and be aware in terms of growing requirements of mobile learning and ways of handling them (Terras & Ramsay, 2012).

These challenges mean that adaptation to mobile learning is not an easy work, and users may incline to not accepting mobile learning. Thus, the success of mobile learning may depend on cost-effectiveness, wireless infrastructure reliability, and comfort level learners with the mobile learning (Leung, 2003). The cost-effectiveness of mobile learning is important for successful implementation of mobile learning. While classroom-based learning methods has a high cost in gathering students to and form the classroom environment, there is no need these in mobile learning (Preece, 2000). Furthermore, learning materials can be delivered in multimedia formats in fast and cost-effective way to students via mobile learning

(Leung, 2003). Wireless networking is the one of the important requirements for successful mobile learning (Caudill, 2007). The wireless network enable learners to be engaged into the learning anytime and anywhere. The students can pursue learning at any time and any location where learners are in various mood and motivation via wireless network (Ting, 2005). From the wireless infrastructure reliability view, wireless networking increase pedagogical requirements of mobile learning and desires of students to be involved in mobile learning (Leung, 2003).

The availability of mobile devices does not guarantee their use in mobile learning effectively; mobile learning readiness should be considered before use them (Corbeil & Valdes-Corbeil, 2007; Keller, 2011). Mobile learning readiness is defined as the ability of an organization to take advantage of e-learning (Lopes, 2007). Furthermore, it is the mental and physical preparedness of learners to gain some mobile learning experience or action (Borotis & Poulymenakou, 2004). In order to benefit from of mobile learning, students must adopt themselves to mobile learning.

Despite of importance of mobile learning readiness, very small numbers of research studies have been conducted to explore the factors which affecting on readiness of mobile learning of higher-education students (Cheon, Lee, Crooks & Song, 2012). Readiness pace of mobile learning of higher education students sooner than K-12 students because of the fact that higher education students have their own mobile phone (Traxler, 2007). On the other hand, Park (2011) claimed that mobile learning in higher education is still in the early periods of the development. For example, despite many universities provide free applications (e.g. news, calendars, map), contexts of these applications are non-instructional. Hussin, Manap, Amir & Krish (2012) stated that more research is require to explore the issues of readiness for using mobile learning approach.

In addition to mobile learning readiness, mobile learning acceptance of students and instructors are important because of the successful implementation of mobile learning depends on understanding the factors that affect students' and instructors' acceptance to use mobile learning. This study has investigated the acceptance to use

mobile learning by adopting Unified Theory of Acceptance Model (UTAUT) as the base of research design. Jairak, Praneetpolgrang and Mekhabunchakij (2009) stated that the unified theory of acceptance and use of technology model that was developed by Venkatesh, Morris, Davis and Davis (2003), depend on Technology Acceptance Model (TAM) was able to use to explain university students' mobile learning acceptance. Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four components of UTAUT model (Venkatesh et al., 2003).

This investigation will help to understand the pre-service teachers' mobile learning readiness levels, mobile learning acceptance levels and pre-service teachers' opinions about mobile learning in Faculty of Education. While mobile learning is important in the technologically developing world, readiness and acceptance of mobile learning are also important research topics. Instead of advantages of mobile learning, there are some challenges encountered with implementation of mobile learning, such as hardware problems or software problems that affect readiness of mobile learning (Wang et al., 2009). These challenges mean that adapting existing e-learning services to mobile learning is not an easy work, and these users may be prone to not accepting mobile learning. Thus, the successful implementation of mobile learning may be based on whether or not learners are eager to embrace the new technology that is different from what they have used in the past and fits their particular needs (Mac Callum and Jeffrey, 2013).

1.2 Statement of the Problem

While popularity of mobile devices is increasing day by day, many practitioners use mobile technology in their teaching and learning environments (Park, 2011). Mobile technologies have brought new changes in working and learning because of some characteristical features such as independence of place and time (Peters, 2007). According to the Virvou and Alepis (2005) the place independence characteristics of mobile learning provides several benefits such as students and instructors utilize their spare time while they are out of classroom environment to complete their homework

or lesson preparation. Similar benefits of mobile learning can be seen in business life. Mobile learning provides management of time by converting workers' dead time into productive activity via mobile devices (BenMoussa, 2003). Motiwalla (2007) created a typical scenario is that of a learner who is enrolled in an e-learning class for MBA program. While students were waiting for his flight at the airport, they can access the lecture materials and or interact with their classmates and instructors or download an assignment via their wireless PDA device. As a result, time and place independency provide several benefits to instruction.

Traxler (2007) investigated that mobile learning has growing visibility and significance in education. As more and more students have access to the Internet, there is an increasing demand for mobile access to learning materials and resources, as well as more participation and interactive communication in the learning process. Furthermore, mobile learning facilitates communications and interactions among teachers, students, and course administrators as well as encourages the mode of collaborative learning (Seong, 2006). After pre-service teachers finished their undergraduate program, they should be able to integrate mobile learning into their instruction due to the rapid changes in information society. Without consideration of mobile learning acceptance and mobile learning readiness levels of pre-service teachers can cause ineffective usage of mobile learning devices and mobile learning. Investigation of their mobile learning acceptance and mobile learning readiness levels may cause more successful implementation of mobile learning in the instruction. Cheon et al. (2012) claimed that a better understanding of the process of mobile learning adoption will help researchers and decision-makers work together to implement proper strategies for mobile learning.

The impact of mobile devices on reaching the information, on higher education and their effect on lifelong learning opportunities are unclear and still evolving (Kukulska-Hulme, 2007). Although mobile learning industry has been developed fast, there is a need to understand the elements that have effect on mobile learning acceptance (Liu, Lee & Carlsson, 2010; Wang et al., 2009).

A review of the literature also provides limited empirical research on the use of mobile learning in higher education such as usage of course-related mobile devices using technology acceptance as a theoretical framework (Fernandez, Simo, & Sallan, 2009). Researchers suggest that mobile learning has specific characteristical features and traditional technology acceptance models may not fit and have called for further research in this area (Pendersen & Ling, 2003; Wang, Wu, & Wang, 2009). Wang, Wu, and Wang (2008) suggest future mobile learning research include all UTAUT independent variables.

More research is required to investigate the students' readiness of usage of mobile devices and mobile learning in higher education (Spencer & Hughan, 2008). Few researchers have studied which factors have effect on students' readiness on mobile learning (Liu, Li, & Carlsson, 2010; Lowenthal, 2010; Wang et al., 2009). Hussin et al. (2012) proposed that basic readiness, skills readiness, psychological readiness, and budget readiness are the types of readiness for mobile learning and more research with a larger simple from higher learning institution will indicate types of readiness more clear. Furthermore, faculty administrators and instructors may benefit from the advantages of mobile learning in higher education by planning to use mobile learning in classroom and out of the classroom settings according to the results of researches (Lopes, 2007). Mobile learning readiness may be impressed by some external variables such as personal demographic situation, social atmosphere and organizational context (Park, Nam and Cha, 2012). Investigating the factors that effect on readiness of mobile learning will help faculty members and administration to prepare their students for mobile learning.

1.3 Purpose of the Study

The purpose of this study was to explore the mobile learning readiness and mobile learning acceptance level of prospective teachers in faculty of education. The aim of the investigation was to explore the mobile learning readiness levels and mobile learning acceptance levels of pre-service teachers by implementing questionnaire and interview.

1.4 Research Questions

The purpose of this study is to investigate pre-service teachers' mobile learning acceptance level, mobile learning readiness level and pre-service teachers' opinions about mobile learning acceptance.

1. What is the readiness level of pre-service teachers for mobile learning?

2. What is the acceptance level of pre-service teachers for mobile learning?

3. What are the pre-service teachers' opinions about mobile learning acceptance?

1.5 Significance of the Study

This study has been carried to investigate mobile learning readiness and mobile learning acceptance levels of prospective teachers in faculty of education. Mobile learning is still in the beginning ages in higher education and the instructional implications of mobile learning require further research (Kukulska-Hulme, 2007). Performing mobile learning in higher education is still challenging because of because of social, cultural, and organizational factors (Corbeil & Valdes-Corbeil, 2007). Before implementation of mobile learning, it is important that an institution be able to know the factors that influence pre-service teachers' mobile learning readiness (Cheon et al, 2012). Therefore, understanding mobile learning readiness level and mobile learning acceptance level of prospective teachers are essential to the successful implementation of mobile learning. If they fail to accept the mobile technology offered to them in the academic setting, they will also fail to use mobile learning and its devices.

This study provides faculty staff with additional knowledge and information on mobile learning readiness and mobile learning acceptance levels of pre-service teachers. It offers information from both archival survey data and interviews conducted by this researcher to explain how students currently use mobile devices

and pre-service teachers' opinions about the mobile learning acceptance. Faculty staff may develop teaching strategies according to the mobile learning readiness and acceptance levels of pre-service teachers. They can plan and organize their course by considering mobile learning readiness and acceptance levels of pre-service teachers.

This study can assist faculty administrators with information useful for planning implementation of mobile learning services and support. It will also provide information on pre-service teachers' readiness of mobile learning, actual usage of mobile devices, level of expected support for using mobile learning, and methods to address pre-service teachers' resistance. In terms of faculty administration, they can improve the technological conditions with respect to result of these researches. Since, one of the components of the acceptance survey is the facilitating conditions. Faculty administration may develop the technological infrastructure of the faculty for mobile integrated learning. Faculty administration may also encourage the faculty staff to integrate mobile devices into their teaching process. In addition to these, faculty administration can develop new strategies for effective integration mobile devices and instruction.

Thus, more research is required for using these systems more effectively. The lack of research on the user side of information systems is partly responsible for the underutilization of information systems in developing countries (Park, Roman, Lee & Chung., 2009). Therefore, this study also contributes to the literature by filling the gap for pre-service teachers' mobile learning readiness levels and mobile learning acceptance levels and the factors that have effect on these. It also provides information about mobile learning acceptance and mobile learning readiness levels of pre-service teacher in faculty of education that can be used in further research as well as by researchers and education policy makers.

1.6 Definition of Terms

Mobile Learning: Mobile learning is defined as the usage of mobile or wireless devices for the objectives of instruction. Cell phones, smartphones, palmtops, and handheld computers, tablet PCs, laptops, and personal media players are the characteristical examples of these devices (Kukulska-Hulme & Traxler, 2005).

Mobile Learning Readiness: People's propensity to embrace and use mobile learning for accomplishing goals in or out of the school environment (Abas et al., 2009).

Mobile Learning Acceptance: People's recognizing and a process or condition without attempting to change or exit (Abas et al., 2009).

Unified Theory of Acceptance Model: In the past decade, a number of modifications and changes to the original TAM model have been made, in which UTAUT stands out as a most outstanding one. The UTAUT model consists of four main constructs of intention and usage, which are performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

Performance Expectancy: Performance expectancy is defined as "the degree to which an individual believes that using the sys-tem will help him or her to attain gains in job performance" (Venkatesh et al., 2003).

Effort Expectancy: Effort expectancy is defined as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003).

Attitudes Toward Technology: Attitude toward using technology is defined as "an individual's overall affective reaction to using a system "(Venkatesh et al., 2003).

Facilitating Conditions: Facilitating conditions are defined as "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."

CHAPTER 2

LITERATURE REVIEW

In this chapter, the literature related with mobile learning, theory of acceptance model, unified theory of acceptance model and mobile readiness were reviewed. In this wise, recent studies related with subject of this research, related terms and concepts were focused.

2.1 Mobile Learning

Most of learning theories have been developed and emerged from 2500 years; all of these theories generally depend on the application of learning in a fixed classroom mediated by a teacher. Just a few educational thinkers have developed theories based on out of the classroom environment, including Argyris (Argyris & Schön, 1996), Freire (Freire, 1972), Illich (Illich, 1971), and Knowles (Knowles & Associates, 1984), but none of them have stressed mobility of learners and learning (Sharples, Lonsdale, Meek, Rudman & Vavoula, 2007). Innovations and developments taken place in internet and wireless technology enable learning to be anywhere and anytime instead of fixed place and time.

The term of mobile learning is still developing day by day and its' exact mean is still unclear. In spite of its ambiguity, there are some keywords to explain it. Traxler (2007) offered some keywords such as personal, spontaneous, situated, private, context-aware, bite-sized, and portable to explain mobile learning. Quinn (2000) also identified mobile learning as the integration of mobile computing and e-learning (electronic learning): "accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment."

Mobile learning is a popular term and it is commonly used in different purposes in life. Traxler (2007) claimed that mobile learning term covers the individualized, connected, and interactive use of handheld devices in different purposes such as in classroom environment, in collaborative learning, in fieldwork, and in counseling and guidance. Furthermore, Traxler (2007) said that mobile devices support collaborative training for mobile workers and support different fields of daily life such as teacher and nurse training, health education and composition of music.

The mobile learning currently applied through both mobile telephones and some of the other portable devices, which are iPods, tablet PCs, PDAs, iPads MP3 players, e-book readers (Taylor, 2010). With the students' increasing demands to access to internet by using mobile devices causes for increasing demand to mobile learning materials and resources, in addition more participation and synchronize communication in the learning process. Thus, Corbeil and Corbeil (2007) claimed that mobile devices could enhance interaction among learners and instructors; reduce communication barriers between faculty and students by using synchronous and asynchronous communication channels.

2.1.1 Educational Impacts of Mobile Learning

Mobile learning and its applications are used in different learning types such as formal, informal learning, classroom teaching, distance teaching, and different educational levels such as K-12 and higher education (Park, 2011). Park (2011) also claimed that while popularity of mobile devices is increasing day by day, many practitioners such as researchers or teachers use this improving technology in their teaching and learning environments. Since mobile technologies have brought new changes in working and learning because of some characteristical features such as independence of place and time (Peters, 2007).

Mobile learning provides independency on time and place for learners instead of fixed classroom environment (Valk, Rashid & Elder, 2010). This is a great advantage for students in rural and remote areas that cannot go to school because of environmental challenges and infrastructure challenges. Feasibility of mobile

learning in out-of-school settings in rural, underdeveloped areas were examined by Kumar, Tewari, Shroff, Chittamuru, Kam and Canny (2010). They conducted a study that lasted 26 weeks to investigate voluntariness of rural children use of their usage to access instructional content. The result of study showed that academic learning levels and motivation of children towards to the course was increased.

Visser and West (2005) suggested that mobile learning could enhance access in those situations where cost plays a significant role in learning (p. 132). Mobile learning provides effective ways to convey educational programs to large populations (Valk et al., 2010). Mobile learning also allows a method of educational delivery that could be more cost-effective than e-learning methods (Motlik, 2008). Dholakia and Dholakia (2004) wrote that mobile networks could deliver educational content to regions with difficult geography or poor economic conditions more cost effective ways than fixed networks.

Mobile learning makes education more effective by facilitating both instructional methods and learning process (Valk et al., 2010). Mobile learning provides assessment-centered learning by assessing students during the learning process, provides continual feedback for them and formative guidance about what students learned during the educational process (Geddes, 2004). Furthermore, mobile learning also provides immediate feedback for students so it causes for constant motivation (Valk et al., 2010). Other researchers also investigated immediate feedback characteristics of mobile learning. Islam (2005) investigated how mobile phones could be used to enhance interactivity and thus overcome the problems encountered in distance education in Bangladesh. Fifty-two students were divided into two groups that were control group and experimental group. While the control group was establishing face-to-face conversation with the teachers, the experimental group watched the instructor with a projection screen and used SMS to communicate with the instructor. According to the results of the study, mobile learning might be attractive way to educational access in Bangladesh. Moreover, students that joined the study liked interactivity of mobile learning and claimed that immediate feedback was the great motivator for them.

From the perspective of social context, mobile learning is a key element to solve the socio-economic problems that are about the health and family care (Sharples et al., 2007). Perraton (2000) compiled two important mobile learning projects about family care and health. In Gobi Desert Project in Mongolia, 15000 nomadic women were educated in family care, income generation, basic business skills, and livestock rearing techniques by using mobile devices. The radio program includes visiting teachers was broadcasted and women listened program by their radio. Second project is MERMAID (Medical Emergency Aid through Telematics). The aim of the project is to transfer medical expertise via satellite to distant and isolated populations where there are no experienced doctors. Furthermore, public and private emergency centers around the world are connected with telematics network for delivering 24-hour multilingual telemedicine system of surveillance. In brief, mobile learning has changed the character of education and generated new learning style that is more personalized, learner-centered, situated, collaborative, ubiquitous, and lifelong (Sharples et al., 2007).

2.1.2 Evolution of Mobile Learning

Communication technologies and mobile information are the two major elements of new social structure. First generation of truly mobile devices was small and portable devices that combined different components such as mobile telephony, data input, diaries, email, and Word (Peters, 2007). Sharples (2000) stated that in early 1970's, as learning began to change to learning-centered, collaborative and continuous cause for Information and communication technology (ICT) has become more personalized, user centered and mobile. In 1980s, the Electronics Revolution related to development of telecommunications industry constituted e learning. In this period, distance teaching, World Wide Web and Internet were evaluated by increasing speed of chips developments in broadband technologies. In 20th century, mobile learning was improved because of the mobile and Wireless Revolution (Lam et al., 2010). Moreover, Keegan (2002) claimed that characteristic features of distance education were altered from electronic revolution to mobile learning. Distance education become face-to-face and group-based by changes in electronic revolution in 1980s.

Furthermore, the mobile revolution in 1990s has ensured learners alternative choices for distance education with mobile technologies instead of traditional college education.

Kukulska-Hulme and Traxler (2005) divided mobile learning into 6 categories;

- **Technology-driven mobile learning:** Recent innovations in technology are used in educational settings. For example, Wireless network technologies like Wi-Fi or 3G can be integrated into mobile learning in this type of mobile learning.

- **Miniature but portable e-learning:** Mobile devices are used for flexible and conventional solutions. For example, delivering educational content to the learners who were out of the classroom environment and reaching content via their mobile devices such as tablets or mobile phones.

- **Connected classroom learning:** Similar technologies are used in classroom environment for providing collaborative learning or connecting classrooms each other's. For example, students in different classroom in the world may join the webinar services via their tablets. Webinar services bring to classrooms together. Webinar services can help instructors to present web seminars and product demonstrations to students from anywhere in the world at any time.

- **Informal, personalized, situated mobile learning:** Mobile technologies are supported for being operational. Location-awareness and video-capture may be given as examples of this feature. For example, FutureLab (2005) declared that mobile devices enhanced the opportunities of informal learning that is students can communicate with their instructors and with each other while they are out of the classroom.

- **Mobile training/ performance support:** Mobile technologies are used for increasing job performance of workers in some occupational areas. For example**,** Ragus (2004) tested the use of PDA in botanical gardens or nursing.

- **Rural development mobile learning:** The technologies are used to delivering course content and making education more effective in some geographical areas in where environmental and infrastructural challenges could be lived. The students living in rural areas are benefited from opportunities of mobile learning via their mobile devices in cost-effective ways.

2.1.3 Technological Attributes and Pedagogical Affordances

Mobile learning has technological features that provide positive pedagogical advantages for learners (Park, 2011). Hardware advances are one of two key attributes to the emergence of mobile learning, the other being networking (Caudill, 2007). Portability, small screen size, computing power, diverse communication networks, a broad range of applications and data synchronization across computers are the major features of handheld devices (Pea and Maldonado, 2006). Wireless networking is the second technological component which contributing to mobile learning success (Caudill, 2007). While some mobile learning resources can be worked in offline environment, many depend on access to the internet to share information, exchange information, communication, and collaboration.

Mobile learning framework mainly depends on three features that are *personalization, authentication, and collaboration.* One of the important features of mobile learning is the *personalization*. Learner choice, agency, and self-regulation are the key options associated with personalization (McLoughlin and Lee 2008). Learner can control pace, location, time and set the goals of the instruction. Learners also enjoy convenience and intimacy with their mobile devices and individuality of mobile learning activities leads sense of ownership of one's learning (Traxler, 2007).

Another important feature of mobile learning is *authenticity*. Authentic tasks provide real world conditions and personal meaning to the learner (Radinsky, Bouillion, Lento & Gomez., 2001). Task and process authenticity features of mobile learning also provide learners to engage with contextual tasks involving ‘‘real-life’’ practices (Kearney et al., 2012). Hence, learners can generate their own contexts with the help of their mobile devices (Pachler, Bachmair, & Cook, 2009).

Last key feature of mobile learning is the *collaboration.* Mobile learning allows learners to participate in social interaction, conversation, and dialogue. It also offers collaboration by establishing connections with other people and resources by a mobile device. Learners engaging with mobile learning communicate easily with their teachers, peers, exchange to share information by the help of networking and social media (Gikas & Grant, 2013).

Mobile devices also produce unique *educational affordances*, which are *portability, social interactivity, context sensitivity, and individuality* that depend on three main features of mobile learning (Klopfer & Squire, 2008). Especially, *portability* is the key factors that make mobile devices different from other *emerging technologies* and another attributes such as individuality and interactivity are related to this factor (Park, 2011). For example, Marcus Ragus (2006) examined the usage of PDA in different environments such as biology, music, and health. According to the Ragus, students instructors recognize and employ mobile devices as an important asset in their training systems and students wanted to use them in their studies.

Another affordance of mobile learning is *social interactivity*. Hsu and Ching (2013) examined mobile technologies for providing connectivity between students. According to the results of this study, Web 2.0 activities and social media facilitate collaborative working between the students and it support knowledge sharing. Students learn best after they learn the subject, they construct their knowledge by sharing their understanding with others (Resnick, 1987; Soloway, 1996). Mobile computer supported learning environments help students to construct their knowledge and share their understandings with other students (Gay & Reiger, 2002).

Mobile technology provides face-to-face communication by helping of mobile devices in the classroom environment Ownership of mobile devices by participants in some research studies makes using these devices in the educational settings (Park, 2011).

Context sensitivity is another affordance of mobile learning. Context sensitivity feature that senses mobile learning environment and responses to versatile context during the learning process. Through the help of context awareness of mobile devices, learner can interact with learning more than conventional instruction (Wang, 2004). Furthermore, context-awareness function of mobile learning has become increasingly crucial because of the continually changing learning settings in the learner's mobile learning environment lead to many different instructional contexts (Nagella & Govindarajulu, 2008). Wu et al. (2012) developed context-aware mobile learning system for nursing training course. During the learning activities, each students used own mobile devices and used devices to detect whether student conducted to operate correct location of the dummy patients' body. In this process, mobile devices both gave immediate feedback to the students and guide students to perform operation in procedure. The results of the study showed that the students' learning outputs are significantly enhanced by applying the mobile learning system for nursing training.

Last affordance of mobile learning is *individuality.* Individuality feature can provide scaffolding that is adapted to the path of investigation of individuals (Klopfer, Squire & Jenkins2002). Participatory simulations are the examples of individuality and connectivity features of handheld computers (Klopfer, Yoon & Rivas 2004). Participatory simulations give information about the participants' role in the simulation and learner can scan other participants' role with in broader simulated system (Klopfer & Woodruff, 2002).

Widespread use of mobile devices in societies changes the nature of knowledge and ways of delivering the information. Learning that used to be delivered 'just-in-case,' can now be delivered 'just-in-time,' 'just enough,' and 'just-for-me'. Mobile

technologies also changed the nature of work. Mobile devices used for training and performance support of knowledge workers. This causes the generating new concept called as "mobile workforce" and "connected society." Mobile technologies are generating many innovations on commerce and many other economic activities as well (Traxler, 2007).

2.1.4 Limitations and Considerations of Mobile Learning

Kukulska-Hulme (2007) gathered usability problems of mobile learning in five main categories;

- **Physical attributes of mobile devices:** The screen size and weight of PDAs, limited memory, limited battery life, and limited storage space are the major physical limitations of mobile devices. Poorly designed mobile technologies have negative effects on usability and can distract students from goals of instruction. Furthermore, physical aspects of mobile devices such as small screen size, and limited battery life also adversely effect on learning experience (Mobilearn, 2003).

- **Content and software applications:** Being not familiar with mobile applications, challenges for loading new applications, and difficulties in learning how to work of mobile devices.

- **Network speed and reliability:** Slow network speed and students feeling insecure themselves as using the mobile devices due to lack of keyboard and mouse. Slow internet connection may distract students' attention and motivation and has negative effects on learning (Smørdal and Gregory, 2005).

- **Physical environment:** Problems with using the device outdoors, excessive screen brightness, concerns about personal security, radiation exposure from devices using radio frequencies, the need for rain covers in rainy or humid

conditions. Environmental conditions should be adapted to mobile devices for working of these devices in proper conditions.

Most applications that are created for effective mobile learning are not based on a solid pedagogical framework. It is required to create powerful applications, directions, and applications for mobile learning. Because of these, it is necessary to arrange applications of mobile learning into a logical framework (Park, 2011).

2.2 Mobile Readiness

Technology is not a new term for the field of education and using mobile technology in education is increasing its popularity among the instructors (Rahamat, Shah, Din & Aziz 2011). Mobile phone or other mobile devices such as an IPod, laptop are widely used among students for entertainment and socializing (Ally, 2009). However, the question is whether students and teachers are ready to use these mobile technologies for instruction (Rahamat et al., 2011).

2.2.1 Definition of Mobile Readiness

Mobile learning readiness is one of the important construct investigated in this study and the term is defined by the Oxford Advanced Learner's Dictionary as "The state or quality of being ready; preparation; promptness; aptitude; willingness. Prepared for what one is about to do or experience; equipped or supplied with what is needed for some act or event; prepared for immediate movement or action". Readiness can be considered as students' capacity of adapting themselves to technological innovations, collaborative learning, and self-paced training (Schreurs, Ehler & Moreau, 2008, p. 3).

2.2.2 Pace of Readiness

As with the new developed technology, learner' pace of readiness is at relatively different rates. While some learners easily to be ready to use technology, others may less eager to adapt new technology (Stockwell, 2008). Wang and Higgins (2006) argued that technology acceptance takes some time and users can learn how to use new technology at different rates. There may be some reasons for different readiness periods for each learner. According to the Dias (2002), some prejudices against mobile learning such as perceiving mobile learning as intrusion may limit the degree of acceptance of mobile learning. Dias (2002) stated that learners might see mobile learning as an intrusion to their own personal space, which may limit their readiness and aceptance of using mobile devices. Stockwell (2008) conducted another research about pace of readiness. According to the Stockwell (2008), how eager to use the mobile technology is not depend people to have own mobile phones and actually use it. Stockwell (2008) also claimed that patience of instructor with learners is the most important for the early stage of development into mobile learning. Thus, instructors can empathize with the learner, and let the learner investigate and get used to mobile technologies. Moreover, Stockwell (2008) added that learners who did not want to use new technologies at the beginning could see their advantages after observing other learners over time.

2.3 Technology Acceptance Model

Many theories have been developed to define user acceptance and intention to use new technology since mid-1980's (Min et al., 2008). Davis (1989) developed Technology Acceptance Model (TAM) that depends on Theory of Reasoned Auctioned (TRA) and validated by other researchers in different academic divisions later. Theory of Reasoned Action is widely accepted and used in human behavior researches, which were developed by Fishbein and Ajzen (1975). According to the TRA, individuals' behavior was determined by assessing attitude, behavioral intention and subjective norm (Davis, 1989; Fishbein & Ajzen, 1975) Technology

Acceptance Model is used to investigate how user's beliefs and attitudes impress their willingness or reluctance to use information technology (Jairak et al. , 2009).

A number of studies investigated the intention of using mobile learning by adopting Technology Acceptance Model as a foundation for research design (Park, Nam & Cha, 2012). These studies showed that TAM was useful for understanding adoption of students to mobile learning with 3G generation mobile telecommunication technology (Phuangthong and Malisawan, 2005). Researcher will go into details about these studies in below.

2.3.1 Key Constructs of TAM

Technology Acceptance Model is used for deciding how students' perceived usefulness and perceived ease of use affects their mobile learning acceptance (Park et al., 2008). Davis (1989) defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance." Perceived ease of use is the "degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). Furthermore, perceived ease of use and performance expectancy is also relevant factors that are ubiquity, mobility and enjoyment of m-learning and behavioral intention of using mobile learning (Jung, 2009).

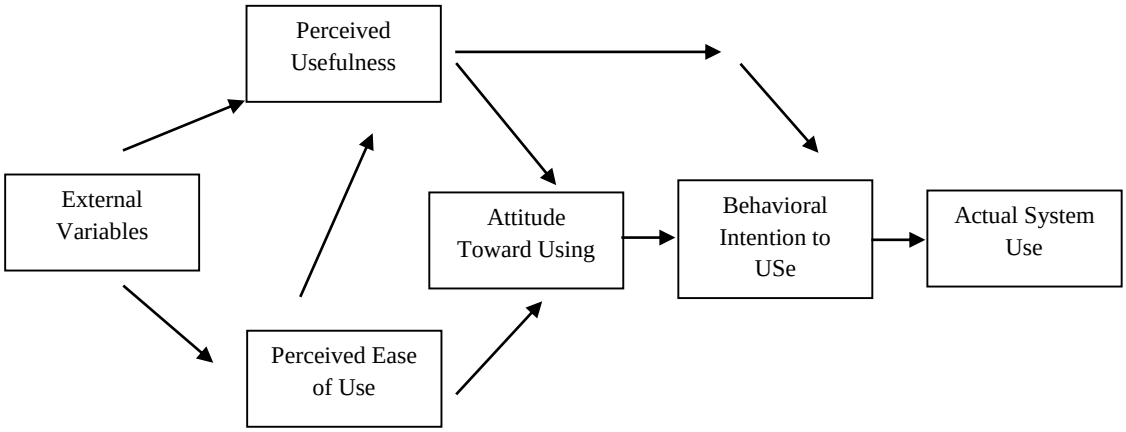

Figure 2.1 Technology Acceptance Model (Davis, 1989, p. 319)

2.3.2 Strengths of TAM

About 40% variance in use of intentions and behavior of individuals in organizational settings explained consistently by TAM is the key strengths of it (Donaldson, R. L, 2011). Technology Acceptance Model consists of favorably different acceptance models such as the Theory of Reasoned Action and the Theory of Planned Behavior (Venkatesh & Davis, 2000). In addition, suggests TAM is IT specific; may address variety of user populations, technology, settings, and organizations; and psychometric measurements have been validated (Hu et al., 1999).

2.3.3 Limitations of TAM

Although TAM is used frequently, applications of TAM were limited. A major deficiency of TAM is being lacking of outer variables that have the effects on intention of users for using technology (Legris, Ingham & Collerete, 2003). These contain variables such as "financial cost to the individual, system characteristics, training, support, and management support" (Handy, Whiddett, & Hunter, 2001). In addition to these, van Biljon (2006) also states that social and cultural factors as external variables that are effective on acceptance. Furthermore, individual differences on accepting of system are not being considered by TAM. TAM is being lacking of acknowledging individual differences such as experience, age, and gender have an effect on accepting technology or system (Agarwal & Prasad, 1999).

2.4 Unified Theory of Acceptance Model

In the past decade, a most successful model was Unified Theory of Acceptance Model after modification and changes applied on the Technology Acceptance Model. UTAUT model has four main determinants that are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). As shown in Figure 2.2 that is below, four main moderators of UTAUT model affect the four direct determinants directly: gender, age, experience, and voluntariness of use. Eight prominent models were used for developing UTAUT for investigation of information technology acceptance of users.

These models were: Theory of Reasoned Action (TRA),Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT). After the examination of UTAUT, 70% variance was accounted in user intention and it was outperformed the eight individual models (Venkatesh et al., 2003).

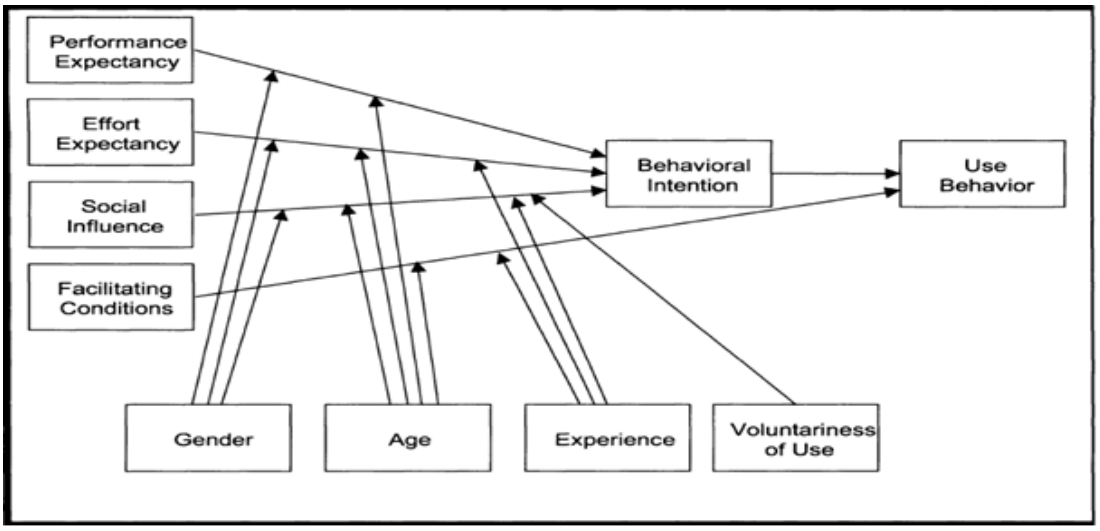

Figure 2.2 Research Model. (Venkatesh et al., 2003)

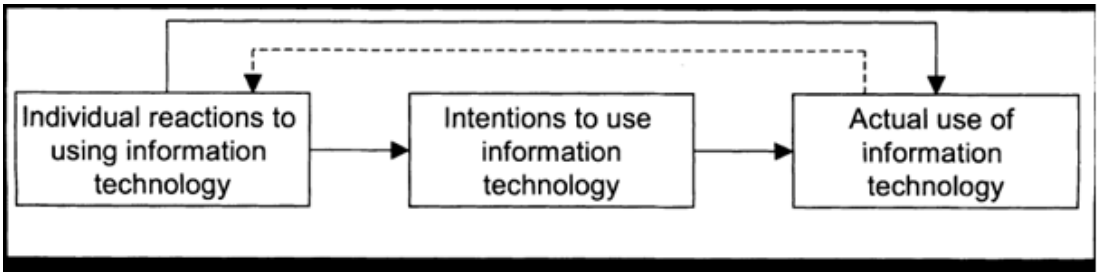

Figure 2.3 Basic Concept of User Acceptance Model. (Venkatesh et al., 2003)

2.4.1 Components of UTAUT Model

a. Performance Expectancy

Performance expectancy is defined as "using the system will enhance users' job performance and help user to reach the goals." Perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations are the four main constructs that effect on performance expectancy (Venkatesh, 2003).

Performance expectancy is also related to perceived usefulness construct in TAM. In the content of technology-enhanced education, positive relationship between performance expectancy and behavioral intention is supported (Chiu and Wang 2008).

After adaptation of performance expectancy construct to mobile learning content, mobile learning perceived as more helpful because mobile learning allow learners to complete learning activities more flexibly and quickly or increase effectiveness instruction (Wang et al., 2009).

b. Effort Expectancy

Effort expectancy is defined as "the degree of ease associated with the use of the system." Perceived ease of use, complexity, and ease of use are the three major effect which are used for determine the effort expectancy (Venkatesh, 2003).

Effort expectancy has a direct effect on performance expectancy and intention to use and it causes for improved performance (Liu, 2008).

Furthermore, Chiu and Wang (2008) claimed that effort expectancy construct was associated with performance expectancy and behavioral intention in the mobile learning content.

c. Social Influence

Social influence is defined as "which an individual believes that he/she should use the systems by the influence of others"(Venkatesh, 2003). Compliance, internalization, and identification have significant effect on individual behaviors (Venkatesh & Davis, 2000).

Social influence is also used in the Technology Acceptance Model and Theory of Planned Behavior as a construct of behavioral intention. Previous studies proposed that social influence is an important predictor of user' behavioral intention to use information system (Venkatesh & Davis, 2000).

The results indicate that peer influence was more significant on students who have limited experience with a mobile learning (as cited in Ronaldson, 2011). This study clarificated that users influenced by their peers that considered important for them during the use of mobile learning system.

d. Facilitating Conditions

Facilitating conditions are defined as "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system." Definition of facilitating conditions covers the three different constructs that are perceived behavioral control, facilitating conditions, and compatibility (Venkatesh, 2003).

There is a positive correlation between facilitating conditions and behavioral intention in mobile learning context (Wu et al. 2007). In the mobile learning context, individuals around the user affect the pleasure of learner. Thus, facilitating conditions constructors appear as a significant structure in the model (Liu, 2008).

2.4.2 UTAUT Strengths

UTAUT's key advantage is that it shows significant factor strength. It can explain up to 70% of variance of intention (Venkatesh, et al., 2003). According to the Ronaldson (2011), Unlike TAM, voluntariness of use and facilitating factors were addressed by UTAUT. Moreover, UTAUT has the advantage of including a distinction between mediating and determining factors.

2.4.3 UTAUT Limitations

Although popularity of UTAUT model in researches in Information System area, there are still different areas need for further experimental researches to address technology that may fall within the 30% unexplained acceptance (Baron, Patterson, & Harris, 2006), and account for invariance of the UTAUT scales across different cultures, subpopulations and self-management of learning (Venkatesh et al., 2003). Furthermore, it does not include individual factors like perceived playfulness and self-motivation that may help explain acceptance of information system and usage of mobile devices.

2.5 Research Studies on Mobile Learning and Mobile Learning Applications

Considering the evaluation of the effects of mobile learning, Evans (2008) carried out a study to investigate the effectiveness of mobile learning in the form of podcasting with undergraduate students in Higher Education. In this study, two different groups that were consisting of 200 first-level students were provided with podcasts after finishing of Information Technology course. During the subscription process, students were required to complete an online questionnaire about their experience. The results of the study indicate that students think that when compared with textbooks, podcasts are more effective revision tools and when compared with their own notes, they are more efficient to help them learn. Results also showed that they are eager to have the instructional material as a podcast form when compared with conventional materials.

In another research, Copley (2007) described a method to produce audio and video podcast content and delivered supplementary lecture materials as podcasts during the experiment. In the study, the majority of students used the podcasts and their experiences were positive. All students that tried to use podcast materials mentioned them as convenient as traditional printed handouts. Most of students preferred video podcasts as supplementary course materials. Moreover, students found the podcasts to be most useful to revision or preparation for assessments according to the quantitative results of the study.

Regarding designing a mobile learning system, Schwabe and Göth (2005) introduced the scenario and created prototype called Mobile Game to explore the effects on supporting learning by using an orientation game in a university environment. The paper focused on evaluating design aspects and the effects observed in tutorials. The main design issues were difficulty in interface questions and the requiring real-time response time. Furthermore, paper also shows that 'map-navigation' and 'hunting and hiding' functions of the game cause for enthusiasm and fun. The success of the game was depending on the motivational design of the game.

In another paper, Thornton and Houser (2005) send 100-word to the mobile phones of 44 Japanese university student at predetermined times as an e-mail in English vocabulary lectures. Compared with students studying the same materials on paper or Web, students that received mobile e-mail learned more. Seventy-one percent of the participants preferred to receive these lectures on mobile phones instead of on PCs. Furthermore, ninety-three percent of them stated that this was valuable teaching method. According to this study, mobile devices such as mobile phones and PDAs may be effective tools for delivering foreign language learning materials to students. This study also showed that Japanese university students were comfortable reading text and viewing video on small screens. Rich multimedia materials may increase their attention and mobile e-mail system was effective tools for learning new vocabulary.

Similarly, Saran et al. (2008) investigated some issues to be taken into account for creation of educational MMS content and SMS quiz system. They developed

instructional materials and delivered through mobile phones for improving English language learners' vocabulary acquisition. Students in the study see the word definitions, example sentences, related visual representations, and pronunciations using multimedia messages. After participants finish studying multimedia materials, they received interactive short quizzes by interactive short message service. According to the findings of the study, learners enjoyed using mobile phones for vocabulary learning and SMS quiz system pushed them to study more.

In another paper, Martin and Ertzberger (2013) created a mobile learning system called as “Here and Now” and inspected effect of the system on achievement and attitude. 109 undergraduate students participated in the study and then they were assigned to IPad versions of an art lesson. After the lesson, participants completed achievement test and attitude survey. According to the findings of the study, participants displayed high level of performance and attitudes of participants towards to the course were positive.

2.6 Research Studies on Mobile Learning Readiness

In order to investigate the factors affecting Mobile Learning Readiness, Hussin et. al. (2012) conducted a large-scale questionnaire and semi-structured interviews. The findings stated that the students were highly familiar with computing skills and they were in favor of mobile learning integration in education. The research also showed that the learners were not sure about cost of software and hardware requirements of mobile learning. Most of students intended to use mobile learning in their future courses because they had basic skills in using mobile devices.

Furthermore, to investigate the factors affecting readiness pace of mobile learning, Stockwell (2008) tried to answer the questions that were: Were students ready to use mobile phones in language learning activities? When and where did students who preferred to use mobile phones use them, and why did they preferred them? He assigned 75 English learners in Japanese University for vocabulary learning activities and offered them two options as mobile phone or desktop computer to complete the

activity. After that, he investigated reasons why and when people used mobile phones. According to the study results, while some learners were willing to use a new technology, others were less keen on adopting the technology. To be ready to adapt to mobile learning activities, reluctant learners may need time. Moreover, learners who did not want to use new technologies in the beginning might find later that they could see their advantages through observing other learners.

In other study, Ozdamlı, Soykan and Yıldız (2013) examined the readiness of computer education teacher candidates for mobile learning. Their study consisted of 216 students of computer education and instructional technology department. They investigated students' competence on using mobile devices and mobile applications, their internet usage and mobile device using competencies according to the gender. According to the results of this study, students use internet every day and they have high level of competency in using mobile devices.

2.7 Research studies on Mobile Learning Acceptance

About the factors that affected mobile learning acceptance, Liu (2010) inspected driving factors of mobile learning acceptance. According to Liu (2010), although mobile learning was becoming popular research area in many parts of the world, the researches about the factors that affected acceptance of mobile learning were limited. Liu and his colleagues used a hypothesized model based on Technology Acceptance Model and collected data from 230 undergraduate students by a survey questionnaire. The results of the study indicated three important determinants on mobile learning acceptance that are perceived near-term/long-term usefulness and personal innovativeness. Moreover, the research revealed that perception of near-term usefulness of students was mainly aroused from a positive feeling of long-term usefulness. Of these factors, perceived long-term usefulness was inspected to be the most important moderator of use intention. Hence, an improvement of perceived long-term usefulness played important role in the successful implementation of mobile learning, as it would enhance both the near-term usefulness perceived as well as the usage intention. In addition to these, this study indicated that personal

innovativeness was also a significant predictor of both the perceived ease of use and perceived long-term usefulness as well. This result was also consistent with one of the previous study on personal innovativeness. According to the previous study about personal innovativeness that was conducted by Crespo and Rodriguez (2008), innovative learners were more prone to use mobile learning activities and developed immediately positive beliefs on new technology.

In order to inspect the effects of age or gender differences in the mobile learning acceptance, Wang et al. (2009) collected data from 330 students in Taiwan. The results of the study indicated that performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning were important moderators of behavioral intention to use mobile learning. Moreover, researchers investigated the effect of gender and age differences on moderators of mobile learning acceptance in the study. According to the researchers, there were three main results about effects of gender and age differences on mobile learning acceptance of pre-service teachers. First, no gender or age differences on behavioral intention although effects of performance expectancy and perceived playfulness on behavioral intention were significant. Second, the effect of social influence on usage intention was moderated by gender and age. That is, effect of social influence of usage intention was significant for men and older users, but insignificant for women and young users. Finally, the effect of self-management of learning on intention was moderated by gender. That is, the effect of self-management of learning on intention was more significant for women than man.

In the past decade, a number of researches that used the Technology Acceptance Model as a research framework were conducted to assess the mobile learning acceptance. However, just a few studies were carried out for understanding invariance across two culturally different samples. In this research, Teo and colleagues (2009) investigated self-reported future intentions of pre-service teachers to use technology in Singapore and Malaysia. They used 11 items questionnaire containing four components that are intention to use (ITU), attitude towards computer use (ATCU), perceived usefulness (PU), and perceived ease of use (PEU).

They collected data from 495 pre-service teachers and structural equation modelling (SEM) was employed to analyze the data. This research contributed to the literature testing a new model and usability of TAM for assessing mobile learning acceptance across different two cultures.

In another research, Liu (2008) stated that the factors on adoption of mobile learning is not fully understood by the researchers, so he inspected a research model about adoption model of mobile learning that depended on Unified Theory of Acceptance and Use of Technology to reveal the factors that affect mobile learning. According to this research, there are nine items affecting mobile learning acceptance: Performance expectancy, effort expectancy, self-efficacy, social influence, facilitating conditions, mobility, self-management of learning, attainment value, perceived enjoyment. Liu used key constructs of UTAUT model in his research model. The model aimed to provide an insight into adoption theory in the context of mobile learning. It was clear that the model was likely to be a useful framework for future research design. In addition, this model served as a basis for our future survey and analysis of data.

Another research study was conducted by Timothy Teo (2008) to construct a model for predicting technology acceptance levels of pre-service teachers in Singapore. Data was collected from 475 pre-service teachers by using a survey questionnaire. This study examined the relationship of variables that affected the mobile learning acceptance. To test the model fit, structural equation modelling was used in the study. According to the results, perceived usefulness, attitude towards computer use, and computer self-efficacy had direct effect on technology acceptance levels of pre-service teachers, whereas perceived ease of use, technological complexity, and facilitating conditions affect technology acceptance indirectly. This study provided an alternative framework model for the researchers. Moreover, this study had several implications for the both school administrators and instructors. The teachers who were inexperienced in using mobile devices, they may meet some limitations if they do not participate in professional development. Since according to the Sugar, Crawley, and Fine (2004) when learners had experienced the advantages of

technology in their instruction, they would expect technology take place all times in their learning environments, this may cause anxiety and insecurity for teachers. To support instructors in their use of technology, school administrators need to develop strategies that cause for effective successful experiences.

2.8 Summary of Related Studies

At first glance in the literature, mobile learning seems a developed technology and there are many researches about mobile learning and its applications. Compared to studies of mobile learning and applications, limited number of studies was conducted on mobile learning acceptance and mobile learning readiness. While designing a model system for mobile learning, evaluating the effects of mobile learning and the influence of learner characteristics in the mobile learning process were the most selected research field, gender differences on acceptance of mobile learning and developing a model for assessing mobile learning acceptance are the least focused research field in the literature.

As for mobile learning readiness, relatively few studies have investigated factors affecting mobile learning readiness. There were insufficient information and research studies about gender and age differences on mobile learning readiness. Furthermore, except research about age and gender differences on mobile learning readiness, studies about mobile learning readiness of instructors have not been carried about adequately.

Review of literature indicated that factors affecting mobile learning acceptance were the popular topic and were studied by many researchers and therefore, it was very common to locate many researches on this topic. Generally, performance expectancy, effort expectancy, social conditions, and attitudes as the main variables of UTAUT model were accepted as the major factors of acceptance of mobile learning by the researchers. However, gender and age differences on acceptance of mobile learning and mobile acceptance levels of instructors have not been investigated enough.

CHAPTER 3

METHODOLOGY

In this chapter, the research questions, the overall design and participants of the study, data collection instruments, data analysis procedures, assumptions and limitations of the research are presented in order.

3.1 Research Questions

The purpose of this study is to investigate pre-service teachers' mobile learning readiness levels, mobile learning acceptance levels and pre-service teachers' opinions about mobile learning.

1. What is the readiness level of pre-service teachers for mobile learning?

2. What is the acceptance level of pre-service teachers for mobile learning?

3. What are the pre-service teachers' opinions about mobile learning acceptance?

3.2 Overall Design of the Study

This study was designed to investigate the mobile learning acceptance level and mobile learning readiness level of pre-service teachers. Sequential explanatory design used as a design method in this study in order to gather reliable data, provide meaningful interpretation and draw rigorous conclusions about the mobile learning acceptance and mobile readiness levels. A sequential explanatory design is commonly used for interpreting and explaining quantitative results by collecting and analyzing follow-up qualitative data (Creswell, 2009, p. 211). Both qualitative and quantitative data are the phases of sequential explanatory design. In this design,

researcher first collects and analyzes the quantitative (numeric) data. Then, qualitative (text) data are collected and analyzed to help explain or elaborate on the quantitative results obtained in the first phase (Ivankova, Creswell & Stick, 2006). The sequential explanatory method derives questions from reexamination of earlier questions' findings (Tashakkori & Creswell, 2007). In order to investigate pre-service teachers' mobile learning readiness and mobile learning acceptance levels, this research design is seen suitable to be used to explore them.

For data collection, mixed method design was employed in this study. The aim of the mixed method is that researcher searches to elaborate or expand the findings of one method with another method (Creswell, 2009). Collecting and analyzing of quantitative data constitutes first phase of the research and collecting and analyzing qualitative data constitutes second phase that based on results of initial quantitative results. Hence, two forms of data are separated from each other's but connected (Creswell, 2009). In this dissertation, firstly , survey used for collecting data and secondly interviews were conducted for exploration the mobile learning readiness levels and mobile learning acceptance levels of pre-service teachers in accordance with the constructs that play a significant role in mobile learning readiness level and mobile learning acceptance level. Those constructs were composed of performance expectancy, effort expectancy, attitudes towards using technology, and behavioral intentions for mobile learning acceptance level and basic readiness, skills readiness, psychological readiness and budget readiness for mobile learning readiness levels(Venkatesh, 2003; Hussin, 2012). Hence, responses of prospective teachers to questions of survey and interviews were examined to investigate mobile learning readiness and mobile learning acceptance levels in the direction of the main constructs.

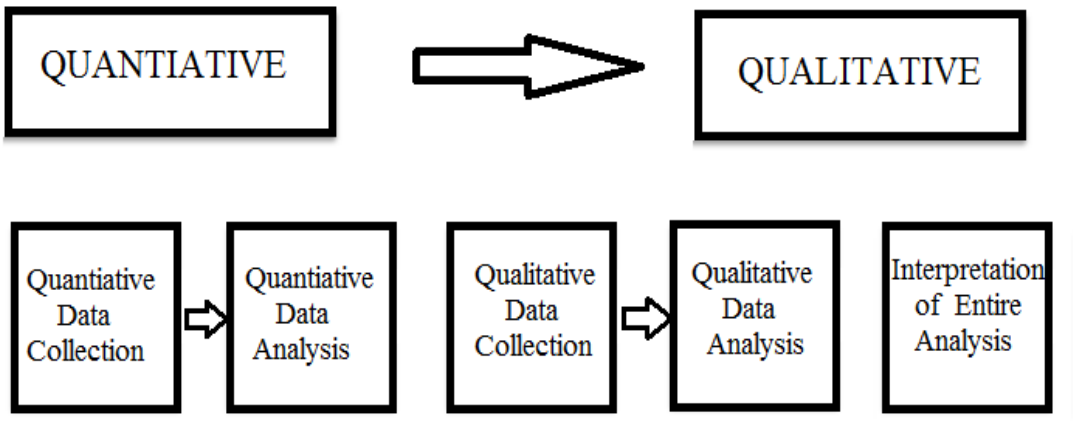

Figure 3.1 Sequential Explanatory Design

This research used both quantitative and qualitative methods to explore the mobile learning readiness and acceptance of mobile learning of pre-service teachers in faculty of education. The quantitative data was derived from the Mobile Learning Readiness and Mobile Learning Acceptance Survey collected from Faculty of Education in Middle East Technical University. In the second phase of the study, that was qualitative part; qualitative data was gathered from interview questions that were derivated based on the quantitative results.

3.3 Participants of the Study

Participants of the study were undergraduate students in Faculty of Education in one of the public university in Ankara, Turkey. There are seven undergraduate departments in Faculty of Education in the research. The departments are;

- Computer Education and Instructional Technology
- Early Childhood Education
- Elementary Science Education
- Elementary Mathematics Education
- English Language Teaching
- Chemistry Education
- Physics Education

The total number of prospective teachers who participated in the study was 571. The number of female prospective teachers was 221 (39.4%) and male prospective teachers were 340 (60.6%). Participants include different sexes but the proportion of male prospective teachers was higher than female prospective teachers. Even though there is a slight difference between male and female pre-service teachers' mobile learning acceptance mean scores in favor of males, the findings indicated that there is no significant mean difference. Of 561 prospective teachers 89 were in freshmen, 132 were in sophomore, 183 were in junior, 125 were in senior, and 32 were in fifth year. Of 561 prospective teachers 26 prospective teachers were from Chemistry Education Department, 57 prospective teachers were from computer education and instructional technology department, 94 prospective teachers were from Early Childhood Education Program, 130 prospective teachers were from Elementary Mathematics Education Program , 102 prospective teachers were from Elementary Science Education Program, 98 prospective teachers were from English Language Teaching, and 54 prospective teachers were from Physics Education Program. (See Table 3.1). Results related to the difference between mobile learning acceptance means scores of pre-service teachers from seven departments indicated that only CEIT department is different from other departments. However, the difference is not significant. The other remaining departments were not different from each other or one another in terms of pre-service teachers' mobile learning acceptance.

Prospective teachers were in the 18-25 age range. They got pedagogical courses, subject matter courses and general culture courses. Moreover, senior prospective teachers get school experience lecture to gain teacher experience during two terms. They were from different locations of the country. While some of them come from urban area, the other ones come from rural area. Their GPAs were in the range of 1.8 and 3.96. In addition, the mean of the GPA is 2.72. Of 561 prospective teachers, 119 were in range of 17-20, 429 were in range of 21-25, 11 were in range of 26-30, and 2 were in range of 30-35.

Of 561 prospective teachers, 277 prospective teachers had smartphone and 284 prospective teachers did not have smartphone. Of 556 (99.1%) prospective teachers had mobile phone and 9% of the prospective teachers did not have mobile phone. Of

53 prospective teachers had Tablet PC and 508 prospective teachers did not have Tablet PC. Of 53 prospective teachers that had a tablet, PC 42 prospective teachers had internet connection, and 11 prospective teachers did not have internet connection. Most prospective teachers had smartphone, laptop or another mobile devices and basic computer knowledge. Most of prospective teachers were preparing their homework by using computers. Because of these, they know fundamental issues about mobile learning. (See Table 4.1)

Table 3.1 Gender, Year of Study, Department, GPA, Age

Variable	Frequencies	Percentage
Gender		
Female	221	39.4%
Male	340	60.6%
Year of Study		
1st Year	89	15.9%
2nd Year	132	23.5%
3rd Year	183	32.6%
4th Year	125	22.3%
5th Year	32	5.7%
Departments		
Chemistry Education Program	26	4.6%
Comp. Edu. and. Inst. Tech	57	10.2%
Elementary Childhood Education	94	16.8%
Elementary Mathematics Education	130	23.2%
Elementary Science Education	102	18.2%
English Language Teaching	98	17.5%
Physics Education	54	9.6%
Age		
17-20	119	21.2%
21-25	429	76.5%
26-30	11	2%
31-35	2	,4%
More than 35		
Cumulative GPA		
Minimum	Maximum	Mean
1.0	3.96	2.72

Interview Participants

Among the participants of the study, some pre-service teachers were selected purposively for the *interview*. Since the intent of this phase is to debrief as much information as possible for comprehensive understanding of mobile learning readiness levels and mobile learning acceptance levels of pre-service teachers, interview participants were selected purposefully. Participants were selected based on four main criterias. First criterion was that participants were 4th year undergraduate students because 4th year undergraduate pre-service teachers have taken technology courses and school experience courses in their department so they were conscious of using technology and mobile devices. The second criterion was that participants who had smart phone or Tablet PC, because pre-service teachers who had mobile devices were more engaged in using mobile learning applications and games. Pre-service teachers who had mobile devices were expected to have awareness of using mobile learning and its applications. The third criterion was that participants were chosen from each different department. The last criterion was that two pre-service teachers (one male and one female) were chosen from each department.

Researcher had identified 14 pre-service teachers who were 4th year and had mobile devices. E-mails were sent to all 14 and they accepted to participate in the interviews. A place and a time for each interview were set in collaboration with participants through e-mail. Out of 14 participants the number male and female are the same. Of the seven departments, two pre-service teachers were selected. (See Table 3.2)

Table 3.2 Characteristics of Interview Participants

Characteristics	f	Percentage
Gender		
Male	7	50
Female	7	50
Total	14	100

Departments	f	Percentage
Chemistry Education Program	2	14
Computer Education and Instructional Technology	2	14
Early Childhood Education	2	14
Elementary Mathematics Education	2	14
Elementary Science Education	2	14
English Language Teaching	2	14
Physics Education Program	2	14
Total	14	100

3.4 Data Collection Instruments

In this study, three main instruments were used to collect data: mobile learning readiness questionnaire and mobile learning acceptance questionnaire in the quantitative phase and an interview guide in the qualitative phase. For this study, the data collection procedure and the instruments have been approved by Middle East Technical University Human Subjects Ethics Committee (HSEC).

3.4.1 Mobile Learning Readiness Questionnaire

Mobile Learning Readiness questionnaire was developed by Supyan Hussin, Mohd Radzi Manap, Zaini Amir & Pramela Krish (2012) to measure mobile learning readiness of students in higher education institutes. There were 42 questions. The questions focused on basic readiness, skills readiness, psychological readiness, and budget readiness of students. There were four main subscales of this instrument that were;

The first subscale of the questionnaire was comprised of demographic questions for gathering information about the pre-service teachers' demographic data. In this part of the questionnaire, there were eight items that aimed to gather information about pre-service teachers' gender, year of study, department of the pre-service teachers, cumulative GPA (general points of average), age of students; whether they had smartphone and Tablet PC for understanding their mobile experience were identified.

The second subscale of the questionnaire was used to gather data information about the mobile phone facilities of the pre-service teachers. There were nine items that aimed to help to find which facilities such as 3G and 4G services, MMS services, video call services and internet access are exist on the pre-service teachers' mobile phone.

The third subscale of the questionnaire was used to gather information about the internet access of pre-services teachers' mobile phone. Twelve questions aimed to help to find which mobile activities pre-service teachers commonly performed by using the internet connection.

The fourth subscale of the questionnaire, there were items about the mobile readiness. In this part, there were twenty-one items, which aimed to gather information about the mobile readiness of pre-service teachers in terms of definition of mobile learning, perceive of mobile learning and attitudes towards mobile learning.

The instrument was piloted with 137 CEIT students in spring term of 2012 academic year. Pre-service teachers, who attended this study, answered the questions in the survey in the online environment (www. metusurvey. com). In this research, three items in the survey was modified grammatically after the pilot study by the expert opinion.

3.4.2 Mobile Learning Acceptance Questionnaire

Second data collection instrument was about the mobile learning acceptance. This questionnaire was adopted by Kallaya Jairak, Prasong Praneetpolgrang and Kittima Mekhabunchakij (2009) to measure mobile learning acceptance of pre-service teachers in higher education institute. Thirteen items aimed to help to investigate an acceptance of mobile learning of pre- service teachers. (See Table 3.4) That data collection instrument was based on the survey instrument developed by Venkatesh et. al., (2003) and Wang, Wu, and Wang (2009). The Unified Theory of Acceptance and Use of Technology (UTAUT) instrument has been used by numerous researchers (Anderson & Schwager, 2004; Moran, 2006; Wang & Shih, 2008) and is composed of questions adapted from previous IS surveys used to measure the constructs included in the model (Venkatesh et al., 2003; Wang & Shih, 2008; Wang, et al., 2009). Cronbach's alpha coefficients range from 0.79 to 0.91 and reliability value is above .70 (Jairak et al, 2009).

The instrument was piloted with 137 CEIT pre-service teachers in spring term of 2012 academic year. Pre-service teachers, who attended this study, answered the questions in the survey in the online environment (www. metusurvey. com). The data were composed 43.7% (N=60) of the female pre-service teachers and 56.3% (N=77) of the male pre-service teachers.

The results of pilot study were important because it tests the reliability and factors distributions of the survey. A confirmatory factor analysis was performed using LISREL 8. 30 for Windows (Jöreskog & Sörbom, 1993) in order to test how well the factor structure emerges from the pilot data fits the validation data; in other words to

confirm the initial model suggested by the Exploratory Factor Analysis (Jöreskog & Sörbom, 1993; Kline, 2005).

There were 20 items in this part of the original survey and distributions of the items in the survey before conducting confirmatory factor analysis. (See Table 3.3)

Table 3.3 Distribution of items in the Survey

Items	Factors
Item 1, item 2, item 3, item 4	Performance Expectancy
Item 5, item 6, item 7	Effort Expectancy
Item 8, item 9, item 10	Social factors
Item 11, item 12, item 13, item 14	Facilitating conditions
Item 15, item 16, item 17	Attitudes Toward Technology
Item 18, item 19, item 20	Behavioral Intention

In this research, social factors component, facilitating conditions component and their related seven items were removed because of the fact correlation coefficient value (R-square) of these items were low. Moreover, only one item in the survey was modified grammatically after the pilot study by the expert opinion. It was an expected result because of the fact that instructors in the university were not using mobile learning in their lectures, a specific person is not available for assistance in mobile learning difficulties, and approach of the university towards mobile learning is not clear. Due to those reasons some items did not resulted with acceptable value. In the questionnaire, there were four subscales after the pilot study (See Table 3. 4):

Four items represents Performance Expectancy,
Three items represents the Effort Expectancy,
Three items represents the Attitudes towards Technology
Three items represents Behavioral Intention

Table 3.4 Distributions of the Items in the Research

Items	Factors
Item 1, item 2, item 3, item 4	Performance Expectancy
Item 5, item 6, item 7	Effort Expectancy
Item 8, item 9, item 10	Attitudes Toward Technology
Item 11, item 12, item 13	Behavioral Intention

According to the results, Root Mean Square Error of Approximation (RMSEA) = 0.12, 90 Percent Confidence Interval for RMSEA = (0. 10; 0. 13), Non-Normed Fit Index (NNFI) = 0.90, Comparative Fit Index (CFI) = 0.92, Root Mean Square Residual (RMR) = 0.13, Standardized RMR = 0.096, Adjusted Goodness of Fit Index (AGFI) = 0.67. Overall, these fit indices indicated a moderate fit.

3.4.3 Interview Guide

Qualitative data were gathered through interview guide developed by the researcher because of iterative and comprehensive literature review, in consultation with subject matter experts, and a pilot study with three pre-service teachers. The first version of the interview questions were developed based on the information contained in previous studies in the literature about mobile learning, mobile learning readiness, and mobile learning acceptance. Then a pilot study was conducted with purposefully selected three 4th year CEIT pre-service teachers in the same university who had smart phone and using mobile learning applications and games.

Interviews were conducted in meeting room in Faculty of Education Building. The time taken for each interview was about 30 minutes. Participants' comments and suggestions were written on the paper separately. As a results of pilot study, four questions were revised because of the because of not being clear and include grammatical errors. After revision of the interview questions, revised interview guide was reviewed by two faculty members who have extensive experiences concerning with the preparation of interview questions. The validity and suitability of each interview questions were approved after detailed examination. There were 10 questions in the final interview guide that are consisted of two questions for

performance expectancy, one question for effort expectancy, two questions for social factors, two questions for facilitating conditions, one question for attitude towards using technology, one questions for behavioral intention and one question for mobile learning readiness.

3.5 Data Analysis

3.5.1 Quantitative Data Analysis

The quantitative data collected through Metu-Survey System, has been entered to SPSS 20.0 for Windows program to be analyzed. Regarding research questions of the study, the researcher has performed statistical data analysis.

Descriptive statistics were calculated for first section, which was composed of demographic questions such as gender, age, and department of pre-service teachers. During the analysis, no outliers were identified that could significantly affect the study. Frequencies were calculated for each of the eight sub-questions in demographic questions. These percentages indicated the amount of pre-service teachers in the population who had smartphone, Tablet PC, and Internet connection of Tablet PC.

Nine questions were asked in the second section that was mobile facilities section of the questionnaire in order to measure the mobile phone facilities of pre-service teachers in faculty of education. The frequencies and percentages of the each question of the pre-service teachers' responses were calculated. These percentages indicate the amount of pre-service teachers in the population who used video call service, 3G service, and MMS.

For the third part of the questionnaire that was internet access part, 12 questions were asked to the pre-service teachers. Frequency, percentages, means, and standard deviations were calculated for the 12 questions measured on the likert scale in the

internet access section in order to analyze the capabilities of pre-service teachers on using internet line.

Research question one was answered by analyzing the results from the twenty-one questions measuring mobile learning readiness levels of the pre-service teachers in the questionnaire that was in the fourth part of the questionnaire. Frequencies, means, and standard deviations for each question were also calculated for this part.

The second research question was answered by analyzing data from the 13 questions measuring mobile learning acceptance level of pre-service teachers in faculty of education that was in fifth part of the questionnaire. Means and standard deviations were calculated for the four questions related to performance expectancy, the first indicator of the model; and for the three questions related to effort expectancy, the second indicator of the model; and for the three questions related to attitude towards technology, the third indicator of the model; and for the three questions related to behavioral intention, the fourth indicator of the model.

Validity and Reliability of Instruments

Regarding the validity issue, first of all, content validity of instrument was independently checked with respect to suitability of content and format of questionnaire by two researchers who had experience and knowledge in the content area and the questionnaire design.

Secondly, construct-validity of instrument was considered by researcher with a pilot study and further ensured by means of applying confirmatory factor analysis that was used to see if items load as predicted on the expected number of factors in mobile learning acceptance questionnaire for the actual study. Confirmatory factor analyses were performed on all UTAUT survey items to get at a data-driven description of the constructs/factors that emerged. Kim and Mueller (1978) stated that confirmatory factor analysis seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of

pre-established theory , in this case the prior studies conducted by Venkatesh et al., (2003).

For the actual study, confirmatory factor analysis was performed using Lisrel 8. 80. The largest percentage of variance was accounted for by attitude towards technology that was item 9, standardized regression weight = .98, r2 = .96. The least amount of variance was accounted for by the Effort Expectancy that was item 6, standardized regression weight = .78, r2 = .61 (See Table 3.5).

Table 3.5 Results of Confirmatory Factor Analysis

Variable	Item	Standardized Regression Weight	R^2
Performance	1	.83	.68
Expectancy	2	.84	.71
	3	.86	.74
	4	.84	.71
Effort Expectancy	5	.87	.75
	6	.78	.61
	7	.82	.67
Attitudes Toward	8	.95	.90
Technology	9	.98	.96
	10	.84	.71
Behavioral	11	.91	.82
Intention	12	.92	.84
	13	.93	.87

Table 3.6 Correlation Matrix

Indexed Variable		PE	EE	ATT	BI
PE(Performance Expectancy)	R^2	1.00			
	Sig.				
EE(Effort Expectancy)	R^2	.73	1.00		
	Sig.	.03			
ATT(Attitude Towards Technology)	R^2	.80	.74	1.00	
	Sig.	.02	.02		
BI(Behavioral Intention)	R^2	.74	.65	0.81	1.00
	Sig.	.02	.03	.02	

For RMSEA, values less than .05 indicate good model data fit, values ranging from .05 to .08 indicate mediocre fit, and values greater than .10 indicate poor fit (Browne & Cudeck, 1993). Root Mean Square Residual (RMR) and Standardized Root Mean Square Residual (SRMR) should have values less than .05 for a good model fit (Jöreskog & Sörbom, 1993; Kline, 2005). The values of AGFI, NNFI, and CFI above .90 are indicative of good fit (Jöreskog & Sörbom, 1993; Kline, 2005).

According to the results, Root Mean Square Error of Approximation (RMSEA) = 0.089, 90 Percent Confidence Interval for RMSEA = (0.080; 0.099), Non-Normed Fit Index (NNFI) = 0.95, Comparative Fit Index (CFI) = 0.96, Root Mean Square Residual (RMR) = 0.035, Standardized RMR = 0.035, Adjusted Goodness of Fit Index (AGFI) = 0.87. Overall, these fit indices indicated a good fit.

A reliability analysis using Cronbach's α was conducted to estimate the reliability of the predictor variables. The generally agreed upon lower limit for Cronbach's α is 0.70 (Hair et al., 1998). The mobile learning readiness survey and the modified UTAUT survey instrument proved reliable with Cronbach's α coefficient above 0.7 for all predictor variables. The results of the iterations of reliability analysis can be seen Table 3.7.

Table 3.7 Results of Reliability Analysis

Variable	Number of Items	α
Performance Expectancy	4	0.87
Effort Expectancy	3	0.82
Attitudes Towards Technology	3	0.91
Behavioral Intention	3	0.92

3.5.2 Qualitative Data Analysis

Research questions and codes gathered from the open-ended questions were used as a basis for interview coding. The six main steps for qualitative data analysis as set out by Creswell (2003) were used for data analysis of interview. Firstly, researcher transcribed interview and prepared the data for the analysis. During the preparing the data, data was sorted and arranged into different types depending on the sources of information. Secondly, researcher read through all the data for obtaining general sense of the information and reflected on its general meaning. In the third step, detailed analysis with a coding process was started. This process involved taking text data gathered during data collection, segmenting sentences into categories. In the fourth step, researcher forms a description of the setting or people as well as categories or themes for analysis by using the coding process. In the fifth step, descriptions and themes were presented in the qualitative narrative. In this process, several discussions about themes and multiple perspectives from individuals were conducted. In addition to these tables, figures, and charts are used as needed to support important points. In final step in data analysis involved making an interpretation and meaning of the data. (See Appendix C)

Validity and Reliability of Instruments

Reliability analysis was conducted based on procedures outlined by Gibbs (2007). Transcripts were double-checked to make sure that they do not contain obvious mistakes during the transcription. Furthermore, codes were given definitions and data were constantly compared with each code to ensure that there was not a shift in meaning during the coding process.

Qualitative validity was guaranteed by using various strategies suggested by Creswell (2009). Firstly, qualitative data was triangulated with quantitative data to build a coherent justification for themes. Then, member checking was used to determine the accuracy of qualitative findings through follow-up interview with the participants in the study and provide an opportunity for them to comment on the findings. Lastly, peer debriefing was used in the validity process. In this process, a peer debriefed reviews and asks questions about the qualitative study for enhancing the accuracy.

3.6 Procedures of the Study

3.6.1 Quantitative Phase

The study was conducted in spring term of 2013 on Faculty of Education pre-service teachers. For both of surveys necessary permissions was obtained by creators of the surveys. In this study, for gathering the quantitative data, pre-service teachers were given 5-point Likert type, ranging from "strongly disagree" to "strongly agree," questionnaire containing 55 items towards the end of 2013 spring semester. Questions were divided into five parts to give the pre-service teachers clue about what the items were related to. 561 pre-service teachers attended this study and answer the questions in the survey in the online environment (www.metusurvey. com) or classroom environment. Data collection lasted two months. First portion of data was collected at laboratories in Faculty of Education Building at the beginning of laboratory courses. The second portion of data was collected on classrooms in

Faculty of Education Building at the beginning of the course. Mobile learning acceptance survey was integrated into mobile learning readiness survey for this research.

3.6.2 Qualitative Phase

A semi-structural interview was carried out with 14 volunteer pre-service teachers who were selected based on the determined for this study to investigate mobile learning readiness levels, mobile learning acceptance levels and pre-service teachers' opinions about the mobile learning acceptance. The primary purpose of interviews was to investigate that the constructs that play a significant roles on pre-service teachers' mobile learning readiness levels and mobile acceptance levels. The interview questions were prepared by considering survey results and checked by two experts that were in CEIT department. Language of interview questions was Turkish. The reason of choosing Turkish was that pre-service teachers expressed themselves comfortably by speaking in their native language.

Conducting Interview

Researcher prepared a comfortable atmosphere in which participants expressed their feelings, suggestions, and opinions freely. Because of this, researcher chose meeting room in Faculty of Education Building. Before the interview, the researcher talked with participants about 5 minutes for increasing motivation of participant. Then, purpose of the interview was explained to participant by researcher. Participant was informed about the importance of study and contributions to the research.

Consent forms were delivered to participants. Participants were informed with regard to the rights they possessed during the interview section through voluntary participant form. Voluntary-based participating, right of not answering bothering questions, right of quitting interview anytime, and acceptance of the use of data for the study were especially highlighted in the consent form. After participants signed the form, questions were asked to participants.

All interviews were recorded to digital-recorder. Each interview took about 30 minutes and was conducted face to face.

3.7 Assumptions of the Study

The following assumptions were accepted in this study:

- The participants filled the questionnaires accurately.
- The data were collected and recorded appropriately.
- The measures in the study were reliable and valid to make accurate results
- The participants responded the interview questions honestly.

3.8 Limitations of the Study

The following limitations were recognized throughout the study:

- The scope of this study is limited to Faculty of Education in a public university in Ankara, Turkey.
- The validity of the study was limited to the honesty of participants' responses given to data collection instruments used in the study.
- Most of students do not have Tablet PC.

CHAPTER 4

RESULTS

In this chapter, demographic data, statistical results of the mobile learning readiness and acceptance questionnaire, and the results of interviews with students are presented. For analyzing the data SPSS (Statistical Package for Social Sciences) 20.0 software was used.

4.1 Quantitative Results

Demographic information about the participants were collected through five questions in the data collection instruments. Participants' demographic information in relation to the gender of students, departments of students, year of the study in their department, GPA (grade point average) , age gathered through those questions are presented in Table 3.1 in method chapter.

Before presenting the findings in relation to the research questions that guided this study, in the following section, information about participants' smartphone, Tablet PC ownership and their internet connection are presented. Then, participants' mobile facilities and internet access were explored.

As it is shown in Table 4.1, out of the 561 pre-service teachers, about half of them had smartphone and only 9.4 % (N=53) of pre-service teachers had Tablet PC. The findings of the study also showed that 80% (N=42) of the pre-service teachers who had Tablet PC, also had internet connection and 20% (N=11) of the pre-service teachers who had Tablet PC did not have internet connection.

Table 4.1 Smart Phone Ownership, Tablet PC ownership, Internet Connection

Variable	Frequency	Percentage
6. Smart Phone Ownership		
Yes	277	49.4%
No	284	50.6%
7. Tablet PC Ownership		
Yes	53	9.4%
No	508	90.6%
8. Internet Connection For Tablet PC		
Yes	42	79,3%
No	11	20.7%

4.1.1 Mobile Facilities

The pre-service teachers were asked nine questions (items 9 to 17) to explore their mobile phone facilities. The answers for those questions were given at Table 4.2. The findings of the study showed that 99.1% (N=556) of the pre-service teachers had mobile phone and only 9% (N=5) of them did not have mobile phone. Among these who had mobile phone, 62.4% (N=350) of them had 3G service and 37.6% (N=211) of them did not have 3G service. Furthermore, just 7.7% (N=43) of prospective teachers' mobile phone had 4G service and 92.3% (N=518) of mobile phone did not have 4G service. Majority of smart phone owners (N=491) also had MMS service. Specifically, more than half of the prospective teachers' mobile phone (54.7%) had video call service and 33.3% (N=187) of prospective teachers used video call service. Regarding the internet access, 85.6% (N=480) of the pre-service teachers' mobile phone had internet access. Related to memory card ownership, memory cards were used in the mobile phone by 475 (85%) pre-service teachers. In the item 17, "Can your mobile phone read/open up the following files?" was asked to prospective teachers and they were requested to mark which type of files their mobile phone opens up. As it is provided on the Table 4.2, 48.1% (N=270) of the prospective teachers' mobile phone open up Word files, 51.3% (N=288) of the prospective teachers' mobile phone open up PDF files, 39.7% (N=224) of the prospective

teachers' mobile phone open up Excel files. In addition to these, 38.1% (N=214) of the prospective teachers' mobile phone open up Power Point files, 80.6% (N=452) of the prospective teachers' mobile phone open up Video files, 79% (N=443) of the prospective teachers' mobile phone open up Audio files and 88.6% (N=497) of the participants' mobile phone open up Photos/Graphics.

Table 4.2 Mobile Facilities

Variable	Frequency	Percentage
9. Smart Phone Ownership		
Yes	556	99.1%
No	5	9%
10. 3G Services		
Yes	350	62.4%
No	211	37.6%
11. 4G Services		
Yes	43	7.7%
No	518	92.3%
12. MMS		
Yes	491	87.5%
No	70	12.5%
13. Video Call Service		
Yes	307	54.7%
No	254	45.3%
14. Use video call service		
Yes	187	33.3%
No	374	66.7%
15. Internet Access		
Yes	480	85.6%
No	81	14.4%
16. Memory Cards		
Yes	475	84.7%
No	86	15.3%

Table 4.2 (Continued)

17. Open up Following Documents (Sub items)		
a. Word Document		
Yes	270	48.1%
No	291	51.9%
b. PDF Document		
Yes	288	51.3%
No	273	48.7%
c. Excel Document		
Yes	224	39.7%
No	337	60.3%
d. Power Point Document		
Yes	214	38.1%
No	347	61.9%
e. Video Files		
Yes	452	80.6%
No	109	19.4%
f. Audio Files		
Yes	443	79%
No	118	21%
g. Photos / Graphics		
Yes	497	88.6%
No	64	11.4%

4.1.2 Internet Access

The pre-service teachers who joined the research were asked 12 questions to understand internet access of their mobile phone. The questions, percentages, frequencies, and means of the items were given in Table 4.3. In the first item, the pre-service teachers who had internet connections for their phone were asked whether they have subscribed to the internet line using their mobile phone, about half of the (52. 2%) of the pre-service teachers stated that they subscribed to the internet

line using their mobile phone often or always. On the other hand, 52.8% (N=296) of the pre-service teachers indicated that they never send files over 3G to other people through their mobile phones. Furthermore, 57% (N=317) of the prospective teachers preferred to use Wi-Fi facility to connect to the internet often or always. Very close percentage of the participants (59%) accessed the social networking sites using their mobile phone often or always. Half of the prospective teachers (N=283) never opened up files that received over 3G via their mobile phone; however, 45% (253) of the pre-service teachers read online news via their mobile phone often or always. In the seventh item, the pre-service teachers who had internet connections for their phone were asked whether they used mobile phone to send MMS, 64% (N=351) of the pre-service teachers stated that they used mobile phone to send MMS never or rarely. Regarding the receiving files over 3G, 50.6% (N=284) of the pre-service teachers have never received files over 3G from other people. Furthermore, related to ninth items indicating majority of pre-service teachers (N=393) said that they never converted power point slides into the files over 3G.

Table 4.3 Internet Access

*N=561

Item	Never	Rarely	Sometimes	Often	Always	M	SD
1. subscribes to the Internet line using my mobile phone	72 (12.8%)	57 (10.2%)	107 (19.1%)	119 (21.2%)	174 (31%)	3.50	1.39
2. uses Wi-Fi facility to access the Internet.	113 (20.1%)	39 (7%)	60 (10.7%)	131 (23.4%)	186 (33.2%)	3.45	1.54
3. sends/receives email via mobile phone.	153 (27.3%)	67 (11.9%)	107 (19.1%)	96 (17.1%)	106 (18.9%)	2.88	1.50
4. downloads files from the Internet using my mobile phone	143 (25.5%)	80 (14.3%)	103 (18.4%)	109 (19.4%)	94 (16.8%)	2.87	1.46
5. sends files to other people over 3G	296 (52.8%)	86 (15.3%)	64 (11.4%)	39 (7%)	44 (7.8%)	1.96	1.31
6. opens up a file that received over 3G	283 (50.4%)	75 (13.4%)	77 (13.7%)	47 (8.4%)	47 (8.4%)	2.05	1.35

Table 4.3 (Continued)

7. uses mobile phone to send messages using MMS	188 (33.5%)	163 (29.1)	100 (17.8%)	46 (8.2%)	32 (5.7%)	2.19	1.18
8. receives files over 3G.	284 (50.6%)	90 (16%)	71 (12.7%)	40 (7.1%)	44 (7.8%)	2.00	1.31
9. knows how to convert PowerPoint files into other formats	393 (70.1%)	54 (9.6%)	32 (5.7%)	24 (4.3%)	26 (4.6%)	1.56	1.11
10. shares the Internet between mobile phone and computer	166 (29.6%)	64 (11.4%)	111 (19.8%)	100 (17.8%)	88 (15.7%)	2.77	1.47
11. accesses social networking sites using mobile phone.	68 (12.1%)	55 (9.8%)	71 (12.7%)	119 (21.2%)	216 (38.5%)	3.68	1.42
12. reads online news using mobile phone.	107 (19.1%)	66 (11.8%)	103 (18.4%)	123 (21.9%)	130 (23.3%)	3.19	1.45

Note. 5.7% (N=32) of students have no Internet connection. M: Mean; SD: Standard Deviation.

4.1.3 Mobile Learning Readiness

In the questionnaire of mobile learning readiness and mobile learning acceptance, data for mobile learning readiness has been collected with 21 items. As Table 4.4, illustrated, pre-service teachers' overall mobile learning readiness score was found 2.79. This value shows a medium level of mobile learning readiness.

Table 4.4 Pre-Service Teachers' Overall Readiness Scores of Mobile Learning

Overall	Number of Items	N	Mean Score
	21 Items	561	2.79

Survey items were designed to elicit a response based on a 4-point Likert scale whereas 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree. Means and standard deviations were calculated for four items specifically related to participation and engagement. Means above 2 indicate a positive response while means below 2 indicate a negative response to the question. The means, percentages, and frequencies were calculated for each question and the results were reported in the Table 4.5 below. As seen in the Table 4.5, majority of the pre-service teachers 70% (N=390) agreed or strongly agreed with the statement that they know what mobile learning is all about. On the other hand, 53% (N=299) of the pre-service teachers disagreed or strongly disagreed with the statement that some of their instructors already integrated mobile learning into their course.

Furthermore, 84% (N=472) of the pre-service teachers agreed or strongly agreed with the statement that they want to know more about mobile learning; however, 61% (N=343) of the pre-service teachers indicated that their university is not ready for mobile learning using mobile devices (mobile phone, Tablet PC etc.) facilities. In the item, fourth, pre-service teachers were asked whether they preferred conventional learning than mobile learning, 54% (303) of the pre-service teachers preferred mobile learning than conventional learning. Similarly, in the item fifth, prospective teachers were asked whether mobile learning was good for working adults who were pursuing on

their higher education, 84% (N=472) of the prospective teachers agreed or strongly agreed with the statement that mobile learning was good for working adults who were pursuing on their higher education.

Regarding the integration of mobile learning in the class by instructor in addition to the face-to-face meetings, 66% (N=371) of the prospective teachers agreed or strongly agreed with the statement that they would like their instructor to integrate mobile learning in class in addition to face-to-face meetings. On the other hand, 47% (N=261) of prospective teachers strongly disagreed or disagreed with the statement that they will be ready for mobile learning after two years. In addition to these, majority of the prospective teachers (N=389) would like their instructors to integrate mobile learning in their class besides online forum in their course, and likewise 72% (N= 404) of the prospective teachers agreed or strongly agreed with the statement that mobile learning save their learning time.

In the item 15, prospective teachers were asked whether mobile learning was an alternative to web based learning, 86% (N=485) of the prospective teachers agreed or strongly agreed with the statement that mobile learning was an alternative to web based learning. However, nearly half of the pre-service teachers (N=283) disagreed or strongly disagreed with the statement that they do not mind paying extra money for mobile learning.

Prospective teachers' responses related to knowledge of using mobile devices showed that 63% (355) of the prospective teachers disagreed or strongly disagreed that they need to learn how to use my mobile devices (mobile phone, Tablet PC etc.) for mobile learning. In the item 3, prospective teachers were asked whether they thought to be involved in mobile learning, 75% (N=394) of the prospective teachers disagreed or strongly disagreed that they did not think to be involved in mobile learning. Regarding to using 3G facility, 56% (N=213) of the prospective teachers agreed or strongly agreed that they did not know how to use 3G facility in my mobile devices (mobile phone, Tablet PC etc.).

Furthermore, 68% (N=359) of the prospective teachers agreed or strongly agreed with the statement that they looked forwards to engage in mobile learning; however, 56% (N=313) of the prospective teachers were afraid they would spend more money on mobile learning. In the item 18, prospective teachers were asked whether they upgraded their mobile devices (mobile phone, Tablet PC etc.), if mobile learning was going to be implemented in their courses. Majority of pre-service teachers (72%, N=307) agreed or strongly agreed that they upgraded their mobile devices (mobile phone, Tablet PC etc.), if mobile learning was going to be implemented in their courses. On the other hand, regarding to the pre-service teachers' readiness for mobile learning, 39% (N=215) of the pre-service teachers agreed or strongly agreed that they were not ready for mobile learning if the university implemented it now.

Table 4.5 Mobile Readiness Scores of Students

N=561

Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable	M	SD
1. knows what mobile learning is all about	15 (2.7%)	147 (26.2%)	310 (55.3%)	80 (14.3%)	9 (1.6%)	2.82	0.75
2. want to know more about mobile learning.	13 (2.3%)	67 (11.9%)	272 (48.5%)	200 (35.7%)	9 (1.6%)	3.19	0.76
*****3. don't think to be involved in mobile learning	97 (17.3%)	297 (57.9%)	112 (20%)	40 (7.1%)	15 (2.7%)	2.95	0.91
*4. prefers conventional learning than mobile learning	110 (19.6%)	193 (34.4%)	193 (34.4%)	42 (7.5%)	23 (4.1%)	2.69	0.97
5. mobile learning is good for working adults who are pursuing their higher education	11 (2.0%)	67 (11.9%)	323 (57.6%)	148 (26.4%)	12 (2.1%)	3.11	0.72
6. don't mind paying extra money for mobile learning	50 (8.9%)	233 (41.5%)	195 (34.8%)	77 (13.7%)	6 (1.1%)	2.54	0.87

Table 4.5 (Continued)

*****7. mobile learning will make my life difficult	127 (22.6%)	325 (57.9%)	64 (11.4%)	15 (2.7%)	30 (5.3%)	3.05	0.95
*****8. not ready for mobile learning if the university implements it now	83 (14.8%)	251 (44.7%)	172 (30.7%)	43 (7.7%)	12 (2.1%)	2.67	0.90
9. I would like my instructor to integrate mobile learning in my class in addition to face-to-face meetings in the class.	38 (6.8%)	137 (24.4%)	269 (48.0%)	102 (18.2%)	15 (2.7%)	2.80	0.88
10. I am afraid I will spend more money on my mobile devices (mobile phone Tablet PC etc.) bill because of mobile learning.	35 (6.2%)	200 (35.7%)	242 (43.1%)	71 (12.7%)	13 (2.3%)	2.64	0.85
11. be ready for mobile learning after 2 years.	54 (9.6%)	207 (36.9%)	190 (33.9%)	45 (8.0%)	65 (11.6%)	2.46	1.11
*****12. don’t know how to use 3G facility in my mobile devices (mobile phone, Tablet PC etc.)	51 (9.1%)	186 (33.2%)	223 (39.8%)	90 (16.0%)	11 (2.0%)	2.64	0.93

Table 4.5 (Continued)

13. I would like my instructor to integrate mobile learning in my class besides online forum in my course.	29 (5.2%)	128 (22.8%)	305 (54.4%)	84 (15.0%)	15 (2.7%)	2.81	0.82
14. mobile learning will save my learning time.	18 (3.2%)	110 (19.6%)	297 (52.9%)	107 (19.1%)	29 (5.2%)	0.85	2.93
15. mobile learning is an alternative to web based learning.	9 (1.6%)	41 (7.3%)	367 (65.4%)	118 (21.0%)	26 (4.6%)	0.70	3.11
*16. needs to learn how to use my mobile devices (mobile phone, Tablet PC etc.) for mobile learning.	101 (18.0%)	254 (45.3%)	135 (24.1%)	62 (11.1%)	9 (1.6%)	0.93	2.71
17. looks forward to engage in mobile learning.	27 (4.8%)	141 (25.1%)	284 (54.6%)	75 (13.4%)	34 (6.1%)	0.90	2.77
18. upgrades my mobile devices (mobile phone, Tablet PC etc.) , if mobile learning is going to be implemented in my courses.	25 (4.5%)	108 (19.3%)	292 (52%)	115 (20.5%)	21 (3.7%)	0.85	2.92

Table 4.5 (Continued)

19. mobile learning is an alternative to conventional learning.	28 (5.0%)	106 (18.9%)	309 (55.1%)	93 (16.6%)	25 (4.5%)	0.85	2.87
*20. my university is not ready for mobile learning using mobile devices (mobilephone,Tablet PC etc.) facilities.	50 (8.9%)	144 (25.7%)	259 (46.2%)	84 (15.0%)	24 (4.3%)	0.98	2.70
21. Some of my instructors are already integrating mobile learning in their teaching.	89 (15.9%)	210 (37.4%)	187 (33.3%)	40 (7.1%)	35 (6.2%)	1.04	2.34

Note. *****Negative items were reversed in calculating the means, frequencies, and percentages.

4.1.4 Mobile Learning Acceptance

In the questionnaire of mobile learning readiness and mobile learning acceptance, data for mobile learning acceptance has been collected with 13 items. As Table 4.6, illustrated, pre-service teachers' overall mobile learning acceptance score was found 3.59. This value shows a medium level of mobile learning acceptance.

Table 4.6 Students Acceptance of Mobile Learning

Overall	Number of Items	N	Mean
	13 Items	561	3.59

The items were designed to elicit a response based on a 5-point Likert type scale whereas 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree. Means and standard deviations were calculated for four components specifically related to acceptance. Pre-service teachers' mobile learning acceptance subscales mean scores can be seen at Table 4.7 According to findings, mean scores of performance expectancy was 3.54, effort expectancy was 3.50, attitudes towards technology was 3.65 and behavioral intention was 3.67. The means, percentages, and frequencies were calculated for each question and the results are reported in the table 4.8 (Performance Expectancy), 4.9 (Effort Expectancy), 4.10 (Attitudes toward Technology) and 4.11 (Behavioral Intention) below. The findings showed that pre-service teachers' mobile learning acceptance mean scores in all categories were higher than M=3 indicating that majority of the pre-service teachers accept mobile learning.

Table 4.7 Pre-Service Teachers' Subscales Mean Scores of Mobile Learning Acceptance

Item	N	Mean Scores
Performance Expectancy	561	3.54
Effort Expectancy	561	3.50
Attitudes Towards Technology	561	3.65
Behavioral Intention	561	3.67

a. Performance Expectancy

In the questionnaire, performance expectancy for mobile learning acceptance was gathered from the related items 1, 2, 3 and 4. The percentages and mean value of the items were given in Table 4. 8. Overall, performance expectancy level of pre-service teachers (M=3.54) on mobile learning acceptance is positive.

In the item 1, pre-service teachers were asked whether mobile learning was useful for education overall. According to pre-service teachers' responses, the mean score of the item 1 was 3.47, and 55.4% (N=309) of the pre-service teachers agreed or strongly agreed with the statement that mobile learning was useful for education overall. Furthermore, in the item 2, pre-service teachers were asked whether using mobile learning enables them to accomplish the tasks more quickly. Majority of prospective teachers (65.4%) agreed or strongly agreed with the statement that using mobile learning enables them to accomplish the tasks more quickly. Similarly, in the item 3, pre-service teachers were asked whether using mobile learning improves their performance in online, 68% (N=385) of pre-service teachers indicated that using mobile learning improves their performance in online. Moreover, in the item 4, pre-service teachers were asked whether using mobile learning increased their productivity. According to the results of item 4, nearly half of the prospective teachers (49%) agreed or strongly agreed with the statement that mobile learning increases their productivity. While about one third of the pre-service teachers were neutral for item 1 and 4, more than fifth of them were neutral for the item 2 and 3.

Table 4.8 Performance Expectancy Scores

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	M	SD
1. Mobile learning is useful for education overall.	17 (3%)	50 (9%)	183 (33%)	273 (49%)	36 (7%)	3.47	0.85
2. Mobile learning enables me to accomplish the tasks more quickly.	12 (2%)	50 (9%)	132 (24%)	320 (57%)	47 (8%)	3.61	0.84
3. Mobile learning improves my performance in online.	11 (2%)	38 (7%)	127 (23%)	322 (57%)	63 (11%)	3.69	0.83
4. Mobile learning increases my productivity.	11 (2%)	78 (14%)	197 (35%)	221 (39%)	54 (10%)	3.41	0.91
Overall Mean						**3.54**	

Note. M: Mean; SD: Standard Deviation

b. Effort Expectancy

In the instrument, there were 3 items to understand the effort expectancy for mobile learning acceptance of pre-service teachers. The means and frequency of pre-service teachers' responses to the related items were given in Table 4. 9. The related items were 5, 6 and 7. In the item 5, pre-service teachers were asked whether mobile learning was easy to use, 57% (N=323) of the pre-service teachers agreed or strongly agreed with the statement that mobile learning was easy to use. Regarding the pre-service teachers'

interaction with the mobile learning, 57% (N=324) of the pre-service teachers agreed or strongly agreed with the statement that their interaction with the mobile learning would be clear and understandable. Almost the same percentage 57% (N=316) of the pre-service teachers indicated learning to operate the mobile learning was easy for them in the item 6. Furthermore, more than one-fourth pre-service teacher were neutral for item 5, 6, and 7.

Table 4.9 Effort Expectancy Scores

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	M	SD
5. Mobile learning is easy to use.	12 (2%)	63 (11%)	163 (29%)	263 (47%)	60 (11%)	3. 53	0.9
6. My interaction with mobile learning would be clear	9 (1.6%)	75 (13%)	153 (27%)	276 (49%)	48 (9%)	3. 50	0.88
7. Learning with mobile learning is easy for me	12 (2%)	81 (14%)	152 (27%)	256 (46%)	60 (11%)	3. 48	0.93
Overall Mean						**3.50**	

Note. M: Mean; SD: Standard Deviation

c. Attitudes towards Using Technology

In the questionnaire, there were three items to understand the attitudes towards using technology expectancy for mobile learning acceptance. The means and percentages of the prospective teachers' responses to the related items were given in Table 4. 10. The related items were 8, 9, and 10. In the item 8, prospective teachers were asked whether using mobile learning was a good idea, majority of prospective teachers (68 % , N=382) agreed or strongly agreed with the statement that using mobile learning was a good idea. In the item 9, pre-service teachers were asked whether they liked the idea of using

mobile learning, 66.0% (N=370) of the pre-service teachers agreed or strongly agreed that they like the idea of using mobile learning. In addition to these, regarding the working desire of prospective teachers with the mobile learning, 64% (N=366) of the pre-service teachers agreed and strongly agreed with the statement that working with mobile learning was fun. Furthermore, more than one-fifth pre-service teacher were neutral for item 8, 9, and 10.

Table 4.10 Attitude towards Technology Scores

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	M	SD
8. Using mobile learning is a good idea.	18 (3%)	43 (8%)	118 (21%)	307 (55%)	75 (13%)	3. 67	0.91
9. Like the idea of using mobile learning.	20 (6%)	46 (8%)	125 (22%)	287 (51%)	83 (15%)	3. 65	0.95
10. Working with mobile learning is fun.	16 (3%)	50 (9%)	134 (24%)	275 (49%)	86 (15%)	3. 65	0.94
Overall Mean Score						**3.65**	

Note. M: Mean; SD: Standard Deviation

d. Behavioral Intention

In the questionnaire, there were 3 items to understand the behavioral intention for mobile learning acceptance. The means and frequencies of the prospective teachers' responses to the related items were given in Table 4. 11. The related items were 11, 12, and 13. In the item 11, prospective teachers were asked whether they intended to use mobile learning in the future. According to the results of item 11, 65% (N=368) of pre-service teachers agreed or strongly agreed with the statement that they intended to use

mobile learning in the future. Likewise, in the item 12, pre-service teachers were asked whether they predicted they would use mobile learning in the future, 65.8 % (N=369) of the pre-service teachers agreed or strongly agreed with the statement that they predict they would use mobile learning in the future. In addition to these, in the item 13, pre-service teachers were asked whether they planned to use mobile learning in the future. 62. 2% (N=349) of the pre-service teachers agreed or strongly agreed with the the statement that they planned to use mobile learning in the future. Furthermore, more than one-fourth pre-service teacher were neutral for item 11, 12, and 13.

Table 4.11 Behavioral Intention Scores

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	M	SD
11. Intends to use mobile learning in the future.	14 (3%)	48 (9%)	131 (23%)	275 (49%)	93 (17%)	3.69	0.93
12. Use mobile learning in the future.	15 (3%)	46 (8%)	132 (23%)	271 (49%)	98 (18%)	3.70	0.93
13. Plan to use mobile learning in the future.	19 (4%)	50 (9%)	143 (25%)	256 (46%)	93 (17%)	3.63	0.97
Overall Mean Score						**3.67**	

Note. M: Mean; SD: Standard Deviation

4.2 Pre-Service Teachers' Opinions about Mobile Learning

The researchers conducted interviews with 14 volunteer pre-service teachers who had participated in the study in the 2013 spring term. Ten questions were asked in the interviews. First, after reading the all data, researcher determined the ideas that generally participants said. Then, data was segmented and into six categories. The

categories extracted from the interview finding are Support Learning, Barriers, Social Influence, Readiness level, Suggestions and Behavioral Intention. (See Table 4.13). Findings from the interviews were presented in accordance with these categories. After labelling six categories, researcher identified nineteen themes by generating codes and categories. A constant comparative method was used for theme and category development. This involves a systematic comparison of the text assigned to a theme or category already assigned. The theoretical model used in this research therefore did not define the themes or categories. Each theme was further examined to develop central themes or factor categories in which the themes would relate.

Table 4.12 Coding Schema for Interview

Support Learning	Time and Place Independency
	Ease of Use
	Pace and Context Independency
	Immediate Feedback
	Enjoyment and Explorations
Barriers	Hardware Problems
	Small Screen Size
	Cost and Compatibility Issues
	Design Problems
	Abusing
Social Influence	Peer
	Teachers and Instructors
	Social Media
Readiness Level	Students Readiness Levels
	Instructors Readiness Levels
	University Readiness Level
Suggestions	Peer
	Instructors
	University
Behavioral Intention	Future Use

4.2.1 Supporting Learning

Pre-service teachers were asked to respond the question about whether mobile learning increase their performance and creativity and whether using mobile learning and its' applications in education is beneficial in order to elicit information about effect of mobile learning on their performance and usefulness of it. This category includes six themes: time and place independency, ease of use, pace and context independency, immediate learning and enjoyment and exploration. The analysis of the qualitative data indicated that pre-service teachers found mobile devices to be helpful for increasing their performance and creativity and mobile learning and its applications were beneficial.

Time and Place Independency

All pre-service teachers (N=14) focused that time and place independency features of mobile learning during the interview. Pre-service teachers believed that reaching information at any time and any place was one of the most important benefits of mobile learning. They also said that whenever they want, they can reach the course materials from out of the classroom environment and they have chance to study them at any place by the mobile learning. Furthermore, pre-service teachers highlighted the idea that mobile learning is independent from time and place in terms of features. According to the pre-service teachers, time and place independency features of mobile learning make instruction more permanent. Pre-service teachers also gave a specific example about this topic. They emphasized that especially for the language course, students that used mobile learning think that mobile devices helped them to repeat words and searching meaning of the words at any time on the internet environment was helpful for them.

One of the pre-service teachers stated:

"Mp3 player help me to repeat words that I have learned in language course. Furthermore, whenever I wonder the meaning of the word, I have chance to search it on the internet. "

"Mp3 çalar yabancı dil dersinde öğrendiğim kelimeleri tekrar etmemi sağlıyor. Üstelik ne zaman bir kelimenin anlamını merak etsem , onu internette aratabiliyorum. "

Similarly, another pre-service teacher mentioned that:

“While I was walking around the campus, sometimes I think about what I have learned in the lecture. I was searching some definitions and terms on the internet and I learned the meaning of it. ”

“Kampüste yürürken aklıma bazen derste öğrendiğim terimler geliyor. Bunların anlamlarını internette aratıyorum ve öğreniyorum”

Ease of Use

According to qualitative data analysis of responses of pre-service teachers, most of them (n=12) pointed out that mobile learning makes their learning process faster and easier. Pre-service teachers noted that thanks to the portability feature of mobile devices, they search what they have learned in the lecture on the internet easily and reach the information fast. Furthermore, prospective teachers generally said that they dont like searching information on the books, searching it via mobile devices is more convenient way to learn. Moreover, they emphasized that reaching the information fast motivates them towards to the lecture.

One of the prospective teachers stated that:

“I searched general term that I have learned at the school on the bus. When I reach the information by fast and easy way, my motivation towards to the course is increased.”

“Okulda öğrendiğim bir terimleri otobüsteyken aratıyorum. Bilgiye kolay ve hızlı bir şekilde ulaştığımda derse karşı olan motivasyonum artıyor”

Pace and Context Independency

In addition to these, interview result revealed that pace and context dependencies are also important benefits of mobile learning. All pre-service teachers (n=14) stated that they can adjust the pace of learning via mobile devices. Although pre-service teachers sometimes cannot adapt themselves to pace of instructor in the classroom, they can solve this problem by help of the mobile devices. Moreover, some of the pre-service teachers’ responses (n =7) particularly indicated that they can control the context of

learning in the mobile learning by context independency feature of mobile learning. One of the pre-service teachers said:

“During the mobile learning, I don’t feel teacher and peer pressure. I can adjust the pace and context of learning according to me”

“Mobil öğrenme esnasında öğretmen ve arkadaşlarımın baskısını üzerimde hissetmiyorum. Öğrenmenin hızını ve içeriğini kendime göre ayarlayabiliyorum. ”

Another benefit of mobile learning pointed out by two prospective teachers was the effect of mobile learning on introvert students. According to the prospective teachers’ observations during their internship process, mobile learning helps introvert students to express themselves better. As a result, introvert students that are exposed to mobile learning, express their thoughts better in the online environment such as discussion forum or Moodle were observed by the pre-service teachers. Two of the pre-service teachers also pointed out how mobile learning affects introvert students as follow:

“I observed some students during my teaching practice. Students who have introvert characteristics, joined online discussions in the forms actively. I think mobile learning make introvert students more active”

“Stajım esnasında bazı öğrencileri inceledim. İçine kapanık öğrenciler online tartışmalara aktif olarak katıldılar. Bana göre mobil öğrenme içine kapanık olan öğrencileri daha aktif yapıyor. ”

Immediate Feedback

When pre-service teachers talked about effect of mobile learning on their performance and creativity, some pre-service teachers (n=2) particularly added that receiving immediate feedback from instructor or software during the mobile learning is also increase their performance. They emphasized that during the instruction process, immediate feedback was given by instructor or educational software is also important factor that affect their performance positive.

One of the students stated:

“During the instructional process, when instructor asked questions, we answered via mobile devices. Then, instructor delivered the correct answers immediately and gave us feedback. This process increased my motivation and performance because of the fact that I learnt easily and fast.”

“Ders esnasında hoca soru sorduğunda mobil araçlarla cevap verdik. Hoca, doğru cevapları ve dönütleri anında verdi. Hızlı ve kolay öğrendiğimden dolayı derse karşı olan motivasyon ve performansım arttı. ”

Enjoyment and Explorations

Most of the prospective teachers (n=10) who joined the interview pointed out that they like playing educational games and using mobile applications in the mobile devices. The same prospective teachers also stated that they use at least one mobile application and play an educational game during their educational life. Since prospective teachers believed that mobile, applications and mobile support their learning, process and motivate them to study more.

Qualitative data clearly showed that mobile applications and mobile games help students learn better and increase their motivation towards to the lecture.

One of the students stated:

“I downloaded the application that showing the different physic formulas; I learned the formulas by this application”

“Fizik formüllerini gösteren bir uygulama indirdim. Formülleri bu uygulama sayesinde öğrendim”

Similarly, other students commented:

“Games and applications attracted my attention towards to the lecture and made instructional process more motivational. Moreover, applications made me more think about them. I wondered how they were developed. ”

“Oyunlar ve uygulamalar benim derse karşı olan ilgimi arttırıyor ve derse motive ediyor. Üstelik, uygulamalar beni üzerinde düşündürüyor ve onların nasıl geliştirildiğini merak ediyorum”

Some of prospective teachers (n=4) stated that different characteristical features of mobile devices such as GPS, photo taking and connectivity increased their performance and creativeness. Prospective teachers added that taking photos and sharing them immediately with their peer on the internet by mobile devices increase their course performance. Moreover, usage of GPS data to reveal their places during the sharing information process was pointed out these pre-service teachers. Responses of pre-service teachers clearly indicated that this process both increased their performance and creativity. One student commented:

“I used Project Noah application last year. I took photos of the nature and shared it immediately with another people from different places on the earth. Moreover, when I shared, I pointed out my places via GPS. ”

“Geçen yıl Project Noah uygulamasını kullandım. Doğa resimleri çektim ve onları dünya üzerindeki farklı insanlarla paylaştım. Üstelik, paylaştığımda GPS ile bulunduğum konumu da belirttim”

Instead of GPS and photo taking features, QR coding feature of mobile learning was also make mobile learning more attractive for students. According to the two prospective teachers, using QR coding makes educational process more attractive. One of the students pointed out:

“When I use QR code application, I dont need to take note something. For example, I reach homework of the lecture or contact information of my instructor via QR code. ”

“QR code uygulamasını kullandığımda not alma gereği hissetmiyorum. Mesela, dersin ödevine veya kontak bilgisine QR code sayesinde ulaşabiliyorum”

In one of interview questions, students were asked whether mobile learning and its environment are attractive for them. Majority of students (n=12) declared that mobile learning is attractive for them because of the fact that it is more convenient and amusing

than conventional methods. According to pre-service teachers, reaching the information instantly makes learning process not only more convenient but also more attractive. Furthermore, half of the pre-service teachers (n=7) particularly emphasized that learning via books is boring anymore so learning via mobile devices is more attractive. One of the students stated:

"Learning via books is not attractive anymore for me because it is traditional way of learning. Moreover, searching something on the book is hard and exhaustive process. Learning via mobile devices and applications are popular and funny. "

"Kitaplarla öğrenmek artık bana çekici gelmiyor çünkü bunu çok geleneksel olarak görüyorum. Üstelik, bir şeyi kitapta aramak çok zor ve yorucu. Mobil araçlar vasıtasıyla öğrenme popüler ve eğlenceli"

4.2.2 Barriers

To identify barriers to use mobile devices for learning, the researcher asked participants:" What kinds of difficulties did you encounter when you used mobile learning applications?" Additional barriers were identified during the analysis of the interview transcripts. The result of analysis of qualitative data showed that five main barriers were identified as follows: hardware problems, small screen size, cost and compatibility issues, design problems, and abusing.

Hardware problems

Most of pre-service teachers (n=10) stated that they encountered some hardware problems while they were using mobile learning applications. They stated that most of mobile applications that especially depend on high graphical power, were not working properly on the tablets or mobile phones because of their limited graphic card power. Moreover, some pre-service teachers (n=6) added that they live some crash problems while they were using mobile applications on their tablet because of limited memory size of these devices. Responses indicated that limited memory size and limited graphic card power are the major hardware problems that pre-service teachers encountered with while they are using mobile devices. By covering hardware problems, one of the pre-service teachers commented:

“Generally, RAM (random access memory) capacity of my tablet is low. Therefore, I have been living some problems while I was using some applications that are heavily depend on high graphics resolution. ”

“Genellikle tabletlerin RAM kapasiteleri düşük oluyor. Bu yüzden, yüksek çözünürlük isteyen uygulamalarda bazı problemler yaşıyorum”

Small screen size

Second problem was that pre-service teachers encountered with small screen size. In fact, eight pre-service teachers (out of 14) stated that they could not use mobile applications effectively because of small screen size. These pre-service teachers also emphasized that details of the applications cannot be seen properly in the small screen because of design issues. One of the pre-service teachers said:

“Mobile learning is attractive for me but small screen size sometimes cause for problems. I cannot see details of the applications in small screen. Designers should pay attention on small screens and they should avoid detailed of information in the mobile applications while they were designing application. ”

“Mobil öğrenme bana çok çekici geliyor ama küçük ekran boyutu bazen problemlere neden olabiliyor. Uygulamaların detaylarını küçük ekran üzerinde göremiyorum. Tasarımcılar , uygulama tasarlarken küçük ekranlara önem vermeli ve mobil uygulamalarda çok fazla detaya girmekten kaçınmalılar”

Cost and Compatibility Issues

Another problems that highlighted by prospective teachers were cost and compatibility issues. Some prospective teachers (n=4) declared that some applications that working on IOS platform, do not work on android platform or vice versa. That is, according to the prospective teachers, compatibility is an important issue because of the fact that it distracts their attention towards mobile learning. In addition to the compatibility problem, high cost of some applications was underlined as another problem by some prospective teachers (n=4). Prospective teachers said that they could not afford to buy some applications so they could not download these from application stores. Prospective

teachers also suggested that agreement between university and companies to deliver these applications free to the students may be solution to problem. Two of the prospective teachers said:

“Some applications are really expensive and these applications do not have free versions. I could not download these kinds of applications so perhaps university can agree with technology companies about delivering these applications free to the students. ”

“Bazı uygulamalar gerçekten pahalı ve bu uygulamaların ücretsiz versiyonları yok. Bu tür uygulamaları indiremiyorum. Bu yüzden üniversite şirketlerle anlaşmalar yapıp bu uygulamaları ücretsiz olarak dağıtabilir. ”

Abusing

Qualitative data analysis revealed that mobile learning is open to abuse. According to few prospective teachers’ responses (n=3), especially in the young learners, mobile devices can be used for different purposes such as fun or game. Thus, prospective teachers suggested that as a solution for this problem, instructors should be careful in classroom environment for abusing of mobile learning and they should gain learners technological awareness and inform learners about benefits of mobile learning.

Design Problems

Analysis of qualitative data clearly showed that last problem that prospective teachers lived during usage the mobile applications is the design problems. Some prospective teachers (n=5) stated that although some mobile applications were designed effectively and well, some mobile applications were designed poorly and so, they are not working in mobile devices compatible. Prospective teachers also reported that interfaces of most applications are not user-friendly so students could not benefit fully from these mobile applications. Two of the pre-service teachers said:

“Creating educational applications for students’ Tablet PC’s is popular. However, students live some problems with these because of small screen size or limited memory.

As a result of these, designers should be careful during designing the software and they should design considering characteristical features of mobile devices"

"Tablet bilgisayarlar için eğitim uygulamaları yapmak şu an çok popüler. Fakat öğrenciler bu uygulamaları kullanırken bazı problemler yaşıyorlar. Bu yüzden, tasarımcılar uygulamaları tasarlarken dikkat etmeli ve mobil araçların karakteristik özelliklerini dikkate alarak tasarlamalı"

4.2.3 Social Influence

Detailed analysis of the responses of the pre-service teachers to the question "Is there anybody affect you on using mobile learning applications ?" showed that basically three construct that are their friends, instructors and social media affect them to use mobile learning and its applications. In another question in the interview, prospective teachers were asked whether they get any advice on using mobile learning applications. While majority of prospective teachers (n=8) noted that mostly friends and instructors gave an advise them on using mobile learning applications, 6 prospective teachers (out of 14) stated that they did not get any advice on using mobile learning applications.

Peer

According to the responses of some prospective teachers (n=8), while another students using mobile devices and mobile learning applications in the classroom, they were attracted from mobility and convenience features of these devices. Prospective teachers also declared that they are inclined to download the applications, which their friends used in the classroom. In addition to these, near half of the pre-service teachers (n=6) highlighted that they are inclined to download the applications that were advised by their friends. One of the pre-service teachers commented:

"I saw my friends while they were studying on Tablet PC. I affected convenience and portability of these devices. Moreover, after I bought Tablet PC, I downloaded the applications that I saw at my friends' tablet "

"Tablet bilgisayarla ders çalışan arkadaşlarımı görünce bu araçların kullanışlılığından etkilendim. Üstelik, tablet bilgisayar aldıktan sonra onların kullandığı uygulamaları kendi tabletime yükledim"

Social Media

Analysis of qualitative data showed that another important factor that affects pre-service teachers on using mobile learning applications is the social media. Near half of the pre-service teachers (n=6) said that advertisements on social media ,web sites and convenience of sharing information on social media via mobile devices affect them deeply on using mobile devices and mobile applications. Furthermore, pre-service teachers emphasized that mobile devices are used in most of advertisements and mobile support of social media sites such as Facebook and twitter have a major influence on students.

One pre-service teacher said:

"When I saw my friends at the campus with mobile devices, I affected them. Furthermore, I realized that many people connected the Facebook from their mobile devices. Therefore, I thought to buy mobile devices for sharing information easily on social media. "

"Arkadaşlarımı kampüste mobil araçları ile görmek beni etkiledi. Üstelik birçok kişinin tabletlerinde facebook uygulamasını kullanmasından da etkilendim. Bu yüzden sosyal medya üzerinde bilgi alışverişinde bulunmak için mobil araç satın almayı düşünüyorum"

Instructors

Qualitative results interestingly showed that pre-service teachers are affected from teachers in school where they worked as internship on. Few pre-service teachers (n=3) stated that teachers in school using mobile learning effectively in their lecture affect them positively on using mobile learning. According to pre-service teachers, teachers in these schools had enough competence in using mobile applications and mobile devices. Furthermore, instead of the teachers in the schools, instructors in university advised them on using mobile learning applications. Pre-service teachers stated that some

instructors in the university recommend them to use mobile learning applications that are related to his/her course.

One of the pre-service teachers commented:

“My instructors suggested me for downloading mobile applications that are created for young learners. In addition, my instructors recommend us to load mobile applications that are related to their course “

“Hoca bana ilköğretim öğrencileri için tasarlanan mobil uygulamaları indirmemi önerdi. Ayrıca bana kendi dersiyle ilgili olan uygulamaları da yüklememi söyledi”

Despite eight pre-service teachers’ getting suggestion on using mobile learning applications, six pre-service teachers declared that they did not get any suggestions for using mobile learning applications. Furthermore, three pre-service teachers out of eight who get advice on using mobile learning applications declared that instead of getting advice from another people, they gave an advice on using mobile learning and its applications to another people.

4.2.4 Behavioral Intention

Pre-service teachers were asked to respond the question about whether they will use mobile learning and its applications in the future in order to elicit information about usage of mobile learning in their career.

Future Use

Result of qualitative data analysis indicated all pre-service teachers (n=14) intended to use mobile learning and its applications future because of the fact that mobile devices facilitate their job performance from many perspectives. Pre-service teachers also highlighted that instruction would depend on effective use of technology in the future. Furthermore, according to the pre-service teachers, technological tools would be integrated into instruction more effective than todays in the following years. Accordingly, pre-service teachers thought that they intend to use mobile learning and its applications in the future. Moreover, they also declared that they do not resistance to technology in their future career. One of the pre-service teachers pointed out that:

“I will create and use website in educational settings and communicate with my students in online environment. I will deliver lecture notes via web site and I will answer my students’ questions via online forums. “

“Ben eğitimsel web sayfaları tasarlıyorum ve öğrencilerimle online ortamlarda iletişim kuruyorum. Ders notlarımı web sayfası üzerinden dağıtıp, öğrencilerimin sorularını da web sayfası üzerinden yanıtlıyorum”

Similarly, another pre-service teacher also pointed out:

“If there are no enough infrastructures in my school, I will try to improve conditions for mobile learning”

“Eğer gelecekte çalışacağım okulda yeteri kadar mobil altyapısı yoksa, bunu geliştirmek için çalışırım“

Results of qualitative analysis showed that the general opinions of prospective teachers about the intention of using mobile learning in the future are positive. All pre-service teachers wanted to utilize the benefits of mobile learning in their future career.

4.2.5 Readiness Levels

Pre-service teachers were asked whether students, instructors and their university have enough competence in using mobile learning and its applications in order to understand readiness levels of mobile learning of whole university environment. The answers of pre-service teachers to these questions can be gathered in three components: pre-service teachers’ readiness level, instructor’ readiness level, university’ readiness level.

Student readiness level

Engaging with technology, internet and mobile devices is attractive to all of pre-service teachers (n=14) that joining the research. According to the all pre-service teachers (n=14), even they encounter developing technological environments that they do not have any experience in , they can adopt themselves fast and easily to these environments because of their technological background. Furthermore, all pre-service teachers said that they are open to learn more about mobile learning and they are improving themselves in mobile technology every day. Pre-service teachers added that

if university starts to use mobile learning, most students in university can adopt themselves easily and fast into mobile learning and they can solve problems that they encounter during the mobile supported instructional process.

One of the pre-service teachers emphasized:

“I don’t live any trouble with technological devices. If I live any problem with that, I can solve it easily because of the fact that I have enough competence in using technological tools. Moreover, if university implements mobile learning, most of students in university can adopt themselves easily”

“Şimdiye kadar teknolojik aygıtlarla herhangi bir problem yaşamadım. Eğer yaşarsam bunu kendi başıma çözecek kadar teknik altyapım var. Üstelik, üniversitem şu an mobil öğrenime geçerse birçok öğrencinin buna hazır olduğunu düşünüyorum”

Similarly, other pre-service teacher said:

“Most of students have mobile devices and another that doesn’t have mobile devices used other students’ mobile devices. Therefore, students in university are open to use mobile devices so they want to engage in mobile learning. ”

“Birçok öğrencinin mobil aracı var. Olmayanlar da diğer arkadaşlarının mobil araçlarını kullanıyor. Bu yüzden üniversitede ki öğrenciler mobil araçların kullanımına açık ve istekliler. ”

Another question of the interview is the “Do you think whether you are ready for using mobile learning and its applications.” Similarly all pre-service teachers (n=14) emphasized that they are ready for using mobile learning and its applications. Moreover, they highlighted that they can adjust themselves to the mobile learning easily even they encounter different technologies that they do not meet before. Majority of pre-service teachers (n=14) also stated that they are accustomed to using mobile devices and its applications. Furthermore, they want to be involved in mobile learning in the future. Results of qualitative data indicated that all attitudes of prospective teachers towards mobile learning are positive.

Instructor Readiness Level

Detailed analysis of the responses of the prospective teachers to the question "Are instructors in university ready for mobile learning" showed that most of the students (n=10) pointed out that instructors in university were not fully ready yet for mobile learning. Pre-service teachers emphasized that instructors were eager to use mobile learning and its applications in their courses. Prospective teachers stated that instructors in university were open to use new technologies so they can adopt themselves to mobile learning easily if university implements it now.

University Readiness Level

Majority of pre-service teachers (n=9) pointed out that university was not ready for mobile learning because of the fact that it did not have enough infrastructure. For example, university still does not have Wi-Fi network that expanded the whole campus. According to the pre-service teachers, Wi-Fi network around through campus was the most important circumstance for mobile learning because of the fact that it provided mobility. In addition to Wi-Fi network, deficiency of components which were used commonly in mobile instruction such as smart class , smart board and video conferencing tools pointed out by pre-service teachers in the interview. Pre-service teachers also added that university did not have enough tablet PC for delivering to the students during the mobile supported instruction.

4.2.6 Suggestions

Pre-service teachers offered some solutions for increasing mobile learning readiness of instructors, university, and students. These solutions were gathered in three main themes, which are suggestions for students, suggestions for instructors and suggestions for university.

For Students

Most of pre-service teachers (n=10) pointed out that seminar and trainings should be organized for students to encourage them to use mobile devices and applications. Students should be aware of importance and benefits of mobile learning and applications. Number of technology lectures in the curriculum should be increased and most technology courses should be compulsory for them.

"Seminars should be organized for informing students about the usage of mobile devices. Students may understand the importance and benefits of mobile devices via these seminars. Furthermore, the lecture which requires the usage of technology should be integrated into curriculum"

"Üniversite içerisinde öğrencileri mobil araçların kullanılması konusunda bilgilendiren seminerler düzenlenmeli. Bu seminerler sayesinde öğrenciler mobil araçların önemini ve faydalarını kavrarlar. Ayrıca müfredata teknoloji kullanımı gerektiren dersleri eklemeli ve bu dersler zorunlu olmalı"

For Instructors

Majority of prospective teachers (n=9) stated that seminars should be organized for introducing mobile learning to instructors and students by technical support group. According to the prospective teachers, instructors will realize the importance of mobile learning and mobile devices in education and students will begin to use mobile devices at the end of these seminars. Moreover, instructors should work together with instructional designers to integrate mobile devices into their course. Hence, they can use technology in their course outline effectively.

"The instructors in the university should pay attention on mobile learning and use mobile devices in their courses. Furthermore, instructors should work together with application designers and create applications for their lectures"

"Üniversitede ki hocalar mobil öğrenmenin önem vermeli ve derslerinde kullanmalılar. Hatta mobil uygulama tasarımcıları ile ortaklaşa çalışıp kendi dersleri için uygulama geliştirmeliler"

For University

Tablet PC, smart board, and video conferencing were the major tools in using mobile learning. As researcher said above, university did not have enough number of mobile devices and mobile educational software. Pre-service teachers suggested in the interview that university should work together with IT companies such as Microsoft or Apple for delivering mobile applications, tablets on free to the students. University should allocate more funds to build new smart class in the departments. Furthermore, pre-service teachers stated that one of the most important points for preparing technical infrastructure of university for mobile learning was that spreading on wireless network on whole campus. Students considered that the wide spread Wi-Fi network is the main necessity of mobile learning.

"For effective Mobil learning, university should deliver the mobile applications to the students via agreements with IT companies such as Apple and Microsoft. Moreover, university should spread the Wi-Fi to whole campus area"

"Etkili bir mobil öğrenme için üniversite Apple ve Microsoft gibi bilişim firmalarıyla anlaşmalar yapıp mobil uygulamaları öğrencilere ücretsiz dağıtmalı. Ayrıca üniversite kablosuz interneti kampüsün her noktası ulaştırmalı"

CHAPTER 5

DISCUSSION AND CONCLUSION

In this chapter, the discussion and conclusion of the results, implementation, and recommendations for further research studies were presented. The purpose of the study was to inspect pre-service teachers' mobile learning readiness levels and mobile learning acceptance levels. This study was conducted on 561 pre-service teachers in spring semester in 2013 at Faculty of Education at Middle East Technical University. Firstly, the questionnaire was distributed to participants of the study at the spring term. Then, in addition to questionnaire, face-to-face interviews were conducted with 14 volunteer participants in order to understand pre-service teachers' mobile learning readiness and mobile learning acceptance levels.

5.1 Participants Facilities for Mobile Learning

The result of the questionnaire showed that half of the prospective teachers had smart phone that had Android, IOS and Symbian or another software in it. Furthermore, only 10% (N=53) percent of pre-service teachers had Tablet PC and another (90%) had no Tablet PC. Lastly, according to the result of demographic data, most of the pre-service teachers 79.3% (N=42) who had also Tablet PC, had internet connection on it.

Results of demographic questions were expected since because of some reasons such as high cost of mobile devices, they could not afford to buy smart phone or Tablet PC. Moreover, most of pre-service teachers did not accustomed to use Tablet PC because of the fact that instructors in university and infrastructure of university were not ready for mobile learning yet. Qualitative results of the study also showed that high cost of the mobile devices was one of the main barriers in using mobile learning. Most of pre-service teachers did not prefer to use mobile devices because of the high cost. This result was supported by previous studies (Hussin et al., 2012). Hussin and colleagues found that basic readiness and budget readiness were two main readiness types of mobile learning readiness. Possessing a mobile devices and affording to buy a new one

were major requirements of mobile learning readiness and mobile learning acceptance. In addition to these, according to the qualitative results, readiness of faculty staff and faculty infrastructure have big impact on students' readiness of mobile learning. Park et al. (2012) also found same result in their study. According to the Park and his colleagues, instructor and faculty infrastructure readiness were the main requirements for mobile learning readiness of pre-service teachers.

In addition to Tablet PC's, 12 questions were asked to pre-service teachers about the facilities of their mobile phones. Results of the questionnaire indicated that the prospective teachers who had mobile phone, their mobile phones were in good conditions. Having mobile phone in good conditions has positive effect on both students' performance and perceptions about mobile learning. This result was parallel to some of the results of the study by Sharples (2005). In the research conducted by Sharpless, memory of mobile devices was considered too small to hold course materials such pdf, media files, software, and games. Students were displeased with their PDA's because of its inadequate memory and short battery life. So, students in this research did not have positive attitudes towards using mobile devices because of inadequate conditions of their mobile devices (Sharples et al., 2005). Majority of pre-service teachers' mobile phone in this study had 3G connection, memory card, MMS service, and video call service.

In addition to these, 86% of pre-service teachers' mobile phones had internet connection so they could reach the information whenever they wanted. Furthermore, they can communicate with their instructor easily and share information with their friends. As pre-service teachers in the interview stated that reaching the information at any time is the most important point for them. Prospective teachers also focused that reaching the information at any time and communicate with their instructor easily are the most important motivational factors for mobile learning. Pea and Maldonado (2006) also declared that learners can interact with learning content anytime and anywhere they choose. Reaching information at anywhere and anytime were the motivational factors for mobile learning. Qualitative results were also supported by results of Rau and his colleagues (2008). Rau and colleagues found that mobile communications tools

establish connection between instructor and students in the instructional process and they enhance students' extrinsic motivation without causing higher pressure.

Regarding the video call feature of mobile devices, most of pre-service teachers did not use video call feature yet. This result was unexpected since more than half of pre-service teachers' mobile phones have video call feature. Qualitative results indicated that not being internet connection in whole campus, not preferring to use 3G facility in mobile phone because of economic issues and preferring to use computer for video call because of bigger screen size with respect to the mobile phones were three main reasons for using video call rarely by mobile phone.

Another important focus of this study was the exploration of the internet access of pre-service teachers via their mobile devices. In this section, 12 questions were asked to prospective teachers about the internet access of their mobile phone. Qualitative results of the study indicated that reaching the information fast was an important issue on improving students' performance in mobile learning, so it was possible to reach information at anytime and anywhere by fully internet access. Furthermore, joining online discussion platforms, synchronous communication with their friends during the mobile learning and getting immediate feedback from their instructors were also required fully internet access. Thus, pre-service teachers' internet line of mobile devices should be fast for opening web sites, forums, Moodle, and social networking sites. Negative effects of slow internet line for transmission of web page on student' experience has also been investigated by other researches (Smørdal & Gregory, 2005). Smørdal and Gregory (2005) conducted a research on medical students between the years 2000 and 2002, slow internet connection distract attention and motivation of medical students. Furthermore, a JISC case study (2005) about use of wireless connection on Tablet PC at London College inspected that weak signals and slow access to course materials by the internet line as negative aspects of Wi-Fi connectivity in mobile learning. Roberts and colleagues (2003) listed network reliability in one of five key points of mobile learning pilot project that conducted on 300 college students. According to the results of this study, poor internet access had more negative effects than other limitations such as small screen size and poor battery on student' dissatisfaction on mobile learning.

Results of the questionnaire also showed that the most frequent activities done by pre-service teachers were the using social networking sites, reading news and connecting to the internet line. These results may be explained by popularity of using Facebook, twitter or other applications and reaching their personal accounts easily via wireless or 3G. Qualitative results of the study were also parallel with these results. Qualitative data indicated that pre-service teachers were influenced with other students in the campus that used social media websites such as Facebook and twitter by using their mobile devices. Furthermore, they preferred to follow the breaking news via their mobile devices instead of reading the newspaper.

Descriptive analysis also indicated that some activities that requires internet connection such as sending and receiving e-mail, downloading files from the internet and sharing internet line via Bluetooth facility was preferred as secondary by the prospective teachers. These results clearly showed that most of pre-service teachers had enough competence in using mobile devices and its applications effectively. Moreover, pre-service teachers had enough competence in doing basic tasks such as sending and receiving e-mail or downloading files from the internet. This result was also highlighted by the qualitative data of the study. According to the results of qualitative analysis, pre-service teachers were open to use mobile learning and most of pre-service teachers had basic knowledge of using these devices.

In addition to the frequently doing activities via mobile devices, least frequently doing activities were sending and receiving files from others over 3G, opening files that received over 3G and converting files to other formats. While more than half of the pre-service teachers preferred to use Wi-Fi connection to internet access often or always, 15% of them rated that they receive and sent files to other people over 3G often or always. These results may be explained that pre-service teachers do not prefer to use 3G facilities to connect the internet because of its high cost. Thus, pre-service teachers preferred to connect the internet via Wi-Fi freely especially in the campus. Moreover, pre-service teachers wanted to university administration to expand Wi-Fi area in the campus.

5.2 Mobile Learning Readiness

The first research question was “What is the readiness level of pre-service teachers for mobile learning?” in this section. With this question, the researcher aimed to inspect mobile learning readiness level of pre-service teachers. The findings of the research showed that mobile learning readiness level of pre-service teachers is 2.79. This value shows medium level of mobile learning readiness. Both results of statistical analysis yielded that pre-service teachers in faculty of education were not fully ready for mobile learning and using its applications. Quantitative data analysis reflected that more than two thirds of the pre-service teachers had adequate information about what mobile learning is all about. The result of qualitative analysis was also parallel with the quantitative findings. Qualitative results indicated that pre-service teachers were aware of importance of mobile learning and wanted to benefit more from mobile devices and mobile applications in the educational process. Furthermore, some of pre-service teachers were also aware of the importance of some characteristical features of mobile learning such as GPS and QR code.

Both statistical results reflected that majority of pre-service teachers had enough competence in using mobile learning applications and mobile devices and willing to learn more about mobile devices. Most of them though that they do not encounter any problem while they were using mobile learning devices and applications. Qualitative results were also parallel to these results. According to the qualitative results, most of pre-service teachers used mobile devices and its applications in their life. The pre-service teachers who did not have any mobile devices, use others friends’ mobile devices and interested in what other students did with their mobile devices. Mobile devices and mobile applications were not causing for any usability problems for pre-service teachers. If pre-service teachers encountered with any problems with these, they could solve these problems by oneself or help of their friends.

Quantitative results clearly showed that pre-service teachers’ attitudes towards mobile learning were also positive. Specifically, 75% of the pre-service teachers stated that they would be involved in mobile learning. In addition to these, majority of prospective teachers wanted more technology integrated courses in their curriculum. Qualitative

results were also same line with these findings. According to the qualitative results, pre-service teachers wanted to use online discussion forms, web sites, mobile devices, and mobile applications in their courses.

Quantitative results of the study also showed that more than half of the pre-service teachers preferred to use mobile learning instead of conventional learning because of the some reasons. The findings of the interview were at the same line with these results. According to the interview results, most of pre-service teachers preferred to use mobile learning instead of conventional learning because of the fact that mobile learning made their life easy. Pre-service teachers did not like searching information on books because of the fact that searching information via books was very boring according to them. Thus, convenience of the mobile learning was the main reason for preferred to use mobile learning. Another important reason for preferring mobile learning than conventional learning was immediate feedback. According to the qualitative findings, pre-service teachers were affected immediate feedback feature of mobile learning. They indicated that getting immediate feedback increased their performance. Findings about immediate feedback were similar with the findings in the literature. Wang (2010) developed multiple choice dynamic assessment system. One hundred and sixteen students participated in this research and got immediate feedback via this system. The research findings showed that immediate feedback that was given by system, improved learner performance and made instruction more effective.

Regarding to the attractiveness of mobile learning, quantitative results of the study reflected that most of pre-service teachers consider mobile learning as an attractive activity because of the fact that it saves their learning time. According to the qualitative results, pre-service teachers emphasized that they did not waste their time by dealing with conventional learning because of the fact that mobile learning made their life easy. They thought to perform instructional and casual activities easily via mobile devices. Because of these, mobile learning was a motivated activity for them. Developing teaching and learning process and motivational characteristics of mobile learning were in parallel with the literature. Nordin et al. (2010) reported that mobile learning had developed teaching and learning process and mobile learning activities motivates students and increase interaction between them.

Regarding to the some characteristical features of mobile learning such as convenience and mobility, convenience and mobility features of mobile learning were attract pre-service teachers' beliefs in mobile learning. These were also the major factors to motivate pre-service teachers for mobile learning and make them consider important in the readiness of mobile learning. Qualitative results of the study also supported these findings. According to the qualitative results, most pre-service teachers used mobile devices to reach the information at any time not only in classroom settings but also out of the classroom settings. So, using mobile devices whenever they want increased their motivation towards mobile learning. The finding of relationship between pre-service teachers' beliefs in mobile learning and some special characteristics of mobile learning were in line with the findings of previous research studies (Cheon et al., 2012). Cheon and his colleagues tried to explain how college students' beliefs influenced their intention to adopt mobile devices in their course framework. Structural equation modeling was used to analyze self-report data collected from 177 college students. Cheon and his colleagues in their study found that students who felt that mobile learning is convenient and useful were more likely ready to use mobile devices and mobile learning applications in their coursework. However, it was also found that mobile learning system should be designed by considering the technical limitations of mobile devices such as small screen size or slow network speed. Since, encountering technical problems during the mobile supported education affect students' attitudes towards usefulness of mobile devices negatively. Other researchers in the literature also supported this result. Liu et al. (2010) have investigated that effective usage of mobile devices in lectures affected attitudes towards mobile learning positively and it was also a key factor to convince college students to utilize mobile learning.

Attitude of instructors in university towards using mobile learning was another important topic that was investigated in this study. Quantitative results clearly showed that majority of pre-service teachers would like their instructors in the university had to integrate mobile learning into educational process. These findings were supported by qualitative results. According to the qualitative results, pre-service teachers wanted their instructors to use mobile devices, web sites, online forms, and mobile applications in

their courses. They added that instructors in the university should work together with the application designers to create mobile applications for their course.

In addition to instructor readiness, quantitative data showed that half of the pre-service teachers thought that university infrastructure was not ready for implementing mobile learning. University did not have enough technical and instructional background for implementing mobile learning. The findings of the qualitative results were in the same line with these results. Qualitative results showed that more than half of the pre-service teachers believed that university did not have enough infrastructures for mobile learning. They added that there were no enough mobile devices that were used in mobile learning and Wi-Fi area of campus was limited.

According to the questionnaire results of the study, more than half of pre-service teachers did not know how to use 3G facilities in their mobile phone This was an expected result and consistent with result of internet access part of the questionnaire. According to the internet access part of the questionnaire, the internet access by using 3G facility was preferred to use rarely by the pre-service teachers with respect to internet access by using Wi-Fi facility. Furthermore, more than half of the pre-service teachers stated that they were afraid of spend more money on mobile devices in the questionnaire. This result was also supported by qualitative results. According to the qualitative results, pre-service teachers did not want to pay money for loading applications and buying mobile devices because of its high cost. High cost was one of the most important problems for pre-service teachers in mobile learning context. Both pre-service teachers' inadequate knowledge of using 3G facility of their mobile phone and their reluctance to spend money on mobile learning revealed that pre-service teachers were not ready for mobile learning in economic aspects. Similar results had also been investigated one of another researches conducted by Hussin and his colleagues (2012). They also found that students were uncertain how much mobile learning would cost them if they were adapted to mobile learning. Students did not know how much money they would spend on buying mobile devices or mobile applications and they were doubt about their budget would be enough or not. There were some possible solutions for increasing the budget readiness of pre-service teachers in the literature. For example, Nachmian (2002) stated that university grant provided the

funding to buy popular mobile devices, mobile applications, and IT experts to setup a mobile learning environment accessible from W/H devices. University should agree with IT companies and provide cheap mobile devices for students. Other possible solutions were also seen on http://www. mobl21. com web site under the "Ways to Get Technology into Class Despite Budget Cuts". According to the findings of web site, using free multimedia tools and free mobile learning applications in the coursework were the possible solutions to overcome cost problem of mobile learning.

For overcoming these problems, pre-service teachers offered some suggestions. Pre-service teachers offered that Wi-Fi network should spread on whole campus area. Since, they believed that Wi-Fi was the major component for implementing mobile learning. Secondly, pre-service teachers offered that instructors should be trained for using mobile devices. The IT experts in the faculty should organize seminars with instructors for introducing mobile learning and increasing their competence in mobile learning applications (Ozdamlı, Soykan & Yıldız, 2013). Thirdly, university should work together with IT companies such as Microsoft or Apple for providing free licenses and cheap Tablet PC. Pre-service teachers stated that providing free licenses and cheap Tablet PC improve university infrastructure. The suggestions of pre-service teachers were supported by the findings in the literature. Park and his colleagues (2012) also claimed similar results in their studies for increasing instructor, faculty administration, and faculty infrastructure readiness of mobile learning. A sample of 288 Konkuk university students participated in the research. At the end of the study, Park and his colleagues suggested some recommendations based on the study results. First recommendation was that instructors and faculty administration should increase the students' attention towards to the mobile learning because of the fact that attitudes are the most important factor on the readiness of mobile learning. Second recommendation was that university should inform the students about mobile learning experience was necessary according to the social needs because of the fact that social needs had also impact on mobile learning acceptance. Another recommendation was that university should provide internet connection and inexpensive mobile devices to the students for supporting the usage of mobile learning because of the fact that system accessibility was the important factor on mobile learning acceptance. Lastly, both off-line and online

support should be provided to build up mobile learning. Since online and off-line support increased the students' self-efficacy on mobile learning and positive attitudes towards mobile learning.

5.3 Mobile Learning Acceptance

The second research question was "What is the acceptance level of pre-service teachers to mobile learning?" With this question, the researcher aimed to inspect mobile learning acceptance level of pre-service teachers. The results of analysis in the previous chapter showed that mobile learning acceptance level of pre-service teachers is M=3. 59. This value shows a medium level of mobile learning acceptance.

This study indicated that effect of mobile learning on performance expectancy was at the positive level that is 3.54. Qualitative results also showed that mobile learning helps to improve students' performance and productivity in the educational process. However this result partially supported by quantitative data of the study. Quantitative data analysis indicated that one third of the pre-service teachers were neutral about the positive effect of mobile learning on increasing performance and productivity. The reason for this result was that some pre-service teachers did not have mobile device and have no experience in using mobile devices. On the other hand, Wang et al. (2009) supported the positive correlation between mobile learning and student performance. According to Wang and his colleagues, mobile learning cause changing in students from passive learners to active participants, and make them voluntary engagement in the learning process. In addition to these, this research also indicated that mobile learning supports engaging students in learning from all three aspects such as cognitive, social, and emotive.

Concerning personalization and convenience in reaching information, qualitative results of this study highlighted that mobile learning enables pre-service teachers to reach the information fast and easy. Furthermore, some characteristical features of mobile learning such as pace flexibility and content flexibility also increase learner performance in mobile learning. Learners can adjust pace and content of their learning process via mobile learning. Palloff and Pratt (2001) supported this result. In their book, they inspected that when information technology coupled with more learner-centered

education where students can adopt their learning pace in the process improved the learning. Results of previous studies in mobile learning were similar to these. According to the Evans (2008), mobile learning can be more effective and efficient by increasing the amount of learner control over the learning process. Moreover, he also reported that personalization and interactivity could increase the engagement and comprehension of learner.

Some components that were widely used in mobile learning such as mobile applications, mobile games, GPS, and barcode features also increase pre-service teachers' productivity and performance in mobile learning. These are also motivational for pre-service teachers and attract their attention. Qualitative results of the study indicated that pre-service teachers like using mobile applications that are related to their courses and GPS and barcode features are also interesting for them.

Pre-service teachers' attitude towards mobile learning was also positive in the results of questionnaire. Since, pre-service teachers were aware of benefits of mobile learning in educational process. High performance expectancy also affects attitudes of pre-service teachers towards mobile learning. In the literature of technology-enhanced education, many studies were parallel to this result. According to the results of these studies, there is a positive relationship between performance expectancy and behavioral intention (Chiu and Wang 2008). In one these researches, Agca and Özdemir (2013) investigated that English vocabulary learning system with a mobile device significantly improved learning performance and improving performance cause for increasing motivation and changing attitudes towards mobile learning.

Quantitative data indicated that mobile learning is more motivational learning than traditional learning styles and helps pre-service teachers to accomplish the task easily. Qualitative results also supported these results. According to the qualitative results, when pre-service teachers accomplished the task by using mobile learning, they are motivated lecture more. Saran et al. (2009) investigated similar results. They investigated that using mobile device in instructional settings may help learners to overcome the difficulties and make them more motivated. Moreover, mobile learning encourages learner regular study and breaks their motivational barriers.

Concerning *effort expectancy,* the findings of this study indicated that the degree of ease associated with the use of mobile learning and its components was at the moderate level that is 3.50. The result highlighted that most of pre-service teachers could use mobile learning and its components easily. They generally did not confronted any problem with using of mobile devices. The reason for using mobile learning and its components easily was the result of engaging with computer and other technological devices. Engagement with computers and another technological devices increase their technology competence skills. However, these results were partially supported by quantitative results. Quantitative result of the study showed that more than forth of the pre-service teachers were natural about the convenience of using mobile learning. The possible reason for this result was that some pre-service teachers did not live any mobile learning experience and did not have mobile devices.

Qualitative data showed that most of pre-service teachers preferred mobile learning than conventional learning because of its convenience. While they were out of the classroom environment, they could use mobile devices and applications easily because of their mobility and usability. Motiwalla (2007) reported similar results in the literature. Motiwalla tested mobile learning applications and mobile devices for two semesters with 63 students from undergraduate and graduate courses at his university. Motiwalla reported that students liked convenience, ease of use and mobility factors which allowed them to utilize any dead-time for productive activity.

Even if pre-service teachers did not know how to use new developed mobile applications and mobile devices, they could learn it easily in short time. Interview results also showed that prospective teachers were open to learn more about mobile learning and they were willing to use mobile devices. Prospective teachers stated that they wanted whole lectures in online environment and lectures should be given by mobile devices. Furthermore, they declared that increasing effort for using mobile devices would increase positive attitudes and performance. These results were also similar with results of other studies in the literature. Chiu and Wang (2008) indicated that effort expectancy was positively correlated with performance expectancy and behavioral intention in the e-learning content. In their research, Chiu and Wang inspected that student that has made an effort to use mobile devices in their courses. The

result of the study showed that when the amount of effort to use mobile devices was increased, their motivation toward to the lectures and performance in the educational process were also increased.

Concerning *attitudes towards using technology*, the data gathered from the questionnaire showed that pre-service teachers' attitudes towards using technology were positive to some extent that is 3.65. Both quantitative results and qualitative results indicated that most of pre-service teachers liked the idea of using mobile learning and wanted more technology integrated courses in the university curriculum. Prospective teachers wanted their instructors to integrate technology into their courses and use mobile devices during the learning process. The results of the analysis of pre-service teachers' comments also indicated that they were open to use mobile learning and mobile devices. If faculty administration decided to implement it now, they were eager to use it.

The results of the analysis of pre-service teachers' comments also showed that integrating mobile technologies into educational process made learning process more fun. In the interviews, prospective teachers emphasized that mobile learning was more attractive than conventional learning methods because of the fact that it was convenient and enjoyable. The finding of enjoyable aspect of mobile learning was in line with the findings of previous research studies conducted by Liu (2008). Liu reported that instructional process could cause for pressure on learner. Thus, in order to increase learners' acceptance of mobile learning by making learning activities more enjoyable.

In addition to these, some pre-service teachers declared that they liked playing mobile educational games because of the fact that they are enjoyable and motivational for them. Huizenga et al. (2009) supported the motivational factors and attractiveness of mobile games. They wanted students to play mobile game, which was called as Frequency 1550 to acquire historical knowledge of medieval Amsterdam. According to the results of this study, integration of mobile games into the education was the excellent way for combining education and fun. The students who played this game in the research, both they had fun and engaged more with the instruction.

Moreover, prospective teachers also declared that new mobile characteristical technologies such as GPS and QR coding applications were attractive and mysterious for them. Pre-service teachers thought that GPS and QR coding technologies increased their performance and made easy their life. Pre-service teachers liked using these types of features in the mobile devices and they wanted to use these features in the lectures. In one of the studies, Teo (2008) declared that when pre-service teachers perceived technology as useful tool and using technology increased their performance and effectiveness, they were likely continue using technology and had positive attitudes towards it.

Concerning *behavioral intention*, the data gathered from the questionnaire showed that most pre-service teachers intended to use mobile learning and its application in the future. According to the interview results, most of pre-service teacher thought integrating mobile devices into their teaching process and creating online educational tools such as discussion forms or educational web site for their students in their future occupational life. Most prospective teachers also believed that using mobile learning and mobile devices would increase their job performance in the future. They added that mobile learning and its applications would be more integrated into instruction in the future years so pre-service teachers thought that they had to adopt themselves into developments.

The results of the qualitative and quantitative analysis yielded that pre-service teachers were especially affected from their instructors, peers, and social media in terms of using the mobile devices. They were downloading the applications, which were advised by their friends and instructors. Therefore, instructors and peers played an important role on behavioral intention towards using mobile learning. This result was supported by Wang et al. (2009). They stated that social influence have the significant role in usage intention of mobile learning. When users started to use mobile learning, they might begin to persuade their colleagues and friends to adopt it.

Providing inexpensive mobile devices and adequate technological conditions to the students had also effect on behavioral intention. Increasing the effects of these factors influenced positively on behavioral intention to use mobile learning. Similar results

have been investigated by other studies. Liu (2010) explored mobile learning self-efficacy; major relevance, system accessibility, and subjective norm were identified to have direct or indirect effects on behavioral intention to use mobile learning.

About gender difference in acceptance of mobile learning, there was no significant mean difference between male and female pre-service teacher's mobile learning acceptance scores. This was unexpected for prior researches that explored gender differences in behavioral intention use of computers (Yuen, 2002; Mitra, 2000; Wang, 2009). The prior researches suggest that there was a significant difference in intention to use of computer and e learning in favor of males (Yuen, 2002; Mitra, 2000; Wang, 2009). However, these mobile studies focused on effect of gender on behavioral intention to use of computers. In contrast, the archival survey data for this dissertation was examined to determine if there was a significant difference between male and females in mobile learning acceptance scores.

5.4 Recommendations for Practice

Some recommendations for practice can be given according to the results of the research. The possible recommendations are presented below:

- This study provided comprehensive understanding about pre-service teachers mobile learning readiness and mobile learning acceptance levels. This information may be used by pre-service teachers, faculty staff, and faculty administration for different purposes. For example, faculty staff can develop different strategies in their instruction according to the pre-service teachers' mobile learning readiness levels. Faculty administration may organize seminars for increasing pre-service teachers' mobile learning readiness levels.
- Students are aware of benefits of mobile learning and its applications. Mobile learning increases students' creativity and performance. Students enjoy using mobile devices such as Tablet PC and Mp3 players. Mobile integrated education may be designed in order to take students' attention. Visual, textual, and auditory activities may be added into educational process to improve students'

motivation and attention. Therefore, instructors may integrate mobile applications and games into educational process.

- As students stated that immediate feedback is important in educational process and it is used widely in mobile learning. Embedding immediate feedback into mobile learning motivate learners to study hard and increase their performance on course.
- Creating online activities such as discussion forum, Moodle, or wiki for students with the support of technical support group. Instructor may let students discuss about the course topics via online activities.
- Technical components of mobile learning and mobile learning applications are expensive tools, so students cannot afford to buy it. University may work together with IT companies such as Microsoft or Apple for delivering mobile applications, tablets on free to the students.

5.5 Recommendations for Further Research Studies

It is possible to provide some recommendations for further studies related to mobile learning environments.

Firstly, mobile learning acceptance and mobile learning readiness of pre-service teachers were analyzed in this research. Another study can be conducted to examine pre-service teachers' attitudes towards mobile learning and perceptions about mobile learning. How students' perceptions on mobile learning applications and mobile learning devices and also attitudes towards using mobile learning and instruction through mobile learning are in need of further study.

Secondly, participants of the study were pre-service teachers from faculty of education of Middle East Technical University. The same study can be conducted with pre-service teachers who studying on faculty of education of other universities in Turkey. This may lead to comparison of mobile learning acceptance and mobile learning readiness levels of among students in different universities.

Thirdly, in this research, mobile learning acceptance and mobile learning readiness of pre-service teachers were examined. Another study can be conducted with instructors to analyze instructors' mobile learning acceptance and mobile learning readiness. The readiness and acceptance level of mobile learning of instructors can affect the performance and attitudes of students towards mobile learning.

REFERENCES

Abas, Z. W. , Peng, C. L. , & Mansor, N. (2009). A study on learner readiness for mobile learning at Open University Malaysia. IADIS International Conference e-Learning 2009.

Agca, R. K., & Özdemir, S. (2013). Foreign Language Vocabulary Learning with Mobile Technologies. Procedia-Social and Behavioral Sciences, 83, 781-785.

Alexander, B. (2004). Going nomadic: Mobile learning in higher education. Educause review, 39(5), 29-35

Ally, M. (Ed.). (2009). Mobile learning: Transforming the delivery of education and training. Athabasca University Press.

Aydin, C. , & Tasci, D. (2005). Measuring Readiness for e-Learning: Reflections from an Emerging Country. Educational Technology & Society, 8(4), 244-257.

BenMoussa, C. (2003). Workers on the move: New opportunities through mobile commerce. Stockholm Mobility Roundtable, 22-23.

Borotis, S. A. , & Poulymenakou, A. (2004). E-learning readiness componenents. Proceedings of World Conference on E-learning in Cooperate, Government, Healthcare,and Higher Education 2004, (pp. 1622-1629). Washington DC.

Caudill, J. (2007). The growth of m-learning and the growth of mobile computing: Parallel developments. International Review of Research in Open and Distance Learning, 8(2).

Chen, C. M. , & Chung, C. J. (2008). Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle. Computers & Education, 51(2), 624-645. http://dx. doi. org/10. 1016/j. compedu. 2007. 06. 011

Cheon, J. , Lee, S. , Crooks, S. M. , & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. Computers & Education, 59(3), 1054-1064. doi:10. 1016/j. compedu. 2012. 04. 015

Chiu, C. M. , & Wang, E. T. (2008). Understanding Web-based learning continuance intention: The role of subjective task value. Information & Management, 45(3), 194-201.

Copley, J. (2007). Audio and video podcasts of lectures for campus-based students: production and evaluation of student use. Innovations in Education and Teaching International, 44(4), 387–399.

Corbeil, J. R. , & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning? Educause Quarterly, 30(2), 51–58.

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quart. 13 319–339.

Dholakia, R. , & Dholakia, N. (2004). Mobility and Markets: Emerging outlines of m-commerce. Journal of Business Research, 57(12), 1391-1396.

Dias, J. (2002). Cell phones in the classroom: boon or bane? Part 2. Calling Japan, 10(3), 8-14. http://jaltcall. org/cjo/10_1. pdf.

Donaldson, R. L. (2010). Student acceptance of mobile learning. (Order No. 3483638, The Florida State University). ProQuest Dissertations and Theses, , 168. Retrieved from http://search. proquest. com/docview/ 902631958? Accounted =13014. (902631958).

Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in higher education. Computers & Education, 50(2), 491–498.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research.

Frohberg, D. D. , Goth, C. C. , & Schwabe, G. G. (2009). Mobile Learning Projects--A Critical Analysis of the State of the Art. Journal Of Computer Assisted Learning, 25(4), 307-331.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. The Internet and Higher Education, 19, 18-26.

Griffin, G. (2011). Ten Tips for Designing Mobile Learning Content. Retrieved November, 6, 2013 from http://www. learningsolutionsmag. com/articles/700/

Hair, J. F. Jr. , Anderson, R. E. , Tatham, R. L. , & Black, W. C. (1998). Multivariate Data Analysis, (5thEdition). Upper Saddle River, NJ: Prentice Hall.

Hefling, K. (2012). Obama administration's challenge to schools: Embrace digital textbooks within 5 years. Huffington Post. Retrieved from http://www. huffingtonpost. com/2012/02/01/challenge-to-schoolsembr_n_1248196. html.

Herrero Crespo, Á. , & Rodríguez del Bosque, I. (2008). The effect of innovativeness on the adoption of B2C e-commerce: A model based on the Theory of Planned Behaviour. Computers In Human Behavior, 24(6), 2830-2847. doi:10. 1016/j. chb. 2008. 04. 008

Howard, M. S. (2006). Interactive Training on Mobile Devices Training Using Text-to-speech and Speech Recognition, on Pocket PC PDA. MSc Multimedia Computing.

Hsu, Y. C., & Ching, Y. H. (2013). Mobile computer-supported collaborative learning: A review of experimental research. British Journal of Educational Technology, 44(5), E111-E114.

Huizenga, J. J. , Admiraal, W. W. , Akkerman, S. S. , & Dam, G. (2009). Mobile game-based learning in secondary education: engagement, motivation and learning in a mobile city game. Journal Of Computer Assisted Learning, 25(4), 332-344. doi:10. 1111/j. 1365-2729. 2009. 00316. x

Hussin, S. , Manap, M. , Amir, Z. , & Krish, P. (2012). Mobile Learning Readiness among Malaysian Students at Higher Learning Institutes. Asian Social Science, 8(12), 276-283. doi:10. 5539/ass. v8n12p276.

India, Mobl21 Community [Web log post] . (2011, July 13). Ways to Get Technology into Class Despite Budget Cuts. Retrieved September 11, 2013, from http:// http://www. mobl21. Com

Ivankova, N. V. , Creswell, J. W. , & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. Field Methods, 18(1), 3-20.

Jacob, S. M. , & Issac, B. (2008). The Mobile Devices and its Mobile Learning Usage Analysis. International Journal of Interactive Mobile Technology, 2(1), 10-18.

Jairak, K. , Praneetpolgrang, P. , & Mekhabunchakij, K. (2009, December). An acceptance of mobile learning for higher education students in Thailand. In Sixth International Conference on eLearning for Knowledge-Based Society, Thailand (pp. 17-18).

JISC (2005). Case Studies of Innovative Practice: Wireless and Mobile Learning. Project led byAgnes Kukulska-Hulme at The Institute of Educational Technology, The Open University, UK. Retrieved February 14, 2007 from:http://www. jisc. ac. uk/whatwedo/programmes/ elearning_innovation/ eli_oucasestudies. asp

Karmakar, C. K. , & Wahid, C. M. (2000). Recommendations for Bangladesh towards e-learning readiness. Department of computer science. Shah Jalal University of science and technology.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. Research in Learning Technology, 20(1).

Keller, J. (2011). The slow-motion mobile campus. Chronicle of Higher Education, 57(36), B4-B6.

Kim, J-O. and Mueller, C. W. (1978), Factor Analysis: Statistical Methods and Practical Issues, Quantitative Applications in the Social Sciences Series, No. 14, Sage, Thousand Oaks, CA.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental detectives: PDAs as a window into a virtual simulated world. In Wireless and Mobile Technologies in Education, 2002. Proceedings. IEEE International Workshop on (pp. 95-98). IEEE.

Klopfer E. & Woodruff E. (2002) The impact of distributed and ubiquitous computational devices on the collaborative learning environment. Proceedings from the Annual CSCL Conference, January 2002, Boulder, CO, p. 702.

Klopfer, E., & Squire, K. (2008). Environmental Detectives—the development of an augmented reality platform for environmental simulations. Educational Technology Research and Development, 56(2), 203-228.

Kumar, A., Tewari, A., Shroff, G., Chittamuru, D., Kam, M., & Canny, J. (2010, April). An exploratory study of unsupervised mobile learning in rural India. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 743-752). ACM.

Lam, J., Yau, J., & Cheung, S. K. (2010). A review of mobile learning in the mobile age. In Hybrid Learning (pp. 306-315). Springer Berlin Heidelberg.

Leung, C. H. , & Chan, Y. Y. (2003, July). Mobile learning: a new paradigm in electronic learning. In Advanced Learning Technologies, 2003. Proceedings. The 3rd IEEE International Conference on (pp. 76-80). IEEE.

Liu, Y. , Li, H. , & Carlsson, C. (2010). Factors driving the adoption of m-learning: an empirical study. Computers & Education, 55(3), 1211–1219.

Lopes, C. T. (2007). Evaluating e-learning readiness in a health sciences higher education institution. In Proceedings of IADIS International Conference of E-learning, Porto.

Mac Callum, K., & Jeffrey, L. (2013). The influence of students' ICT skills and their adoption of mobile learning. Australasian Journal of Educational Technology, 29(3).

Martin, F., & Ertzberger, J. (2013). Here and now mobile learning: An experimental study on the use of mobile technology. Computers & Education, 68, 76-85.

Mcconatha, D. , Praul, M. , & Lynch, M. J. (2008). Mobile learning in higher education: An empirical assessment of a new educational tool. The Turkish Online Journal of Educational Technology, 7(3), 15-21.

Min, Q. , Ji, S. , & Qu, G. (2008). Mobile commerce user acceptance study in China: a revised UTAUT model. Tsinghua Science & Technology, 13(3), 257-264.

Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. Computers & Education, 49(3), 581-596. doi:10. 1016/j. compedu. 2005. 10. 011

Motlik, S. (2008). Mobile learning in developing nations. The International Review of Research in Open and Distance Learning, 9(2). Retrieved from http://www. irrodl. org/ index. php/irrodl/article/view/564/1071

Nachmian, R. (2002). A research framework for the study of a campus-wide web-based academic instruction project. Computers and Education, 5(3), 213–229.

Nagella, U. B. , & Govindarajulu, P. (2008). Adaptive Approaches to Context Aware Mobile Learning Applications. International Journal of Computer Science and Security, 2(2), 15.

Norazah Nordin, Mohamed Amin Embi, Ruhizan M Yasin, Saemah Rahman, & Melor Md. Yunus. (2010). The Mobile Learning Readiness of the Post-Graduate Students, 2010 EABR & ETLC Conference Proceedings. Dublin, Ireland.

O'Malley, C. , Vavoula, G. , Glew, J. P. , Taylor, J. , Sharples, M. , & Lefrere, P. (2003). MOBIlearn WP4–Guidelines for learning/teaching/tutoring in a mobile environment. Retrieved February, 14, 2012.

Ozdamli, F., Soykan, E., & Yıldız, E. P. (2013). Are Computer Education Teacher Candidates Ready for M-Learning?. Procedia-Social and Behavioral Sciences, 83, 1010-1015.

Park, N. , Roman, R. , Lee, S. , & Chung, J. E. (2009). User acceptance of a digital library system in developing countries: An application of the Technology Acceptance Model. International Journal of Information Management, 29(3), 196-209.

Park, Y. (2011). A Pedagogical Framework for Mobile Learning: Categorizing Educational Applications of Mobile Technologies into Four Types. International Review of Research in Open & Distance Learning, 12(2).

Park, S. , Nam, M. , & Cha, S. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. British Journal Of Educational Technology, 43(4), 592-605. doi:10. 1111/j. 1467-8535. 2011. 01229. x

Rau, P. L. P. , Gao, Q. , & Wu, L. M. (2008). Using mobile communication technology in high school education: Motivation, pressure, and learning performance. Computers & Education, 50(1), 1-22.

Perraton, H. (2000). Rethinking the research agenda. The International Review of Research in Open and Distance Learning, 1(1).

Phuangthong, D. , & Malisawan, S. (2005). A study of behavioral intention for 3G mobile Internet technology: Preliminary research on mobile learning. In Proceedings of the Second International Conference on eLearning for Knowledge-Based Society (pp. 17-1).

Pierson, M. E. (2001). Technology integration practice as a function of pedagogical expertise. Journal of Research on Computing and Education, Summer, 3(4),413-430.

Preece, J. (2000). Online communities: Designing usability and supporting socialbilty. John Wiley & Sons, Inc.

Preedy, V. R. , & Watson, R. R. (2009). Handbook of Disease Burdens and Quality of Life Measures. New York: Springer.

Radinsky, J., Bouillion, L., Lento, E. M., & Gomez, L. M. (2001). Mutual benefit partnership: a curricular design for authenticity. Journal of curriculum studies, 33(4), 405-430.

Quinn, C. (2000). mLearning: mobile, wireless, in-your-pocket learning. LiNE Zine, 2006.

Rahamat, R., Shah, P., Din, R., & Aziz, J. A. (2011). Students' readiness and perceptions towards using mobile technologies for learning the English language literature components. Retrieved August, 31, 2012.

Roberts, J. , Beke, N. , Janzen, K. , Mercer, D. , & Soetaert, E. (2003). Harvesting fragments of time: Mobile learning pilot project. Final Report, May, 1, 2003.

Rodrigues, S. (2006). Pedagogic practice integrating primary science and elearning: the need for relevance, recognition, resource, reflection, readiness and risk. Technology, Pedagogy and Education, 15(2), 175-189.

Roschelle, J. J. (2003). Keynote paper: Unlocking the learning value of wireless mobile devices. Journal Of Computer Assisted Learning, 19(3), 260. doi:10. 1046/j. 0266-4909. 2003. 00028. x

Schreurs, J. , Ehler, U. , & Moreau, R. (2008). Measuring e-learning readiness. Retrieved December 28, 2010 from http://www. uhdspace. uhasselt. be/dspace/ bitstream/ 1942/8740/1/icl08. pdf.

Schwabe, G. , & Göth, C. (2005). Mobile learning with a mobile game: design and motivational effects. Journal of Computer Assisted Learning, 21(3), 204–216.

Seong, D. S. K. (2006, October). Usability guidelines for designing mobile learning portals. In Proceedings of the 3rd international conference on Mobile technology, applications & systems (p. 25). ACM.

Sharples, M. , Corlett, D. , Bull, S. , Chan, T. , & Rudman, P. (2005). The student learning organiser. Mobile learning: A handbook for educators and trainers, 139-149.

Sharples, M. , Taylor, J. , & Vavoula, G. (2005). Towards a theory of mobile learning. Proceedings of mLearn 2005, 1(1), 1-9.

Sharples, M., Lonsdale, P., Meek, J., Rudman, P. D., & Vavoula, G. N. (2007, October). An evaluation of MyArtSpace: A mobile learning service for school museum trips. In Proceedings of 6th Annual Conference on Mobile Learning, mLearn (Vol. 2007).

Shudong, W. , & Higgins, M. (2006, November). Limitations of mobile phone learning. In Wireless and Mobile Technologies in Education, 2005. WMTE 2005. IEEE International Workshop on (pp. 3-pp). IEEE.

Smørdal, O. , & Gregory, J. (2005). KNOWMOBILE: mobile opportunities for medical students. In A. Kukulska-Hulme & J. Traxler (Eds.) Mobile Learning: A handbook for educators and trainers (pp. 99-105). London: Routledge.

Spencer, A. , & Hughan, C. (2008). Podcasting: A fad with a future. Australian Library and Information Association, 1-16.

Stockwell, G. (2008). Investigating learner preparedness for and usage patterns of mobile learning. ReCALL, 20(3), 253-270.

Sugar, W., Crawley, F., & Fine, B. (2004). Examining Teachers' Decisions To Adopt New Technology. Educational Technology & Society, 7(4), 201-213.

Taylor, J. (2010). A theory of learning for the mobile age. In Medienbildung in neuen Kulturräumen (pp. 87-99). VS Verlag für Sozialwissenschaften.

Teo, T. , & Lee, C. (2008). Attitudes towards computers among students in higher education: A case study in Singapore. British Journal Of Educational Technology, 39(1), 160-162. doi:10. 1111/j. 1467-8535. 2007. 00724. x

Terras, M. M. , & Ramsay, J. (2012). The Five Central Psychological Challenges Facing Effective Mobile Learning. British Journal Of Educational Technology, 43(5), 820-832.

Thornton, P. , & Houser, C. (2005). Using mobile phones in English education in Japan. Journal of Computer Assisted Learning, 21, 217–228.

Valk, J. , Rashid, A. T. , & Elder, L. (2010). Using Mobile Phones to Improve Educational Outcomes: An Analysis of Evidence from Asia. International Review Of Research In Open And Distance Learning, 11(1), 117-140.

Venkatesh, V.; Davis, F. D. (2000), "A theoretical extension of the technology acceptance model: Four longitudinal field studies", Management Science, 46(2): 186–204

Venkatesh, V. (2000), "Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model", Information systems research 11 (4), pp. 342–365

Venkatesh, V. , Morris, M. G. , Davis, G. B. , & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Virvou, M. , & Alepis, E. (2005). Mobile educational features in authoring tools for personalised tutoring. Computers & Education, 44(1), 53-68.

Visser, L. , & West, P. (2005). The promise of m-learning for distance education in South Africa and other developing nations. Trends and issues in distance education: International perspectives, 131-136.

Wang, M. , Shen, R. , Novak, D. , & Pan, X. (2009). The impact of mobile learning on students' learning behaviours and performance: Report from a large blended classroom. British Journal of Educational Technology, 40(4), 673-695. doi:10. 1111/j. 1467-8535. 2008. 00846. x

Wang, T. H. (2010). Web-based dynamic assessment: taking assessment as teaching and learning strategy for improving students' e-Learning effectiveness. Computers & Education, 54(4), 1157–1166.

Wang, Y. S. ,Wu, M. C. , &Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. British Journal of Educational Technology, 40(1), 92–118.

Wu, P. , Hwang, G. , Su, L. , & Huang, Y. (2012). A Context-Aware Mobile Learning System for Supporting Cognitive Apprenticeships in Nursing Skills Training. Journal Of Educational Technology & Society, 15(1), 223-236.

Wang, Y. K. (2004). Context awareness and adaptation in mobile learning. InWireless and Mobile Technologies in Education, 2004. Proceedings. The 2nd IEEE International Workshop on (pp. 154-158). IEEE.

Yu-Liang Ting, R. (2005, July). Mobile learning: current trend and future challenges. In Advanced Learning Technologies, 2005. ICALT 2005. Fifth IEEE International Conference on (pp. 603-607). IEEE.

APPENDIX A

QUESTIONNAIRE

Mobile Learning Readiness and Mobile Learning Acceptance Survey

Dear Student,

This study investigates pre-service teachers' mobile learning readiness and attitudes toward mobile learning at Middle East Technical University. The information you will provide with this survey is valuable for us. There is no right or wrong answers in the survey. You do not need to write any information that indicates your identity. The information gathered through this survey will be kept strictly confidential. Thank you for your contributions and cooperation.

Prof. Dr. Zahide YILDIRIM
Res. Assist. Ahmet İLÇİ
For contact: ailci@metu. edu. tr

SECTION A. Background Information (Please answer this section)

Direction: Please respond to the following statements by marking (√) an option in a space next to the options.

1-Gender:

a. Male ____ b. Female ____

2-Year of Study:

a. 1st year _____ b. 2nd year _____ c. 3rd year _____ d. 4th year ____ e. 5th year ____

3-Department:

a) Chemistry Education Program ____

b) Computer Education and Instructional Technology ____

c) Early Childhood Education ____

d) Elementary Mathematics Education ____

e) Elementary Science Education ____

f) English Language Teaching ____

g) Physics Education Program ____

4. Grade Point Average (GPA): ____

5. Age:

a) 17-20 ____ **b)** 21-25 ___ **c)** 26-30 ____ **d)** 31-35 ____ **e)** more than 35 ____

6. Do you have smart phone?

a) Yes _____ **b)** No_____

7. Do you have a Tablet PC?

a) Yes _____ **b)** No_____

8. Does your Tablet PC have Internet connection? (Skip this item if you do not have a Tablet PC)

a) Yes _____ **b)** No_____

SECTION B. Mobile Facilities (Please answer this section)

Direction: Please respond to the following statements by marking (√) an option [(1) Yes or (2) No].

No.	Statements	(1) Yes	(2) No
1.	Do you have a mobile phone?	○	○
2.	Does your mobile phone have 3G service?	○	○
3.	Does your mobile phone have 4G service?	○	○
4.	Does your mobile phone have MMS service?	○	○
5.	Does your mobile phone have a video call service?	○	○
6.	Have you ever used a video call with your mobile phone?	○	○
7.	Does your mobile phone have Internet access?	○	○
8.	Does your mobile phone have a memory card that can store digital files?	○	○
9.	Can your mobile phone read/open up the following files?		
	a. Word document	○	○
	b. PDF document	○	○
	c. Excel document	○	○
	d. Power Point document	○	○
	e. Video files	○	○
	f. Audio files	○	○
	g. Photos/graphics	○	○

SECTION C: Internet Access (Please skip this section if your mobile phone DOES NOT have Internet or Wi-Fi access facility)

Direction: If your mobile phone has an access to the Internet, please respond to the following statements by marking (√) an option [(1) Never, (2) Rarely, (3) Sometime, (4) Often, or (5) Always].

No.	Statements	1	2	3	4	5
		Never	Rarely	Sometime	Often	Always
1.	I have subscribed to the Internet line using my mobile phone.	○	○	○	○	○
2.	I have used Wi-Fi facility to access the Internet.	○	○	○	○	○
3.	I have sent/received email via mobile phone.	○	○	○	○	○
4.	I have downloaded files from the Internet using my mobile phone.	○	○	○	○	○
5.	I have sent files to other people over 3G.	○	○	○	○	○
6.	I have opened up file that I received over 3G in my mobile phone.	○	○	○	○	○
7.	I have used mobile phone to send messages using MMS.	○	○	○	○	○
8.	I have received files over 3G.	○	○	○	○	○
9.	I know how to convert PowerPoint files into other formats	○	○	○	○	○

10.	I have shared the Internet line between my mobile phone and my computer using Bluetooth facility in my mobile phone.	○	○	○	○	○
11.	I have accessed my Facebook and/or other social networking sites using my mobile phone.	○	○	○	○	○
12.	I read online news using my mobile phone.	○	○	○	○	○

SECTION D: Mobile Learning Readiness

Direction: Please respond to the following statements by marking (√) an option [(1) Strongly disagree, (2) Disagree, (3) Agree, (4) Strongly Agree, or (5) Not applicable] that reflects you the most.

No.	**Statements**	**1**	**2**	**3**	**4**	**5**
		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**Not Applicable**
1.	I know what mobile learning is all about.	○	○	○	○	○
2.	I want to know more about mobile	○	○	○	○	○
3.	I don't think I want to be involved in mobile	○	○	○	○	○
4.	I prefer conventional learning than mobile learning.	○	○	○	○	○
5.	I think mobile learning is good for	○	○	○	○	○

6.	I don’t mind paying extra money for	○	○	○	○	○
7.	Mobile learning will make my life difficult.	○	○	○	○	○
8.	I am not ready for mobile learning if the	○	○	○	○	○
9.	I would like my instructor to integrate mobile learning in my class in addition to face-to-face meetings in the class.	○	○	○	○	○
10.	I am afraid I will spend more money on my mobile devices (mobile phone Tablet PC etc.) bill because of mobile learning.	○	○	○	○	○
11.	I will be ready for mobile learning after 2 years.	○	○	○	○	○
12.	I don’t know how to use 3G facility in my mobile devices (mobile phone, Tablet PC etc.).	○	○	○	○	○

13.	I would like my instructor to integrate mobile learning in my class besides online forum in my course.	○	○	○	○	○
14.	Mobile learning will save my learning time.	○	○	○	○	○
15.	Mobile learning is an alternative to web based learning.	○	○	○	○	○
16.	I need to learn how to use my mobile devices(mobile phone, Tablet PC etc.). for mobile learning.	○	○	○	○	○
17.	I am looking forward to engage in mobile learning.	○	○	○	○	○
18.	I will upgrade my mobile devices (mobile phone, Tablet PC etc.) , if mobile learning is going to be implemented in my courses.	○	○	○	○	○
19.	Mobile learning is an alternative to conventional learning.	○	○	○	○	○

20.	I think my university is not ready for mobile learning using mobile devices (mobilephone,Tablet PC etc.)facilities.	○	○	○	○	○
21.	Some of my instructors are already integrating mobile learning in their teaching.	○	○	○	○	○

Section E :Mobile Learning Acceptance

Direction: Please respond to the following statements by marking (√) an option [(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, or (5) Strongly Agree] that reflects you the most.

No.	Statements	1	2	3	4	5
		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1.	Mobile Learning is useful for education overall.	○	○	○	○	○
2.	Using mobile learning enables me to accomplish the tasks more quickly.	○	○	○	○	○
3.	Using mobile learning improves my performance in online.	○	○	○	○	○
4.	Using mobile learning increases my productivity.	○	○	○	○	○
5.	Mobile Learning is easy to use.	○	○	○	○	○
6.	My interaction with mobile learning would be clear and	○	○	○	○	○
7.	Learning to operate the mobile	○	○	○	○	○
8.	Using mobile learning is a good idea.	○	○	○	○	○
9.	I like the idea of using mobile learning.	○	○	○	○	○
10.	Working with mobile learning is fun.	○	○	○	○	○

11.	I intend to use mobile learning in the future.	○	○	○	○	○
12.	I predict I would use mobile learning in the	○	○	○	○	○
13.	I plan to use mobile learning in the future.	○	○	○	○	○

Thank you very much for your participation!

APPENDIX B

INTERVIEW QUESTIONS

1- Mobil öğrenme uygulamalarının eğitim ve öğretimde kullanılmasının yararlı olacağını düşünüyor musunuz? Neden, açıklayabilir misiniz?

2- Mobil öğrenme uygulamalarını kullanmanın performansınızı ve yaratıcılığınızı artıracağını düşünüyor musunuz? Neden, açıklayabilir misiniz?

3- Mobil öğrenme uygulamaları kullandınız mı? Kullandıysanız ne tür zorluklarla karşılaştınız?

4- Çevrenizde mobil öğrenme uygulamalarının kullanımı konusunda sizi etkileyenler oldu mu? Olduysa bu kişiler kimler? Nasıl, açıklayabilir misiniz

5- Çevrenizden mobil öğrenme uygulamalarının kullanımı konusunda herhangi bir öneri aldınız mı? (Eğer cevap evet ise) Hangi kişilerden aldınız? Ne tür öneriler aldınız?

6- Mobil öğrenme konusunda kendinizi hazır ve yeterli görüyor musunuz? Neden, açıklayabilir misiniz?

7- Üniversitenizin (ODTÜ) (öğretim elemanları, teknik destek grubu, teknik ekipman vb.) mobil öğrenme konusunda yeterli olduğunu düşünüyor musunuz? Neden, açıklayabilir misiniz? Eğer yeterli değilse yeterli bir konuma getirmek için neler yapılabilir?

8- Mobil öğrenme (uygulamaları,ortamları,araçları) size çekici geliyor mu? Neden, açıklayabilir misiniz?

9- Gelecekte mobil öğrenme uygulamalarını/ortamlarını kullanmayı düşünüyor musunuz? Neden, açıklayabilir misiniz?

10- Kendini mobil öğrenme uygulamalarını/ortamlarını kullanma konusunda hazır hissediyor musun? Neden, açıklayabilir misini?

APPENDIX C

CODES AND THEMES IN THE INTERVIEW

Table C.1 Coding Schema for Interview

Support Learning	Time and Place Independency
	Ease of Use
	Pace and Context Independency
	Immediate Feedback
	Enjoyment and Explorations
Barriers	Hardware Problems
	Small Screen Size
	Cost and Compatibility Issues
	Design Problems
	Abusing
Social Influence	Peer
	Instructors
	Social Media
Readiness Level	Students Readiness Levels
	Instructors Readiness Levels
	University Readiness Level
Suggestions	Peer
	Instructors
	University
Behavioral Intention	Future Use