MOBILE TECHNOLOGIES AND THEIR INTENTION TO USE FOR LEARNING AMONG STUDENTS AT MALAYSIAN TECHNICAL UNIVERSITIES

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A thesis submitted in fulfillment of the requirement for the award of the Master of Science of Technology Management

Faculty of Technology Management and business
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SEPTEMBER 2016
DEDICATION

For my beloved mother and father and sister
ACKNOWLEDGEMENT

First and foremost, I would like to express my gratitude to ALLAH for His abundant grace that I am able to be what I am today. I would like to express my sincere appreciation to my supervisor, DR. NG KIM SOON, for his support, enthusiastic guidance, invaluable help and encouragement throughout the duration of this research. His comments and suggestions given during the duration of this project were gratefully acknowledged. His patience and availability for any help and support is very much appreciated too.

Heartfelt appreciation is also expressed to my parents without their continuous support in and encouragements couldn’t be able conducted this research. I may never have overcome this long journey in my studies without you.

Apart from that I would like to thank anyone who have contributed anything during conducting this research, I wish all of you have a good endeavor in your life journey and future

Mohamud Ahmed Ibrahim
ABSTRACT

Mobile technologies are developing rapidly among Malaysians. They offer more than just communicating. There are number of innovative features that are crucial and impactful offer by this technology for learning. It varies from tradition face to face learning due to its portability, accessibility, interaction, motivation, collaboration. However, mobile-learning is at its embryonic stage in this country, so much so that studies and research initiatives are critically needed to be undertaken. Thus, the aim of this study was to investigate the factors influencing intention to use m-learning among students at the Malaysian technical universities. The research framework for this research has been adapted from the unified theory of acceptance and use of technology (UTAUT). A total of 400 sets of data was collected from four Malaysian technical universities using the random sampling method. It was found that Performance expectancy, Perceived Playfulness, Self-management of learning have positive significant influence to predict behavioral intention to use m-learning, while social influence and effort expectancy show negative influence towards behavioral intention, performance expectancy, self-management of learning and effort expectancy show positives significance influence toward user satisfaction, while social influence and perceived playfulness showed negatives significance influence towards user satisfaction. On the other hand, it was found that user satisfaction partially mediates factors influencing intention to use and m-learning and behavioral intention to use m-learning. The findings of this study added new understanding as regard to factors influencing students' intention to use m-learning in higher education.
ABSTRAK

TABLE OF CONTENTS

TITLE i
DECLARATION ii
DEDICATION iii
ACKNOWLEDGEMENT iv
ABSTRACT v
ABSTRAK vi
CONTENTS vii
LIST OF TABLE xi
LIST OF FIGURE xii
LIST OF ABBREVIATION xiii

CHAPTER 1 INTRODUCTION

1.1 Introduction 1
1.2 Background of the Study 1
1.3 Problem Statement 4
1.4 Research Questions  7
1.5 Research Objectives  8
1.6 Significance of the Study  8
1.7 Scope of the Research  9
1.8 Key Definitions  9
1.9 Thesis Organizational Structure  10

CHAPTER 2 LETREURE REVIEW

2.1 Introduction  12
2.2 M-learning Classification from Other Learning  13
2.3 Mobile Learning Definitions  16
2.4 The Usefulness of Mobile Learning in Higher Education  18
2.5 Mobile Limitation for Learning  21
2.6 M-learning trend in Malaysia  22
2.7 M-learning Behavioral Intention to Use  24
2.8 Theoretical Background "Unified Theory of Acceptance and Use of Technology Model (UTAUT)"  29
2.9 Factors Influencing intention to use mobile technologies for learning  32
2.10 Summary  38

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction  39
3.2 Research Framework  40
3.3 Research Hypothesis  41
3.4 Research Design  42
| 3.5 | Target Population and Sample Size | 42 |
| 3.6 | Research Instrument | 44 |
| 3.7 | Data Collection | 47 |
| 3.8.1 | Descriptive Statistics | 47 |
| 3.8.2 | Reliability Analysis | 48 |
| 3.8.3 | Structural Equation Modeling | 49 |
| 3.9 | Pilot Study | 50 |
| 3.10 | Summary | 51 |

**CHAPTER 4 DATA ANALYSIS**

| 4.1 | Introduction | 52 |
| 4.2 | Reliability Test | 53 |
| 4.3 | Demographic Profile | 53 |
| 4.4 | Mean Difference | 56 |
| 4.6 | Normality Test | 57 |
| 4.7 | Mean and Standard Deviation | 58 |
| 4.8 | Measurement of Model Fit | 59 |
| 4.9 | Hypothesis Testing | 60 |
| 4.11 | Summary | 64 |

**CHAPTER 5 DISCUSSION AND CONCLUSIONS**

| 5.1 | Introduction | 65 |
| 5.2 | Discussion on the Research Objectives | 65 |
| 5.2.1 | Objective 1&2: The level of behavioral intention to use M-learning | 66 |
5.2.2 Objective 3: Factors Influencing Intention to M-learning 67
5.2.3 Objective 5: Mediation test 71
5.3 Research Contribution 72
5.4 Research Limitation and Direction for Future Researchers 73
5.5 Conclusion 74
REFERENCES 75
APPENDICES 87
LIST OF TABLE

Table 2.1: M-learning Definitions 17
Table 2.2: previous researches on M-learning intention to use 26
Table 3.1: Table for determining sample size from a given population 43
Table 3: Research Instrument 46
Table 3.5: Reliability Coefficient Value 51
Table 4.1: Reliability of Measurements 53
Table 4.2: Demographic Profile 55
Table 4.3: One-way ANOVA test 56
Table 4.4: Normality Test 57
Table 4.5: Descriptive Statistics 58
Table 4.6: Standardized estimation of model fit 60
Table 4.7: Coefficient for indirect, direct and total effects of the causal relationships 62
Table 4.8: Summary of the hypothesis result 63
LIST OF FIGURES

Figure 2.1: Learning Categories (Brown, T. H. 2003). 15
Figure 2.2: The UTAUT model. (Venkatesh et al., 2003). 30
Figure 2.3: Extended by Wang, Wu and Wang, (2009) 31
Figure 3.1: Research Framework. 40
Figure 4.1: Measurement of the Model Fit 60
### LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>M-Learning</td>
<td>Mobile Learning</td>
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<td>E-Learning</td>
<td>Electronic Learning</td>
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<td>UTAUT</td>
<td>Unified Theory of Acceptance and Use of Technology</td>
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<td>IS</td>
<td>Information Systems Success</td>
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<td>TAM</td>
<td>Technology Acceptance Model</td>
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<td>TPB</td>
<td>Theory Of Planned Behavioral</td>
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<td>TRA</td>
<td>Theory of Reasoned Action</td>
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<td>MM</td>
<td>Motivational Model</td>
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<td>MPCU</td>
<td>Model of PC Utilization</td>
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<td>ITD</td>
<td>Innovation Diffusion Theory</td>
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<td>SCT</td>
<td>Social Cognitive Theory TAM</td>
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<td>(C-TAM-TPB)</td>
<td>Technology Acceptance Model and Theory Of Planned Behavioral</td>
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<td>PDA</td>
<td>Personal Digital Assistant</td>
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<td>MCMC</td>
<td>Malaysian Communication and Multimedia Commission</td>
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<td>PSPTN</td>
<td>National Higher Education Strategic Plan</td>
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<td>NKRA</td>
<td>National Key Result Areas</td>
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<td>MOHE</td>
<td>Ministry of Higher Education of Malaysia</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>MTUN</td>
<td>Malaysian Technical University Network</td>
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<td>UniMAP</td>
<td>Universiti Malaysia Perlis</td>
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<td>UTeM</td>
<td>Technical University of Malaysia Malacca</td>
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<td>UTHM</td>
<td>Universiti Tun Hussein Onn Malaysia</td>
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<td>UMP</td>
<td>Universiti Malaysia Pahang</td>
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<td>PU</td>
<td>Performance Expectancy</td>
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<td>Effort Expectancy</td>
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<td>Social Influence</td>
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<td>Perceived Playfulness</td>
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<td>Behavioral Intention</td>
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<td>US</td>
<td>User Satisfaction</td>
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<td>ICT</td>
<td>Information Computer Technology</td>
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<td>SEM</td>
<td>Structure Equation Modeling Using</td>
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<td>SPSS</td>
<td>Statistical Package for Social Science</td>
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<td>H</td>
<td>Hypothesis</td>
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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter highlights the background of the study, the problem statement and the research questions with the research objectives. It also gives the reader the scope, significance of the study and key definitions.

1.2 Background of the Study

Mobile technology has heralded new learning experience and sweeping changes about the way we are learning in our life. Higher education institutions around the world will need to consider how to make the most of these new opportunities to be competitive in the marketplace. Usually, learning occurs face to face learning or exchanging
information between students and instructors, however, the rapid changes of ICT has led educational sectors enormous transformation the way learning process takes place using modern technologies. Face-to-face lecture is still the main means of disseminating knowledge in higher education, but university faculty and administrators have been examining other tools and methods to support and engage with students (Sweeney, O'Donoghue, Whitehead, 2004). However, Mobile Learning has a unique characteristic which differentiates it from the previous two, in that it enables learning to take place across many more settings and contexts (Embi and Nordin 2013). Liang Ting (2005) had strongly agreed that whereby he stated students do not need to be at a fixed, predetermined setting when accessing M-learning, such as the classroom or the computer lab, to follow a class conducted via Mobile Learning.

Learning environment requires universities to examine teaching and learning practices as these changes will have a significant ripple effect on higher education. Mobile technologies for learning (M-learning) are among rapid diffusion technologies ubiquitously evolving learning process and to investigate their impact for educational process in crucial Sarrab et al., (2015). Mobile technologies are developing rapidly nowadays and many young generation are using intensively so that they might have used this incredible devices for their learning. Gökşu and Atici, (2013) reported that mobile devices which are developing rapidly and they are using among young generation intensively they have increased the effectiveness of learning environments further they added, using mobile technologies for learning environment gives the students an opportunity to access their learning process whenever and wherever they want. However Open University Malaysia (OUM), is first open and distance learning institution in Malaysia implemented on a Mobile Learning via SMS initiative in an effort to support distance learners, who are mostly working adults, and to make learning more flexible and ubiquitous for them Lim et., al (2011). The issues of traditional face to face learning is whereby the learner is at fixed place, Moore, (1997) stated that mobile learning helps reduce the transactional distance of psychological and communication space often faced by distance learners who are separated in terms of geographical distance and time.
There are numerous innovative features provided through mobile technologies for learning and study on the impact of it for educational purpose is crucial. Among the important innovative features provided by M-learning are their portability, immediacy, individuality, connectivity and accessibility anywhere (Ally, 2009). Preliminary research suggested that mobile technologies devices can generate more active learning process experiences. This includes increasing student’s learning performance, learning satisfaction, student engagement learning and course retention wherever and whenever. They concluded that mobile technologies are useful devices for learning (Joosten, 2010). The use of mobile technologies devices has been growing and making rapid changes in the Malaysia. Alzaza and Yaakub (2011) surveyed 261 Malaysian higher education students about students' awareness and requirements of mobile learning services and found that students have adequate knowledge and possess awareness to use mobile technologies in their learning environment. Mobile technologies offer more than calling. Korucu and Alkan, (2011) classified mobile technologies for learning as a servers, laptop computers, tablet computers, smartphones, pocket computers, portable media players, MP3 players, video player. Cheon et al., (2012) referred M-learning as any mobile device that is portable, that has instant connectivity and context sensitivity for access and gathers variety of information at anytime and anyplace. Alharbi and Drew (2014) argued that M-learning could be defined basing on the mobility of the device or the mobility of the learner. Kambourakis et al., (2004) defined that M-learning can be considered as any learning and teaching activity that takes place through mobile technologies devices or in settings where mobile equipment is available. Cheon et al., (2012) stated that M-learning is referred to as any mobile device that is portable, has instant connectivity and context sensitivity, can be taken anywhere anyplace, can be accessed and gathers variety of information without a fixed place. Rosman (2008) described M-learning as an array of ways that people learn or stay connected with their learning environments including with their instructors and classmates while going with the mobile devices.

According to Khan et al., (2015), the modern mobile devices have brought universities a major reforms, this includes flexibility, portability, independency, creativity, and interactivity in the academic environments. They argued that these
devices have brought universities everlasting impact on the modern learning system since learning can occur anywhere anyplace without face to face of traditional learning using mobile devices. Ayoade (2015) stated that there is a need to determine factors that contribute towards learners' acceptance of mobile learning in education in order to facilitate adoption and usage of mobile learning. It is increasingly tough to ignore the case of how crucial mobile learning can enhance learning, especially in higher education. Therefore, this study was carried out to investigate the intention to use mobile technologies for learning and learning satisfaction among students at the Malaysian technical universities.

1.3 Problem Statement

Mobile learning is brand new trend from e-learning using portable technologies such as mobiles and tablets as a learning enhancing technologies, therefore it has been identified as one of the Critical Agenda Projects (CAPs) and Key Result Area (KRA) of MOHE. Mobile technologies are developing rapidly nowadays and many young generation are using intensively in Malaysia so that they might use this incredible devices for their learning. Usually, learning occurs face to face learning or exchanging information between students and instructors, however, the rapid changes of ICT has led educational sectors enormous transformation the way learning process takes place using modern technologies. Eteokleous and Ktoridou (2009) summarized issues of traditional face to face learing and advantages that mobile technologies would have impact student leaning, they concluded his research, M-learning has the ability for the lecturer and the learner easily to move with a device in a learning environment, majority of the students own devices like that, they are easily access learning materials even though students might be in different locations as well as equal access, this even disabilities students can have access to content including theoretical information, quizzes, journal entries, balance sheets, learning games from anywhere, finally, M-
learning increase interaction among students in a way they share learning materials with each other and get immediate instructions and feedback from instructors effectively and easily. Mobile Learning is an extension of electronic learning (e-learning) and ultimately distances education, which was previously carried out through physical mail. However, Mobile Learning has a unique characteristic which differentiates it from the previous two, in that it enables learning to take place across many more settings and contexts (Embi and Nordin 2013). Liang Ting (2005) had strongly agreed that whereby he stated students do not need to be at a fixed predetermined setting when accessing M-learning, such as the classroom or the computer lab, to follow a class conducted via Mobile Learning. The proliferation of web-based and mobile instruction media can allow learners to learn by enabling a bi-directional flow of information at any pace, time, and place (Jolliffe et al., 2003). Besides Jacob and Issac (2008) mentioned that on their study, mobile learning provides students self-study and online resource opportunities such as communication, research use and administrative because of their portable, removable, updateable which traditional face to face learning not provided. Göksu and Atici, (2013), stated that using mobile technologies for learning environment gives the students an opportunity to access the learning materials information whenever and wherever they want (Sarrab et al., 2015). There are numerous innovative features and their impact for educational purpose is crucial. Among the important innovative features provided by M-learning are their portability, immediacy, individuality, connectivity, and accessibility anywhere. Hamid et al., (2014) stated that mobile technology is an effective tool that can contribute towards students’ learning satisfaction. Mobile technologies devices are among the most rapid diffusion technologies ubiquitously evolving the learning process and are imparting tremendous impact on the way learning process occurs

On other hand According to Malaysian Communication and Multimedia Commission (MCMC) reported that, there are 43,248,000 handphone subscriptions in Malaysia with a penetration rate of 144.2 per 100 inhabitants, they added that in 2010 only 14% of the survey participants were experienced using smartphone, while 2014 the use of smartphone users in Malaysia has tremendously grown up to 53.4 %, basically 1 or 2 of the Malaysian are now smartphone users. Further, In 2014, about two-third
(63.3%) of users interviewed say that they access the Internet through their handphones. This percentage is a strong indicator that users use their handphone for good connectivity. Moreover, most of the cellular phones and internet users took part in Malaysian Communication and Multimedia Commission (MCMC) 2014 survey are in the age range of 17 to 29 which is generation Y and this age happen to be students among higher education.

Giving the emerge of mobile technologies and their impact for Malaysian higher education students, Malaysian learning context needs to be prepared to implement the new platform learning in a way that learning process takes place through mobile technologies (M-learning) without fixed place (Embi and Nordin 2013). In line with the rapid changes of technology, However Open University Malaysia (OUM), is first open and distance learning institution in Malaysia implemented on a Mobile Learning via SMS initiative in an effort to support distance learners, who are mostly working adults, and to make learning more flexible and ubiquitous for them Lim et., all (2011). Thus it is necessary for Malaysian higher education sectors look the possibility of implementing M-learning. Therefore, Malaysia National Higher Education Strategic Plan (PSPTN), Ministry of Higher Education of Malaysia (MOHE) has developed 21 Critical Agenda Projects or CAPs for national future direction of learning, m-learning is among the 21 critical projects has been set out by the ministry. Besides Minister Datuk Seri Idris Jusoh (minister of Malaysia higher education) in his 2016 New Year address said flexible learning could be done with the use of technology and also through emphasis on “gamification” and he is looking forward to implement Malaysian higher education institution.

Despite the importance of understanding the influence of mobile technologies and their intention to use for learning and the rapid growth of mobile device among student, however, little attention was given researchers related to M-learning. As the Malaysian government has put forth the vision 2020 as a national ambition, to contribute to achieve this national goal, Mobile Learning is at its embryonic stage in this country, studies and research initiatives are critically needed to be undertaken (Embi and Nordin 2013). Besides Datuk Seri Idris Jusoh (minister of Malaysia higher education) in his 2016 New Year address stated that we do not give a time frame implementation of gamification on
Malaysia higher education institutions, added that the ministry would look at universities which were ready to implement it. Further, M-learning is still in its infancy as the focus in most projects or studies are still remaining on the idea of establishing foundation, theory, design, type of M-learning and activities supported by mobile technologies (Pollara, et al., 2011). Further, Keong et al., (2013) reported that despite high penetration rate of mobile technologies in Malaysia, however, researches related to M-learning remains preliminary stage. Soon et al., (2014) advocated that it is crucial to regularly evaluate and appraise e-services used by students at universities to keep pace with the rapid changes of learning technology and stay competitive in the market. Thus, the current study has delved to investigate the intention to use mobile technology for learning satisfaction among students at the Malaysian technical universities. This is reiterated by Ayoade (2015) that there is a need to determine factors that contribute towards learners’ acceptance of mobile learning in education to facilitate adoption and use of mobile learning.

1.4 Research Questions

1. What are the factors that influence behavioural intention to use M-learning?
2. What are the factors influencing user satisfaction to use M-learning?
3. What is the level of behavioural intention to use mobile technologies for learning?
4. What is the level of user satisfaction to use mobile technologies for learning?
5. Does user satisfaction mediates the factors that influence student’s intention to use M-learning and their behavioural intention to use M-learning?
1.5 Research Objectives

The main objectives of this research are as follows:

1. To determine factors that influence student's behavioural intention to use M-learning.
2. To determine factors influencing user satisfaction to use M-learning.
3. To determine the level of student behavioural intention to use M-learning.
4. To determine the level of user satisfaction to use M-learning.
5. To determine whether user satisfaction mediates factors influencing intention to use and behavioural intention to use M-learning.

1.6 Significance of the Study

Mobile technologies is extending learning beyond traditional face to face learning whereby students have ability to conduct their learning anytime at anyplace using their mobile technologies devices. Malaysia National Higher Education Strategic Plan (PSPTN), Ministry of Higher Education of Malaysia (MOHE) has developed 21 Critical Agenda Projects or CAPs for national future direction of learning, however, M-learning is among the 21 critical projects has been set out by the ministry. Therefore, result of this study will contribute understanding mobile technologies and their intention to use for learning among students at Malaysian technical universities. It provides understanding about the factors that influence students' intention to use mobile technologies and user satisfaction on towards M-learning. Thus result of this study will provide valuable guidance to both universities and Malaysia National Higher Education Strategic Plan (PSPTN) to be aware M-learning used by students at the universities and to keep in pace with the rapid changes of learning through mobile technology. This conceptualize model in this study determine whether user satisfaction mediates factors
that influence intention to use mobile technologies for learning and behavioural intention to use M-learning.

1.7 Scope of the Research

This research uses the theoretical framework of UTAUT to find out the factors that influence intention to use mobile technologies for learning among students at the Malaysian technical universities. This is a cross-sectional quantitative study. Data were collected from students at Malaysian Technical University Network (MTUN) which are four technology-based university in Malaysia comprising of the Universiti Malaysia Perlis (UniMAP), Technical University of Malaysia Malacca (UTeM), Universiti Tun Hussein Onn Malaysia (UTHM) and Universiti Malaysia Pahang (UMP). The respondents were selected through random sampling. Students were selected randomly from different faculties, the different races, and their academic levels to respond to the survey questionnaire. In this study, mobile technologies refer to smartphones, cellophones, laptops, PDAs, and tablets.

1.8 Key Definitions

- **Learning**: Learning can be defined as a process in which students acquire information and manipulated artefacts with the help of teachers and shape their thoughts through social interaction with peers (Ting, 2013).

- **M-learning**: M-learning is defined as any sort of learning that happens when the learner is not at a fixed place, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies such as smartphones, laptops, PDAs and tablets (MOBllearn, 2003).
• **User satisfaction**: User satisfaction defined as the pleasure or contentment of one feels when s/he performs a required or desired action and experiences the result (Shee and Wang, 2008). Martin (1988) defined user satisfaction as the level of coherence between the individual’s expectations and his actual experience.

• **Performance expectancy**: The degree to which an individual believes that the use of the system will help him or her to attain gains in job performance.

• **Effort expectancy**: Degree of ease associated with the use of the system.

• **Social influence**: The degree to which an individual perceives that others believe he or she should use the new system.

• **Self-management of learning**: The extent to which an individual feels he or she is self-disciplined and can engage in autonomous learning (Wang, et al., 2009, p. 10).

• **Perceived playfulness**: (Moon and Kim, 2001) Moon and Kim, (2001) playfulness determined by three dimensions: (1) concentration; the extent to which of an individual’s attention will be focused on the activity (2) curiosity; is curious during the interaction; (3) enjoyment; they will find the interaction intrinsically interesting.

• **Behavioural Intention**: A measure of one’s strength to perform a specific behavior (Wang and Shih, 2008).

• **User satisfaction**: User satisfaction is defined as the pleasure or contentment one feels when s/he performs a required or desired action and experiences the result (Shee and Wang, 2008)

1.9 **Thesis Organizational Structure**

This dissertation consists of 5 chapters. Chapter one covers the background of the study, the problem statement, research questions, research objectives, significance of the study, scope of the study and key definitions. Chapter 2 provides a review of the relevant
literature and establishes the theoretical foundations of this study. It begins discussing about M-learning definitions, M-learning devices, classification of M-learning and e-learning, usefulness of M-learning and acceptance of m-learning in higher education. The discussion entails the previous technology acceptance theory models and based theory of this study UTAUT. Chapter 3 describes the research methodology used in this study. It begins by discussing about the proposed research model of this study and hypothesis, covers on population and sample size of this study, where data were collected and how data were analysed. Chapter 4 covers the statistical analysis methods and detailed the results of this research that include demographic statistics, reliability analysis, factor analysis, and descriptive analysis correlation and AMOS regression analysis for testing the hypotheses and mediation. Chapter 5 covers the discussions, finding, and implications of the research, following contributions, limitations, and suggestions for future researchers.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The first part of this Chapter presents information related to mobile technologies for learning such as M-learning definitions, classification of M-learning device and how M-learning differs from e-learning. The second part focuses on the theoretical background of the study and previous research had focused on acceptance of mobile technologies for learning. The last part covers factors influencing mobile technologies for learning and user satisfaction which is the main part of the literature. The Chapter ends with a summary.
2.2 M-learning Classification from Other Learning

Previous researchers have classified M-learning from other categories of learning such as e-learning, distance learning and traditional face to face learning. Quinn (2000) defined mobile learning as 'e-learning through mobile computational devices. While e-learning is learning experiences to support individual learning with various types of computer technologies (Clark and Mayer 2008), Keegan, (2003) defines mobile learning as running of education through PDAs, pocket PCs and mobile phones. Further, Attewell and Savill-Smith (2004) referred mobile learning as the process of using mobile technologies and portable devices which are pocketed and used wherever and whenever by students to be able to receive unbroken transmission signals which is not possible in the past traditional face to face learning. Eteokleous and Ktoridou (2009) summarized issues of traditional face to face learning and advantages that mobile technologies would have impact student’s learning, he concluded his research, M-learning has the ability for the lecturer and the learner easily to move with a device in a learning environment, majority of the students own devices like that, they are easily access learning materials even though students might be in different locations as well as equal access even disabilities, students can have access course contents including theoretical information, quizzes, journal entries, balance sheets, learning games from anywhere, finally, M-learning increase interaction among students in a way they share learning materials among each other and get immediate instructions and feedback from instructors effectively and easily. Mobile Learning is an extension of electronic learning (e-learning) and ultimately distances education, which was previously carried out through physical mail. However, mobile Learning has a unique characteristic which differentiates it from the previous two, in that it enables learning to take place across many more settings and contexts (Embi and Nordin 2013). Liang Ting (2005) had strongly agreed, students do not need to be at a fixed, predetermined setting when accessing M-learning, such as the classroom or the computer lab, to follow a class conducted via mobile learning.
Santosh, (2013) compared the advantages of m-learning and e-learning, he stated that through e-learning, the learner gets access to learning by breaking all barriers of time, place, and distance. Behera, (2013) added that e-learning use fixed, wire devices such as PC's, but mobile learning uses wireless communication devices such as cell and smartphones, microcomputers and personal digital assistants.

According to Korucu and Alkan, (2011) on their study differences in e-learning and m-learning, they stated that E-learning occurred as a new form of distance learning and its terminology is close to those of traditional learning. Although the applications of M-learning are seen as an evolution of e-learning, M-learning is a characterized technology and has its own terminology. For instance, while the term multimedia, interactive, hyperlinked, media-rich environment is among the terminology of e-learning; terms like spontaneous, intimate, situated, connected, informal, lightweight are among the terminology of M-learning. Rosman, (2008) described mobile learning as "an array of ways that people learn or stay connected with their learning environments including their instructors and classmates while going mobile". Further, e-learning takes learning away from the classroom or campus and mobile learning takes learning away from a fixed point, therefore e-learning is a substitute or alternative to classroom learning and mobile learning is an alternative activity to both e-learning and traditional learning. Gerogiev et al., (2004) assumed M-learning to be a subset of E-learning, whereby E-learning is a subset of D-learning. Therefore, any M-learning activity is an E-learning activity, and any E-learning activity is, in turn, a D-learning activity. A similar study was found by Brown, (2003), M-learning is a subset of e-learning. E-learning is a macro concept that involves online learning environment and M-learning. The diagram below indicates clearly the relationship between e-learning and M-learning whereby E-learning is a subset of D-learning, and M-learning and online learning are subsets of E-learning.

Naismith et al., (2004) have been viewed mobile technologies in terms of portability, removable and personality. They refer the word mobile means ‘portable’ and ‘movable’. It also seems to involve a ‘personal’ as opposed to ‘shared’ context of use, and the terms ‘mobile’ and ‘personal’ are often used interchangeably but a device might be one without necessarily being the other. Jacob and Issac, (2008) discussed
some of the common mobile technologies involving for learning, they classified, iPod, PDAs, Laptops, Tablets, and Smartphones. According to Poslad, (2009), mobile devices include laptops, notebooks, tablets, and smartphones are referred as communicators, multimedia entertainment and business processing devices designed to be carried by an individual. Korucu and Alkan, (2011) classified mobile technology devices for learning (M-learning) into servers, laptop computers, tablet computers, smartphones, pocket computers, portable media players, MP3 players, video player. Cromar (2010) defined Smartphone is a mobile electronic device which runs an innovative operating system that allows the users to update and install new applications, it is always connected to the internet, and it provides various functionalities to the users.

Figure 2.1: Learning Categories (Brown, T. H. 2003).
2.3 Mobile Learning Definitions

The definition of M-learning is still not clearly defined. Table 2.1 tabulates the definition of mobile learning of previous researchers and authors. Alharbi and Drew (2014) argued that this could be due to whether to focus its definition on the mobility of the device or the mobility of the learner. Pamela (2011) defined mobile technology as handheld information technology devices or artifacts that encompass hardware (devices), software (interface and applications), and communication (network services), while Kambourakis et al., (2004) considered M-learning as any learning and teaching activity that takes place through mobile technology devices or in settings where mobile equipment is available. Cheon et al., (2012) stated that M-learning is referred to as any mobile device that is portable, has instant connectivity and context sensitivity, can be taken anywhere, anywhere, can be accessed and gathers a variety of information without a fixed place. Rosman (2008) described M-learning as an array of ways that people learn or stay connected with their learning environments, including their instructors and classmates while going with mobile devices. In general, M-learning refers to student interaction with educational materials at anytime and anywhere through the use of mobile technologies and wireless Internet devices, such as personal digital assistants (PDAs), smartphones, mobile phones, and digital audio players (Wang et al., 2009). Researchers have also referred M-learning as the next stage of e-learning. Georgiev et al., (2004) defined M-learning as a new stage of e-learning having the ability to learn everywhere at every time through use of mobile and portable devices. Pinkwart et al., (2003) defined M-learning as an e-learning that uses mobile devices and wireless transmission devices.
Table 2.1: M-learning Definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>Author</th>
</tr>
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<tbody>
<tr>
<td>E-learning through mobile computational devices called information appliances (IAs) – Palms, Windows CE machines, digital cell phones</td>
<td>Quinn, 2000</td>
</tr>
<tr>
<td>The delivery of learning content to learners utilizing mobile computing devices</td>
<td>Parsons and Ryu,  2006</td>
</tr>
<tr>
<td>A new stage of e-learning having the ability to learn everywhere at every time through use of mobile and portable devices</td>
<td>Georgiev et al., 2004</td>
</tr>
<tr>
<td>Mobile learning educational process can be considered as any learning and teaching activity that is possible through mobile tools or in settings where mobile equipment is available</td>
<td>Kambourakis et al., 2004</td>
</tr>
<tr>
<td>E-learning that uses mobile devices and wireless transmission</td>
<td>Pinkwart et al., 2003</td>
</tr>
<tr>
<td>A form of education whose site of production, circulation, and consumption is the network</td>
<td>Polsani, 2003</td>
</tr>
<tr>
<td>Any educational provision where the sole or dominant technologies are handheld or palmtop device</td>
<td>Traxler, 2005</td>
</tr>
<tr>
<td>A process of coming to know, by which learners in cooperation with their peers and teachers construct transiently stable interpretations of their world</td>
<td>Sharples, 2005</td>
</tr>
<tr>
<td>Learning supported by mobile devices, Ubiquitous communications and intelligent user interfaces</td>
<td>Sharma and Kitchens, 2004</td>
</tr>
<tr>
<td>Learning that arises in the course of person-to-person mobile communication</td>
<td>Nyiri, 2002</td>
</tr>
<tr>
<td>A function of time, space, learning environment, content, technology, learner's aspects – mental abilities, preferences, motivation, etc., and method of content delivery – pedagogy, philosophy</td>
<td>Laouris and Eteokleous, 2005</td>
</tr>
<tr>
<td>Any form of learning (studying) and teaching that occurs through a mobile device, or in a mobile environment</td>
<td>Trifonova, 2003</td>
</tr>
<tr>
<td>E-learning through mobile computational devices that are small, autonomous and unobtrusive for everyday use. Content is stored locally or reachable through interconnection</td>
<td>Trifonov and Ronchetti, 2003</td>
</tr>
<tr>
<td>A next stage or a new form of e-learning through the use of mobile and portable devices and wireless network and communication technologies for teaching and learning</td>
<td>Doneva et al., 2006</td>
</tr>
<tr>
<td>M-learning is handheld information technology devices or artifacts that encompass hardware (devices), software (interface and applications), and communication (network services)</td>
<td>Pamela, (2011)</td>
</tr>
</tbody>
</table>
2.4 The Usefulness of Mobile Learning in Higher Education

Rosman, (2008) stated that M-learning is the exciting art of using mobile technologies to enhance the learning experience. Mobile phones, PDAs, Pocket PCs and the Internet can be blended to engage and motivate learners, anytime and anywhere. Besides Jacob and Issac (2008) mentioned that on their study, mobile learning provides students' self-study and online resource opportunities such as communication, research use and administrative because of their portable, removable, updateable. Furthermore, similar study was found by Göksu and Atici, (2013), using mobile technologies for learning environment gives the students an opportunity to access the learning materials information whenever and wherever they want. Therefore, mobile devices which are developing rapidly and they are using among young generation intensively they have increased the effectiveness of learning environments. In the context of mobile technologies for learning, universities are providing learning materials, information via mobile technologies, wireless services to students, so that student would access individually anywhere at any place (Chary 2014).

According to Kutluk and Gülmez, (2014) on their study mobile learning perspectives of university students investigated 4 class accounting students how they benefit mobile technology on accounting lessons, the result indicated that, most of the students who have used mobile devices for learning and educational purposes are made research/homework about accounting lessons using cell phone/smartphones and handheld computer and spent more time on mobile devices for learning and education purpose on daily basis, they think that, they have the necessary knowledge to use mobile devices for making research or homework about accounting lessons, using mobile devices for learning. Furthermore, Wagner, (2005) reviewed mobile technologies and their benefits to students in their learning environment, these include access to academic and library information, support of interactive and collaborative learning, expand student communication, and extend engagement with course content, taking snapshots as a notice via camera and etc.
According to Eteokleous and Ktoridou (2009) listed out several advantages that mobile technologies would have impacted student learning.

1. Portability: The ability for the lecturer and the learner easily to move with a device in a learning environment or to different learning environments.

2. Cost Effectiveness: Handhelds are becoming more affordable and therefore accessible to students. Additionally, the majority of the students own devices like that.

3. Accessibility: Easy access to mobile devices, even though students might be in different locations as well as equal access for learners with disabilities.

4. Convenience: Students can have access to content including theoretical information, quizzes, journal entries, balance sheets, learning games from anywhere.

5. Increase motivation: Since students own their devices, they are motivated to use them and learning from it.

The pedagogical usefulness of Smartphone was summarized in three main categories: students’ collaboration, interaction, and increased involvement:

1. Collaboration: Students can learn best when they share with each other and get immediate instructions and feedback.

2. Interaction: Student can interact with instructors and among each other effectively and easily.

3. Increased involvement: The new generation likes mobile devices such as PDAs, Smartphones and game devices, so they feel more motivated and interested in using them.

The findings of the Attewell, (2005), study in formulating the project M-learning suggests that the use of M-learning can have a positive impact on several areas:

1. M-learning helps students to improve the literacy and numeric skills to identify their true capability.

2. M-learning can be used to encourage both independent learning and experience sharing of learning experiences.

3. M-learning can help the students identify things that need help and support.
4. M-learning can help to use the information and communication technology and can help to reduce the gap between mobile phone literacy with information technology literacy.

5. M-learning helps the students to refuse some of the formalities in the learning experience.

6. M-learning helps the students to maintain focus on learning for a longer time period.

7. M-learning helps to increase the self-esteem.

8. M-learning helps in increasing the self-confidence.

Rahman and Hashim (2011) M-learning have been proven that it is very useful to support learning in other countries and now it has first introduced in Malaysia where there are several higher education institutions have to integrate this technology in their teaching curriculum. There are some advantages in the use of M-learning such as:

1. Learning process can occur anywhere at any time and does not limited to the classroom only.

2. System of M-learning is very interesting because students can create an interactive training using a Smartphone that has an internet access anytime at anywhere during their free time.

2. Students can easily download notes by using the internet service provided by a mobile technologies subscription. Therefore, the downloading process can be anywhere at any time.

3. Teacher can make quizzes for students at any time by simply inserting the question and determine the time taken for the quiz.

4. A test that held through mobile devices in education found that the evaluation done by the test via M-learning is more effective and efficient.

5. The multimedia elements that can integrate audio and video are able to attract student’s interest in the use of M-learning.
2.5 Mobile Limitation for Learning

Despite M-learning advantages to students in order they benefit them to support their learning, hence there are barriers and limitation of mobile technologies for learning as well. Those limitations consider the challenges of mobile technologies for learning (M-learning) therefore they should be taken care when discussing M-learning implementation of. Siau et al., (2001) Stated that, mobile devices have ‘(1) small screens and small multifunction keypads; (2) less computational power, limited memory and disk capacity; (3) shorter battery life; (4) complicated text input mechanisms; (5) higher risk of data storage and transaction errors; (6) lower display resolution; (7) less surf ability; (8) unfriendly user interfaces; and (9) graphical limitations. Corlett et al., (2005) surveyed students to describe M-learning disadvantages and limitation, some of the issues reported was the usability of the hardware, including weight and screen size, the limited memory and the battery life. However, several limitations of M-learning obstacles exist in terms of implementing any significant M-learning applications were listed out by McLean, (2003), based on recent mobile technology capacity. These obstacles were summarized in the following form:

- Limited memory and storage are major inhibitors.
- Screens are generally too small for the use of any sophisticated applications.
- Intermittent connectivity is a major barrier.
- Cross-platform solutions are not yet possible.
- Links to learning management systems or enterprise systems are in an embryonic stage of development.
- The industry is plagued by proprietary solutions.
- Transmitting across different browsers and platforms is almost impossible.
- Existing applications are not easily integrated with the mobile technology environment.
- Start-up costs are invariably high.
- Tracking outcomes are difficult.
- Security is a major issue.
- Cost of accessing major third-party networks is punitive.
- Multiple permissions are necessary in terms of negotiated access.
- Continuous technology development militates against stability and sustainability in terms of mounting viable M-learning applications.

Iqbal and Qureshi, (2012) Stated that Due to difficult use mobile technologies for learning (M-learning) this might be reluctant students to adopt M-learning. Therefore (Wang et al., 2009) suggested that mobile technologies designers should improve the user easiness, friendliness, and ease of use of M-learning systems in order to attract students to adopt M-learning. For example, M-learning system designers should provide easy-to-use user interfaces are hidden the complexity and details of the hardware and software involved, including touch screen menus, light pen data entry, handwriting recognition, natural language processing.

2.6 M-learning trend in Malaysia

Giving the emerge, mobile technologies and their impact on Malaysian educational sectors, Malaysian learning context needs to be prepared to implement the new learning platform in a way that learning occurs through mobile technologies (M-learning) (Embi and Nordin 2013). However the National Higher Education Strategic Plan (PSPTN), Ministry of Higher Education (MOHE) has developed 21 Critical Agenda Projects or CAPs for national future direction of learning, M-learning is among the 21 critical projects has been set out by the ministry. However Open University Malaysia (OUM), is first open and distance learning institution in Malaysia implemented on a Mobile Learning via SMS initiative in an effort to support distance learners, who are mostly working adults, and to make learning more flexible and ubiquitous of them Lim et., all (2011)

On other hand According to Malaysian Communication and Multimedia Commission (MCMC) in its 2014 Malaysia handphone user survey reported that, there
are 43,248,000 handphone subscriptions in Malaysia with a penetration rate of 144.2 per 100 inhabitants, apart from that in 2010 they reported only 14% of the survey participants were experienced using smartphone, while 2014 the use of smartphone users in Malaysia has tremendously grown up 53.4 %, basically 1 or 2 of the Malaysian are now smartphone users. Furthermore, another survey was done by Malaysian Communications and Multimedia Commission (MCMC) in its 2014 survey internet users in Malaysia 2014 indicated that Smartphone is the most widely used devices to access the Internet at 74.3% of the participants. Among the interesting findings in relation to M-learning in Malaysia as reported by Osman et al., (2011) on their study Trend of Smartphone and its usage behavior in Malaysia, there were 75% of the participants accessing internet through the smartphone. In Malaysia Smartphone mobile devices are notably becoming more accessible, affordable and widely used (Song et al., 2013). The Ambient Insight Comprehensive Report (2011) is that globally, for the duration of 2010-2015, Malaysia is ranked the 9th highest Mobile Learning Five-year Growth Rates

In Malaysia Phase 2 Action Plan between 2011 to 2015 National Higher Education Strategic Plan (PSPTN) was set out and mobile Learning is a brand new trend emerging from e-learning has been identified as one of the Critical Agenda Projects (CAPs) developed by Ministry of higher education of Malaysia, then the rise of research focused on mobile learning has been gradually gaining among researchers in Malaysia. For instance a research team led by Professor Dr. Mohamed Amin Embi and Dr. Norazah Mohd Nordin are among the researchers has given much effort on contributing the success of one of the 21 critical agenda, that is e-Learning and the National Key Result Areas (NKRA) developed by Ministry of Higher Education, they research work summarized a number of significance M-learning research work carried out various universities in Malaysia (Embi and Nordin 2013). Alzaza and Yaakub (2011) surveyed about 261 Malaysian higher education students to investigate students’ awareness and requirements of mobile learning services among Malaysian students in the higher education environment showed that students have adequate knowledge and a good awareness to use mobile technologies in their learning environment Hussin et al., (2012) focused on mobile learning readiness among students at two different Malaysian
universities in relation to mobile learning, the findings revealed that the students are highly familiar with computing skills and they welcome the integration of mobile learning in their learning process. Mahat et al., (2012) examined the relationship between learners’ self-efficacy and readiness towards M-learning with the learners’ perception of the effectiveness of M-learning, 137 trainee teachers who had enrolled in various educational programs at the Faculty of Educational Studies University Putra Malaysia participated in their study. Result indicated that that, the respondents had a high level of personal innovativeness and mobile readiness. Song et al., (2013) studied on mobile devices for learning in Malaysia then and now, they found that 80 percentage of students owning smartphones and all had access to mobile devices of some sort. Additionally, students intended to use these devices to support their learning in a number of ways. Tan, Ooi, Lion and Lin, (2014) investigated on the elements that affect the user’s intention to adopt mobile learning (M-learning) they employed technology acceptance model (TAM) as an underlying theoretical framework, the result showed TAM constructs has significant influence behavioral intention to use M-learning.

Kim-Soon et al., (2015) investigated factors influencing intention to use M-learning among students at Malaysian technical universities, result showed performance expectancy and self-management of learning are shown positive significance, impact towards behavioral intention to use M-learning while social influence and perceived playfulness indicate negative impact.

2.7 M-learning Behavioral Intention to Use

Behavioral intention has been defined as the individual’s subjective probability of performing a behavior and as a determinant of actual usage behavior (Ajzen, 1991). Behavioral intention is the prediction of individual’s likelihood of performing a conscious act, such as deciding to accept or use of technology. Alzaza and Yaakub (2011) surveyed about 261 Malaysian higher education students to investigate students’ awareness and requirements of mobile learning services among Malaysian students in
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