INTEGRATING MOBILE TECHNOLOGY QUALITY SERVICE, TRUST AND CULTURAL FACTORS INTO TECHNOLOGY ACCEPTANCE OF MOBILE LEARNING: A CASE OF THE JORDAN HIGHER EDUCATION INSTITUTION

MALEK ZAKARYA SALAMEH ALKSASBEH

DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
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Abstrak

Kejayaan sistem pembelajaran mudah alih dalam pendidikan tinggi banyak bergantung kepada penerimaan pelajar terhadap teknologi. Berdasarkan kajian terdahulu, pelajar di institusi-institusi pengajian tinggi di Jordan didapati masih enggan menggunakan aplikasi dan perkhidmatan pembelajaran mudah alih. Faktor penerimaan pelajar sepatutnya menjadi perhatian utama pihak pengurusan dalam mempertimbangkan perlaksanakan sistem pembelajaran mudah alih. Objektif kajian ini adalah untuk mengenalpasti faktor-faktor yang mempengaruhi penerimaan sistem pembelajaran mudah alih berdasarkan kepada *Technology Acceptance Model* (TAM). Sebanyak 500 borang soal selidik telah diedarkan ke lima buah universiti di Jordan. Daripada jumlah tersebut, sebanyak 398 borang soal selidik telah dikembalikan, mewakili 79% kadar maklum balas. Teknik statistik termasuk analisis korelasi bivariat, analisis regresi linear pelbagai dan analisis regresi berperingkat, *T-test*s, dan ANOVA sehala telah digunakan. Keputusan menunjukkan tiga penentu utama iaitu: Budaya, Kepercayaan, dan Kualiti Perkhidmatan Teknologi sebagai faktor yang mempengaruhi secara signifikan Tanggapan Kebergunaan dan Tanggapan Kemudahan Penggunaan. Tanggapan Kebergunaan dan Tanggapan Kemudahan Penggunaan tambahan pula secara signifikan menentukan Sikap, manakala Tanggapan Kebergunaan dan Sikap pula secara signifikannya menentukan Niat Tingkah Laku pengguna. Antara lima pembolehubah budaya, kajian itu mendapati Jarak Kuasa merupakan pembolehubah yang paling banyak menyumbang, dan Kepercayaan Universiti merupakan pembolehubah yang paling banyak menyumbang dalam faktor Kepercayaan. Sementara itu, pembolehubah yang paling banyak menyumbang dalam faktor Kualiti Perkhidmatan Teknologi ialah Akses atau Kebolehcapaian. Bagi faktor Demografi pula, kajian ini membuktikan bahawa jantina, pengalaman pembelajaran mudah alih, dan pengalaman internet mudah alih secara signifikan telah mempengaruhi penerimaan pelajar. Berdasarkan dapatan yang diperolehi, kajian ini mencadangkan satu model penerimaan pembelajaran mudah alih berasaskan TAM. Kefahaman yang komprehensif terhadap model ini akan membantu pembuat keputusan meningkatkan tahap penerimaan sistem pembelajaran mudah alih dalam kalangan pelajar institusi pendidikan tinggi di Jordan pada masa akan datang.

Kata kunci: Penerimaan pembelajaran mudah alih, *Technology Acceptance Model*, Kualiti perkhidmatan teknologi

Abstract

The success of mobile learning system in higher education depends a lot on the students' acceptance of the technology. From an early investigation, students at Jordanian higher educational institutions however are still unwilling to use mobile learning applications and services. The students' acceptance should be a key concern for the management of a university in considering the implementation of mobile learning system. The objective of this study is to identify the factors that influence the acceptance of mobile learning system based on the Technology Acceptance Model (TAM). A total of 500 questionnaires were distributed to five universities in Jordan, out of which 398 questionnaires were returned, representing 79% response rate. Statistical techniques including bivariate correlation analyses, multiple linear and stepwise regression analyses, T-tests, and One-Way ANOVA were used. The results showed three core determinants: Culture, Trust, and Technology Service Quality as significantly influenced Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness and Perceived Ease of Use moreover have significantly determined Attitude, while Perceived Usefulness and Attitude, have significantly determined users' Behavioral Intention. Among the five variables of culture, the study found Power Distance to be the most contributive variable, and Trust in University as the most contributive variable under the Trust factor. Meanwhile, the most contributive variable in Technology Service Quality factor is Accessibility. For the Demographic factors, the study proved that gender, mobile learning experience, and mobile internet experience have significantly influenced students' acceptance. Based on the results obtained, the study proposes a model of mobile learning acceptance based on TAM. A comprehensive understanding of this model will assist decision makers to enhance the acceptance of the mobile learning system among students in Jordanian higher educational institutions in the future.

Keywords: Mobile learning acceptance, Technology Acceptance Model, Technology service quality

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

Jordan, one of the developing countries in the Middle East, is known officially as the Hashemite Arab Kingdom of Jordan(Farah, 1992). The higher education sector in Jordan plays a crucial role in the overall development of the country at various levels and areas. Over the last ten years (i.e. during the reign of His Royal Highness King Abdullah II), the higher education in Jordan has progressed significantly in terms of programme diversification, and teaching and learning approaches. The quality, quantity, and expansion of higher education institutions were properly supervised (Ministry of Higher Education & Scientific Research, 2010). His Royal Highness King Abdullah II of Jordan has envisioned the building of a knowledge-based economy, whereby the forthcoming generations will utilize knowledge so as to contribute significantly to economic growth and wealth creation. Towards this end, Jordon has revolutionized the higher education system with the support of a determined political will. New tools such as mobile technology and the incorporation of new learning methods in line with the installment of advanced network connectivity and state-of-the-art technologies have been adopted by public institutions in enhancing productivity as well as the overall educational system. In current implementation, out of ten public universities in Jordan, five of these universities have adopted mobile learning (m-learning).

In the reviewing sections, this chapter contains the background of the study, problem statement, research questions, and research objectives. The significance of the study, the scope of the study and the research framework are also discussed at the end of the chapter.

1.2 Background

Mobile technologies are the future and promising way to achieve optimum learning advantages (Rosman, 2008). The significant developments in mobile technology and the new mobile devices that can deliver web or internet based learning materials have led to a natural blossoming of e-learning to m-learning (Jacob & Issac, 2007). Arguably, m-learning is seen as a new generation of learning paradigm which follows the traditional lecture-based learning complimented with e-learning pedagogy (Ryu & Parsons, 2008). Traditional lecture-based education methods rely heavily on both printed materials for example teaching slides, textbooks, and laboratory work. These forms of learning activities have significantly restricted learner engagement and motivation because they come at the price of making interaction between learners and lecturers harder and inefficient (Freeman & Blayney, 2005; Traxler, 2005). Instead, to a greater extent, e-learning and m-learning have overcome these limitations of the traditional lecture-based learning activities, and are highly applicable to other learning activities such as life–long learning (Sharples, 2005). The term ‘e-learning’ refers to learning methods which use electronic channels in order to deliver the instructional content. E-learning is also referred to as web-based learning; technology-based learning; online learning; networked learning (Gotschall, 2000; Trombley & Lee, 2002). Further, the term m-learning has been defined as e-learning that uses wireless transmission and mobile devices (Attewell, 2005b).

With the advanced features of mobile technology and its capacity to provide information to people, it has become an optional tool to enhance the presentation and delivery of learning through m-learning. As Robson (2004) stated, it is the time for e-learning and educational technology community to pay serious attention to m-learning and handheld devices. The study indicated that mobile educational system is on track to becoming a potential educational as well as an important tool for supporting learning endurance. Furthermore, recent advanced features in e-learning using mobile technology, such as streaming video, color-display screen, internet browsers, and compatibility with desktop applications make m-learning not only possible, but also practical. In addition, it is obvious that m-learning will change the concept of traditional learning environment (Sharma & Kitchens, 2004).

In fact, the Ministry of Higher Education and Scientific Research in Jordan (MoHESR) has shaped an e-learning steering committee to draft a national e-learning strategy. The mission is to support institutions of higher education in their move towards embedding e-learning appropriately using technology in transforming education into a learner-centric system that is internationally distinguished in its quality and impact, to foster innovation and excellence in teaching and learning, and to support employability of lifelong learning, particularly in the mobile services (Ministry of Higher Education and Scientific Research, 2009). It is possible because Jordan has excellent telecommunication infrastructure. A fixed or mobile telephone service is available almost universally in inhabited areas of the country, and penetration has reached more than 93% of households overall (Ministry of Higher Education and Scientific Research, 2009).

The feature of ‘mobility’ also offers to new applications, as it “enables a transition from the occasional, supplemental use associated with computer labs, to frequent and integral use of portable computational technology” (Roschelle, 2003). In addition, m-learning can bridge the formal and informal communication gaps between student and university (Brown, 2004; Duncan-Howell & Lee, 2007). Universities’ adaptations of m-learning provide students access to learning resources at anytime and from anywhere, as well as flexibility and critical institutional services like assessment deadline, timetable changes, feedback from tutors, enrolment procedures, and other administrative necessities (Keegan, Kismihok, Mileva, & Rekkedal, 2006).

The essential role of m-learning in achieving the objectives set forth by the Jordanian Ministry of Higher Education as well as the cited benefits that can be derived through the m-learning literatures are considered important to be achieved. Consequently, besides the importance of investing in the area of m-learning in recent years, further research should be conducted in the area of acceptance, perception, and readiness in order to attain the Ministry’s objectives. The necessity to understand how learners accept m-learning is crucial in order to help universities and the government to construct successful and effective m-learning strategies in Jordanian universities.

1.3 Problem Statement

Universities have made significant amounts of investments to incorporate educational systems with technologies in supports of different aspects of students’ learning. These include the implementation of learning management systems, all of which work on the assumption of attracting students into the online environment in universities (Oblinger &

Oblinger, 2005). Consequently, expensive investment decisions regarding technology implementation in higher education are made with minimum understanding on the dimensions and factors that impact user, such as technology acceptance. In fact, less or not understanding these dimensions and factors can lead to the failure of post-implementation because users' unwillingness to accept new technology can lead to non-use of technology and thus the technology will not deliver the intended benefits to organizations (Davis, 1993; Davis & Vanketash, 1996; Borthick, 1988; Raymond & Bergeron, 1992).

On the other hand, students are increasingly equipped with mobile devices, most notably mobile phones, which allow quick and easy communication and information sharing. The use of mobile devices is an emerging phenomenon in online teaching and learning. They represent the opportunities for technology solutions in which students can be the primed and are supported in novel ways in their university education (Armatas, Holt, & Rice, 2005). In Jordan, a few universities have been promoting the use of m-learning in their system such as Princess Sumaya University (PSU), Mutah University (MU), and Yarmouk University (YU) (Al-Zoubi, Alkouz, & Otair, 2008; Alksasbeh, Ibrahim, Osman, & Alenezi, 2011).

Among the main factors that contribute to the success of m-learning in higher education is the student's acceptance of the technology (Teo, 2011). Therefore, student acceptance should be the key concern for the administrators when considering for implementing of m-learning. It is importantly to note that many studies have found that students are still unwilling to use m-learning and participate in this mode (Al-Zoubi et al., 2008;Alksasbeh et al., 2011;Ismail, Idrus, & Johari, 2010; Horrigan, 2008; Lawrence, Bachfischer, Dyson, & Litchfield, 2008; Lomine & Buckingham, 2009; Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009).

Furthermore, universities do not have sufficient understanding over the technology perceptions among new generation students (Bennett, Maton, & Kervin, 2008; Keengwe, 2007). In fact, these students are equipped with multiple digital literacies such as electronic book and online journal that are different from those of previous generations(Carlson, 2005). These differences lead to a gap between the perceptions of students and the administrators over technologies (Prensky, 2001). This gap amplifies the university's minimum understanding of students' needs for technology. The understanding of student perceptions regarding technology is therefore among the factors in increasing the student acceptance of technology.

On top of that, Al-Zoubi et al. (2008) revealed some discouraging facts for the future of m-learning in Jordanian universities, including the scarcity of content, the quality of services that can be utilized, the slow internet speed, as well as high service charges. These are major factors that can hinder the progress of m-learning in Jordan. Moreover, the students' satisfaction rate was very low in using m-learning (Al-Zoubi et al., 2008).

Until this study is conducted there is insufficient literatures to further describe the acceptance and related issues of m-learning in Jordanian universities (Alrai, 2010). This may have contributed to the delayed introduction of the m-learning implementation in Jordanian universities and accept this technology. In order to determine the main factors that influence the acceptance of m-learning, a preliminary study has been conducted involving twenty students in Jordanian universities between 10/12/2009 and 25/1/2010. The results revealed that all students were reluctant to use m-learning and a few of them simply did not like the technology at all. It was also revealed that 75% of female students were unwilling to use mobile phones in education. Furthermore, m-learning service was still widely unaccepted, due to the quality of services which did not satisfy the students' requirements, which include security, privacy, accessibility, interface design, content quality, personalization, reliability, and response. In addition, there were also other issues related to culture and trust in the university, besides mobile technology issues. Finally, students were found to be afraid to use m-learning because they were worried that their mistakes would contribute a loss of marks.

The implementation of the national e-learning strategy is in line with the aspiration of Her Royal Highness Queen Rania of Jordan, who stresses the importance of m-learning and who calls for the implementation of this project more broadly, particularly in Jordan. Her Royal Highness has urged for further research in this area to encourage students in accepting the use of m-learning in higher education (Alrai, 2010; Ammon, 2010). It is expected to improve the reputation and to create competitive advantage in higher education in Jordan. This aspiration has invoked the interest of this study to find out the factors that influence the students' acceptance of m-learning in Jordanian universities.

In the previous literatures of Information System (IS), several models and theories have been adapted to study the acceptance and adoption of Information Technology (IT) including personal computer (Jantan, Ramayah, & Chin, 2001), the Internet (Kim, Park, & Lee, 2008), internet banking (Tan & Teo, 2000), e-learning (ALenezi, Karim, & Veloo, 2010), e-commerce (Dishaw & Strong, 1999), mobile (Kaasinen, 2005; Nysveen, Pedersen, & Thorbjørnsen, 2005), m-commerce (Min, Ji, & Qu, 2008; Yang, 2005), and m-learning (Jairak, Praneetpolgrang, &Mekhabunchakij, 2009; Williams & Granger, 2008; Akour, 2009). Among the theories used areDiffusion of Innovation (DOI) (Rogers, 1962, 1995),the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985), Technology Acceptance Model (TAM) (Davis, 1986; Davis, Bagozzi, & Warshaw, 1989), and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003).

Meanwhile, among the factors being studied in relation to acceptance of IT are perceived ease of use (ALenezi et al., 2010; Chen & Huang, 2010; Meso, Musa, & Mbarika, 2005; Ramayah & Ignatius, 2005), perceived usefulness (ALenezi et al., 2010; Chen & Huang, 2010; Meso et al., 2005; Ramayah & Ignatius, 2005), attitude towards use (Akour, 2009; Bauer, Barnes, Reichardt, & Neumann, 2005; Mac, Nickerson, & Isaac, 2009), behavioural intention to use (Akour, 2009; ALenezi et al., 2010; Chen & Huang, 2010; Ramayah & Ignatius, 2005), demographic (Gefen & Straub, 1997; Ong & Lai, 2006; Venkatesh, et al., 2003; Williams, 2009), culture (Linjun, 2003; McCoy, 2002; Srite, 2000, 2006; Srite & Karahanna, 2006; Straub , Keil , & Brenner, 1997), trust (Al-Sukkar, 2005; Gefen, Karahanna, & Straub, 2003a, 2003b; Kaasinen, 2005; Serenko & Bontis, 2004; Watzdorf, Ippisch, Skorna, & Thiesse, 2010), and technology service quality (Lin & Wu, 2002; Akour, 2009;Al-Sukkar, 2005).

Further, among all factors trust shows their strong influence on early acceptance of using the technology (AL-Sukkar & Hasan, 2005; Kaasinen, 2005, 2007). As an example, variables such as trust university and trust mobile channel were found to be strong predictors of technology acceptance especially on m-learning (Al-Sukkar, 2005; Alksasbeh et al., 2011). Besides, Termsnguanwong (2010) argues that users do not trust the mobile technology as a channel to conduct their transactions, and that they may adapt the mobile technology only if they perceive the technology to be useful. Generally, trust in organizations or institutions depends on the competence of managerial. Additionally, trust in institutions in order to support IT facilities is the important key to encourage users to accept new technology (Tyler & Degoey, 1996). This study argues that determining the influence of trust is necessary in understanding how trust could affect the acceptance of m-learning. Hence, this study examines the trust as one of the factors that could affect the acceptance of m-learning.

In terms of culture differences, various studies including in Canada, Australia, Nigeria, China, United States, Malaysia, and Korea have included it in studying the acceptance m-learning (Cardon, 2008; Jacob & Issac, 2007; Sundqvist, Frank, & Puumalainen, 2005). They found that cultural diversity has its own impact on the implementation of new learning techniques and technologies. Particularly, Cardon (2008) in his study of technology acceptance across 63 cultures out of 95 studies, confirmed that cultural differences between countries have particular impact on the effectiveness and efficiency of IT acceptance. Similarly, Kurubacak (2007) argued that there is a need for future research to investigate the influence of culture variables with mobile learning.Thus, it could be assumed that the cultural factors also have specific consequences on the factors that promote and hinder the acceptance of m-learning.

Also the technological factor seems to be a significant key factor in the acceptance of m-learning implementation. As technological aspects are believed to have some contributions to the acceptance of m-learning, this study investigates the factor in relation to the quality of service and not to include other technological variables. Hence, this study integrates variables such as accessibility, interface design, reliability/response, content quality, personalization, and privacy/security. These variables have previously been shown to have significant effects on the acceptance of m-learning (Akour, 2009; Al-Mushasha & Hassan, 2009; Parsons, Ryu, & Cranshaw, 2007; SO, 2008). As Al-Mushasha and Hassan (2009) and Alksasbeh et al. (2011) have suggested to consider technological factor in developing m-learning, this factor could be among the significant factors in developing the acceptance of m-learning in Jordanian higher education institutions.

Besides, the demographic variables were also found to play a significant role in predicting the individual's usefulness and ease of use and behavior towards using mobile technology particularly m-learning (Akour, 2009; Muhanna, 2011; Nestel et al., 2010; Zhao & Zhu, 2010). In particular, Kim and Kizildag (2011) recommended researchers to investigate the significance of demographic variables such as gender, age, education, and previous experience in enhancing the ability to predict actual use of m-learning systems. They anticipate that the prediction will be more accurately and improve the ability to predict usage intention. Therefore, this study investigates the influence of demographic variables on the acceptance of m-learning acceptance among the students.

The acceptance of m-learning in Jordanian universities is very crucial in supporting the enhancements of the teaching and learning process. As culture, trust, technology service quality, and demographic factors become the main issues in the acceptance of IS including m-learning, these issues have been the major concern of this study. This study therefore intends to understand well on the critical factors that could lead to a better acceptance of m-learning. Having described the problems in the previous paragraphs, some questions are formed. Next, the objectives of this study are outlined.

1.4 Research Questions

The problems as discussed in the previous section point out three research questions that need urgent answers:

1. What are the factors that could influence the acceptance of m-learning among the students in Jordanian higher education institutions?

2. Which variables from each external factor have the most influence on the acceptance of m-learning among the students in Jordanian higher education institutions?

3. How do the acceptance of m-learning different across the student groups in Jordanian higher education institutions?

1.5 Research Objectives

The objectives of this study are as follow:

1. To identify the factors that influences the acceptance of m-learning among students in Jordanian higher education institutions.

2. To identify the most influential variables under each external factor that would predict the students' acceptance of m-learning in Jordanian higher education institutions

3. To investigate the students' differences in the acceptance of m-learning based on mobile device ownership, mobile learning usage, mobile Internet usage, gender, and field enrollment in Jordanian higher education institutions.

1.6 Significance of the Study

This study suggests significant practical and theoretical contributions in the area of students' acceptance of m-learning. From the practical perspective, the study is significant in that it provides an insight into one of the most important issues in Jordanian higher education, which is the acceptance of m-learning. The findings of this study are important to the development of m-learning acceptance and the successful future implementation of m-learning. This study determines the factors that could influence the students’ acceptance of m-learning in higher education institutions in Jordan. Determining the significant factors that could influence the students’ acceptance is aimed at reducing the students’ resistance to use m-learning systems. Thus, the findings of this study contribute practically in solving the research problem, which is the students' acceptance of m-learning.

Additionally, it will help determining factors that promote and hinder the acceptance of m-learning in Jordanian higher education institutions. This in turn would help the academic staff in preparing effective guidelines in order to provoke their students’ interests in participating in m-learning activities. It will also provide the m-learning course designers with the positive key factors that could increase the students’ willingness to use m-learning systems.

Also, the findings would be beneficial to the Ministry of Higher Education in improving their universities m-learning courses to engage the students in the learning processes. In addition, this study assists in fostering university partnerships with third-party businesses and enhances their partners’ understanding of student requirements in the educational system. In regards to this, this study will help the manufacturing and marketing departments of companies understand the more specific needs of educational institutions.

From the theoretical standpoint, the results obtained from this study are consistent with the theories and previous literatures. The empirical evidence from this study contribute to the body of knowledge in the fields of IS and m-learning acceptance by providing information needed for their development and implementation. This study hopes to contribute by producing m-learning acceptance model based on the factors that have been confirmed to be most significant. This will help the higher education institutions to work on the acceptance of their m-learning system and ultimately eliminate the student resistance in the future. The present study also hopes to contribute in proving the significant role of attitude relationship between perceived ease of use, perceived usefulness, and the students' acceptance of m-learning. While most studies in the area of technology acceptance have tested the demographical factors as antecedents and moderating factors, this research tests directly the relationship between the proposed demographical factors and the students' behavioural intentions (m-learning acceptance) towards using m-learning. Also, the proposed factors (culture, trust, and technology service quality) have been tested indirectly with the students' acceptance on m-learning. This study also investigates the ability of TAM in predicting m-learning acceptance in a non-western culture (Jordan). Thus, other researchers who are working in cross-cultural research and the meta analysis field will find the research findings useful for the purpose of comparison in their future studies.

1.7 Scope of the Study

This study proposes a model containing significant factors that could lead to the acceptance of m-learning implementation in Jordanian universities. Data including information that help the study to understand the culture, trust, and technology service quality factors affecting m-learning acceptance in Jordan were collected from 395 students of five Jordanian public universities which adopt m-learning through self-administered questionnaires. The five universities are 1) The university of Jordan 2) Yarmouk University 3) Mutah University 4) Jordan University of Science and Technology 5) The Hashemite University.

The undergraduate students in public universities and mobile wireless technology wereused as tools to measure the acceptance of m-learning implementation as the unit of analysis. Particularly, Pearson product-moment Correlation, Multiple regression analysis, Stepwise regression analysis, T-test, and One way ANOVA were performed to analyze the data. On the other hand, the mobile network infrastructure and mobile protocols were excluded from the targeted scope. The issue of acceptance and its related theories and models were discussed, analyzed, and reviewed.

1.8 Research Framework

The research framework consists of three main stages: Phase 1, Phase 2 and Phase 3. The three stages were addressing the central research questions and achieve the research objectives as seen in Figure 1.1. In Phase 1, the problem, basic model of this research and the factors that determine students' acceptance of m-learning in Jordanian higher education institutions are identified from the preliminary study and reviews of literatures.

In Phase 2, based on the information gathered in Phase 1, the study proposes an initial model for the students' acceptance of m-learning implementation in Jordanian universities. Questionnaires were prepared and a pilot test was conducted to test its reliability. The revised questionnaires were distributed and continued for data collection, data screening, and data analysis to achieve the research objectives.

In Phase 3, the final model was proposed based on the results and the hypothesis testing. This phase involves the development of the final theoretical model for students' acceptance for m-learning in Jordanian higher education institutions.

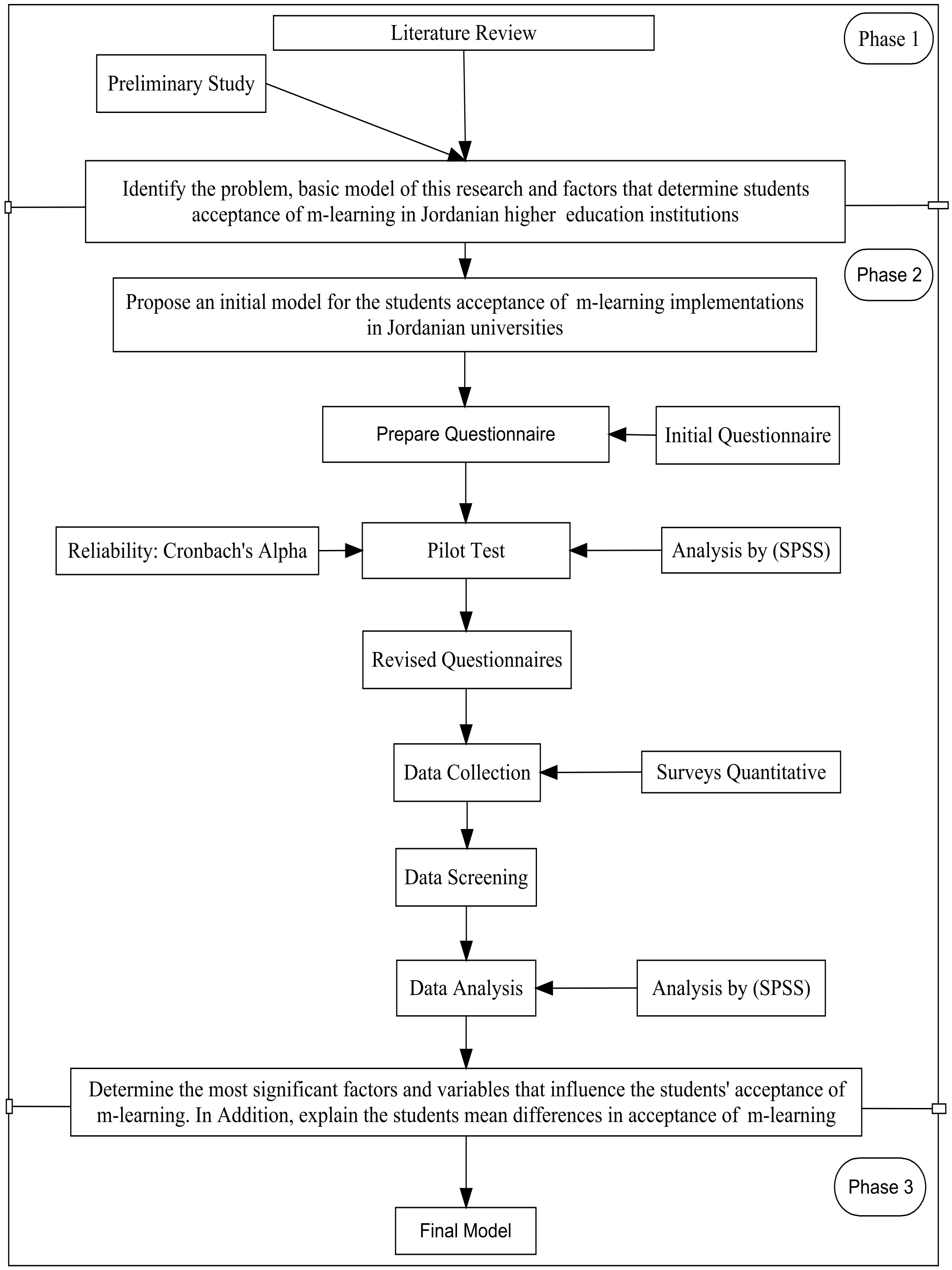

Figure 1.1: Research Framework

1.9 Thesis Structure

This thesis contains six chapters whiles this chapter describes about the background of this study, the remaining discuss about the study in-depth. In short, each chapter is obtained in the following paragraphs.

Chapter 1: Introduction

This first chapter provides an overview of the study. It describes the research background and outlines the problem statement, research question, research objectives, the significance of the study, the scope, and research framework.

Chapter 2: Literature Review

Chapter two reviews the concept of learning, learning systems and m-learning in higher education institutions, the needs of m-learning, issues and challenge of the acceptance of mobile learning in higher education, state-of-the-art of m-learning in developing countries and acceptance models.

Chapter 3: Constructing Research Model

Chapter three elaborates the state-of-the-art of culture, trust and technology services quality with relation to expanding the TAM. The main gist of this chapter is the exposition of relevant empirical studies to help the study formulating the research hypotheses.

Chapter 4: Research Design and Methodology

Chapter four outlines the research design and methodology. It includes descriptions of the research design, descriptions of the population, sampling methods and sample size, research instrument, research procedures, pilot test, and methods for data analysis

Chapter 5: Findings

Chapter five presents the findings to including a detailed data analysis and results of the research: reliability tests, factor analysis, correlation and regression analysis tests of the hypotheses, stepwise regression, ANOVA, and t-tests.

Chapter 6: Conclusion

Chapter six concludes the study by discussing the outcomes, and the implications of the study, including contributions, limitations, and recommendations for future research.

CHAPTER TWO
LITERATURE REVIEW

This chapter describes the concept of learning, learning systems, and mobile learning in higher education institutions. The needs of m-learning are described. In addition, current m-learning implementations in developing countries are explained. Some theories and models for technology acceptance are also highlighted. Besides, the roles of demographic characteristics in students' acceptance of m-learning are presented.

2.1 Learning

How is learning defined? It can be interpreted as follows: the comparatively long lasting change in the behavior of an individual, behavior potential or capability resulting from experience or practice(Weinberger, 1998; Winstein, 1991). Besides, the definition can also be viewed from another perspective, for example, the other main process of producing comparatively enduring change and maturity resulting from biological growth and development. Therefore, the long-lasting change in ourselves or others, with the main reason being either maturation (biology) or learning (experience) (Sarason, 2004). However, there is no connection to altering the biology of an individual (Miller, 1996; Wilson, 1978); the only vital component is to avail an opportunity for students to partake in experiences that will lead to long lasting change (Taraban, Box, Myers, Pollard, & Bowen, 2007).

In a similar vein, for the education system, students now have more control over their education, access to huge amounts of information, are technology-savvy, and use different modes of learning and communication. Two major goals of higher education systems traditionally are: 1) educating students and 2) conducting research (Nomadic, 2004). In fact, the Higher educational systems have had significant impact on society and the economy as students have now been provided with the requisite literacy tools to succeed and new innovations have been created through research. On the other hand, the educational system has been influenced by society, the economy, and businesses and how the education and research are conducted are relative to current demands. Further, technology has indeed significantly influenced and even revolutionized the interaction between economic and educational systems in society (Boylan, 2004).

In fact, technological evolution is constantly occurring; its development and adaptation are driven by the desires of society; individualization, convenience and attractiveness are among the factors contributing tothe attractiveness of an increasingly egocentric lifestyle. The educational system can take a proactive role to be part of this change and not standing in the sidelines waiting for the “right time” (Ragus, 2006). In order to stay relevant, technology infusion and diffusion into the educational systems have become a necessity.

On the other hand, mobile technologies and pedagogies have the potential to uplift the experience of the student, besides reaching out to more students than previously. Although the concept of mobility is not new, it is however a multi-faceted approach to teaching and learning. Although it is not a technological trend, it is however currently embedded into the lives of individuals and society because it is a private and personal tool that provides freedom and a sense of ownership.

Wedge and Kearns (2005) defines that learning is basically a social construct that provides access to teaching, cooperation, research, relevant resources, analysis and integrated results; in which it can be seen as knowledge and wisdom. On top of that Sharples et al. (2005) perceive learning as a flexible process, often open to changes and modifications, mediated by knowledge and technology in supportive teacher, learner, and peer relationships. Although learning is the subject of huge amounts of research, it is not detailed out in this study. On the other hand, theories are presented in pedagogical forms that support m-learning or vice versa.

In this chapter, a brief overview of the changes in the educational system over the last century is presented. Among the issues studied are: 1) the impact of technology-assisted learning commencing with the change from the model on which universities and other learning institutions were established, for instance, the traditional model to the distance learning model; and2) how the economy and society shifted from industrial-based society to an information economy and society driven by the electronic and digital revolution. As described in Chapter 1, the mobile revolution has introduced crucial changes in the economy and society and has become deeply embedded into society, being driven now by economic and societal factors. The educational system is beginning to study in depth about this new teaching and learning technology; hence the shift from e-learning to m-learning is becoming important in enhancing the educational system or in some cases radically changes it.

2.2 Traditional to Distance Learning

The educational system, including universities have played important roles in society and the economy. Graduates contribute to the society and the economy by becoming innovative and productive workforces. In order to contribute to the society and the nation as a whole, it is important for the whole educational system to comprehend the needs and demands of the society and the economy. Besides this, learning institutions must be able to adopt flexible pedagogies, and implement strategies that promote learning and knowledge. Traditionally, knowledge transfer, education, and learning have always been delivered through the classic face-to-face space-and time-restricted educational model (now the backbone of university education). Teaching takes place in the classrooms in campuses, which act as knowledge hubs, and this knowledge is transmitted via the university library or the instructor who are regarded as the fountain of knowledge. Traditional learning is predominantly the main mode of education and learning in universities.

The development that has been witnessed in technologies - especially communications and transport - has much helped in adopting new form of education such as distance learning(Keegan, 2002). Many reasons can be attributed to the need for distance education: industrial societies, working adults, and reaching students who are geographically separated from the campus, have placed new demands on the educational system to offer off campus education through distance learning modes. Before the advent of technology, correspondence courses were offered for more than 100 years (Valentine, 2002). Distance education is defined by Greenberg et al. (1998) as ‘a planned teaching/learning experience that uses a wide spectrum of technologies to reach learners at a distance and is designed to encourage learner interaction and certification of learning’. Keegan (1995) defined distance education and training as ‘the technological separation of teacher and learner which frees the student from the necessity of traveling to a fixed place, at a fixed time, to meet a fixed person, in order to be trained‘. Several other definitions are available in the literature and key words like physical and or time separation of the student from the university and the instructor can be found. Hence, distance education was introduced by the universities in order to be able to deliver learning to outreach students who are not able to attend classes in university campuses because of distance and time limitations or other professional commitments at work. Other than this, increased competition and pressures placed on universities to control costs, generate additional revenue, and meet customer needs further explain why universities ventured into distance education (Collis & Wende, 2002; Gururajan, 2002; Horgan, 1998; Valentine, 2002).

A lot of documentation exists regarding the increasing demand for distance education; in spite of teething problems with quality of instruction and equipment, studies lend support to the success of distance education in universities (Devarics, 2001; Ferguson & Wijekumar, 2000). Technologies such as TV, radio, video, and audio tapes became de facto methods for initial technologically driven distance education modes (Imel, 1998;

Moore & Lockee, 1999; Teaster & Blieszner, 1999). The electronic, information, and communication revolutions and the Internet gave rise to online and electronic methods of students' outreach education and eventually, led to the shift to e-learning. In fact, some private universities offer their programs only via e-learning or online learning.

2.3 Electronic Learning

Electronic learning makes it much more feasible for universities to undertake distance learning(Collis & Wende, 2002; Gururajan, 2002) and it is has been widely offered in either stand-alone or part of a blended mode of learning (blended learning) (Matheos, Daniel, & McCalla, 2005).Particularly, blended learning combines traditional teaching methods with e-learning and e-teaching methods; it can be used for traditional and non-traditional students who are on-campus or who are able to attend face-to-face lectures (Mortera-Gutierrez, 2006).

E-learning has defined in many ways. Trifonova and Ronchetti (2003) defines e-learning as: technology-delivered or technology-enhanced learning, whereby two modes of usage are supported: 1) learners being physically separated from the instructor, with the whole process of teaching and studying being technology-mediated. 2) The earlier mentions blended or hybrid learning with traditional learning scenario through complementary services such as online delivery of learning materials, syllabus, etc. Some argue that blended learning is a mix of traditional face-to-face and online learning leading towards an enhanced learning experience (Collis & Moonen, 2002).According to Rosenberg (2001) e-learning is basically a networked form of learning which depends on internet technology. Pinkwart et al. (2003) defines e-learning as 'learning supported by digital electronic tools and media'. It is hence implied that e-learning refers mainly to the online mode of learning.

E-learning supports synchronous and asynchronous communication and delivery of learning materials via live video and internet communications. Examples of such delivery are email, chat rooms, white boards, and instant messaging. Other components include learning management systems (LMS) such as WebCT, BlackBoard, and Learning Space, which are widely used to support on and off-campus students (Keegan, 2002). Most professors are familiar with some forms of LMS and use it in varying levels of sophistication. Some may just post lecture notes and assignments whilst others may administer exams and facilitate projects.

E-learning has been well established and has been used in many major universities worldwide. Faculty members and students widely accept e-learning, be it on-campus or off-campus, in a stand-alone or mixed delivery modes. At the same time, it is still growing and is continually being refined on a continuous basis as the requirements and services are expanding and more applications become available. Hence, technical supports for such systems are crucial. In fact, training, user involvement, and commitment from university administrators and IT departments can minimize errors (Abbad, Morris, Al-yyoub, & Abbad, 2009). However, e-learning offers limited access to knowledge or information (Denk, Weber, & Belfin, 2007). Wired technology cannot provide the 'at anytime, from anywhere' functionality, an advantage which is now being offered by mobile wireless technologies.

2.4 Mobile Learning

Mobile Learning is a method of using wireless and mobile technologies for education by extending access to a desktop-based online environment to handheld devices such as mobile phones or personal digital assistants (PDA) as part of a mobile community (Farooq, Schafer, Rosson, & Carroll, 2002; Singh & Bakar, 2007). In general, m-learning can be viewed as any form of learning that happens when mediated through a mobile device, and a form of learning that has established the legitimacy of ‘nomadic’ learners (Bryan, 2004; Nomadic, 2004). M-learning can be used to support a wireless online virtual community that is linked to a campus server. This could enable students who are interacting with their handheld devices to merge their learning experiences in a shared collaborative environment both synchronously and asynchronously (Farooq et al., 2002). However, some students do not have the desire to use m-learning (Al-Zoubi et al., 2008; Lawrence, Bachfischer, Dyson, & Litchfield, 2008). The following sections include detailed discussions on the definition and concepts of m-learning, the needs for m-learning, m-learning in higher education, issues and challenges of m-learning and current implementations of m-learning in developing countries.

2.4.1 Definition and Concepts of Mobile Learning

Current practice, academicians and practitioners worldwide define m-learning differently (Paliwal & Sharma, 2009). Among the definitions are:

a) “*Mobile learning is learning through mobile computational devices*.”

Quinn (2000)

b) “*Mobile learning is any sort of learning that happens when the learner is not at a fixed predetermined location or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies*.”

O’Malley et al.(2003)

c) “*Mobile learning or (M-learning) is a natural extension of e-learning*.”

Brown (2004)

d) “*Mobile Learning is the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime*.”

Geddes (2004)

e) “*Any educational provision where the sole or dominant technologies are handheld or palmtop device*.”

Traxler (2005)

f) “*A process of coming to know, by which learners in cooperation with their peers and teachers construct transiently stable interpretations of their world*.”

Sharples (2005)

g) “*Mobile learning is a system and process that connects learners with distributed learning resources; while distance learning takes a wide variety of forms*.”

Horng and Horng (2009)

In conclusion, the definitions of m-learning earlier highlight three main characteristics: (i) there is a separation of place and/or time between instructor and learner, among learners, and/or between learners and learning resources; (ii) there is interaction between the learner and the instructor, among learners and/or between learner and learning resources conducted through one or more media (the use of electronic media is not necessarily required) and (iii) the learner is an individual or group that seeks a learning experience offered by a provider.

2.4.2 M-Learning vs. E-Learning

Previous studies on e-learning and m-learning provide a wide range of thought regarding m-learning classification. Some researchers emphasize the technology in m-learning, whether wirelessly networked devices or mobile devices that are not always connected. Other researchers emphasize the pedagogy over the technology, and social behaviorists incorporate social factors into m-learning systems. Others describe as a social revolution that goes with the mobile revolution(Rheingold, 2002). Hence, it is deduced that m-learning as defined earlier incorporates technology, social influences, and pedagogical or didactic factors.

Learning systems offer different views about how people learn and what the best method of learning is. In the case of distance learning the learner or student is always physically distanced from the university; distance education serves the student through delivery modes such as compressed video and television. Although the ‘e’ in e-learning refers to *electronic*, most definitions explicitly state or imply that e-learning refers to online learning(Rosenberg, 2001). This assumption is due to computers and the Internet being the dominant media for learning in the digital and knowledge age. This more specific designation of e-learning distinguishes it from distance learning by including a specific content and technology as evidenced by the difference on-campus and off-campus delivery modes of e-learning. Thus distance learning, as the name implies, is used only for off-campus students. In contrast, m-learning is not restricted to the distance learners and is not restricted by location; it can be used on-campus as well as off-campus and provides convenient, ubiquitous, and easy access to the materials. The relationship is illustrated in Figure 2.1. As seen in Figure 2.1, m-learning is a subset of e-learning and that e-learning is a subset of d-learning. Thus any m-learning event is an e-learning event and any e-learning event is a d-learning event.

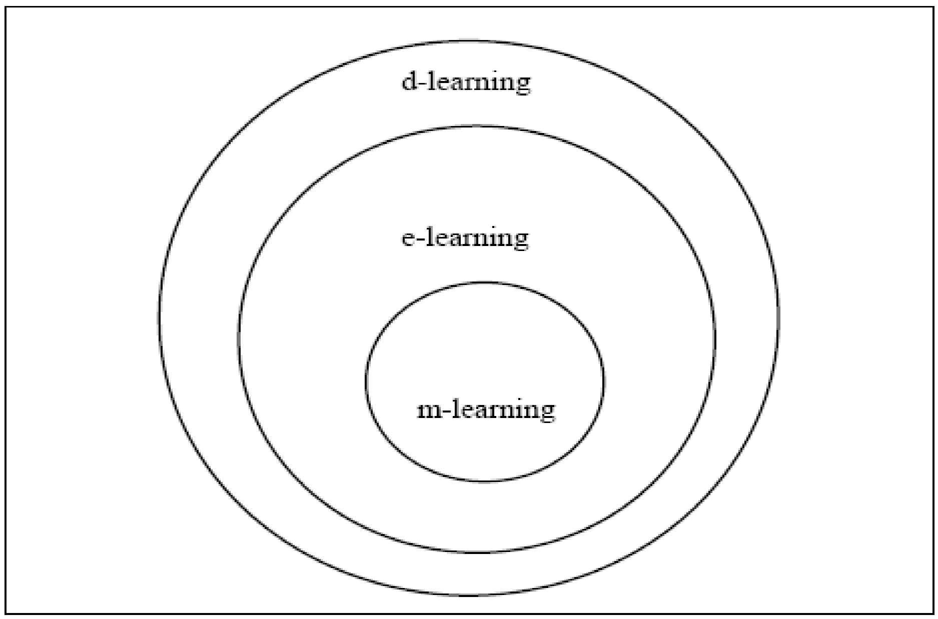

Figure 2.1: Set theory perspective of learning paradigms

Source: Gergiev et al., (2004)

On the another hand, Tick(2006) presents a different picture of the relationship among the three learning paradigms. D-learning is slowly transforming to e-learning because of ICT innovations but he argues that e-learning is not always d-learning. In addition, m-learning provides flexibility of timing and autonomy for the learner. This relationship is depicted in Figure 2.2.

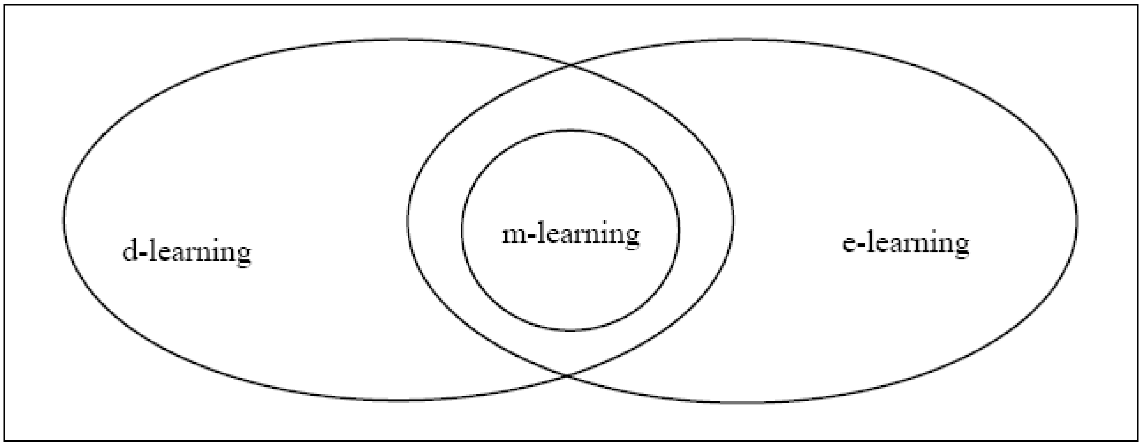

Figure 2.2: The interrelationship of d-learning e-learning, and m-learning

Source: Tick (2006)

In contrast, Low and O'Connell (2006)contradict the view that m-learning is a subset of e-learning provided by Georgiev et al.(2004). They believe that m-learning is linked to flexible learning's 'just enough, just in time, just for me' model. This point of view is depicted in Figure 2.3.

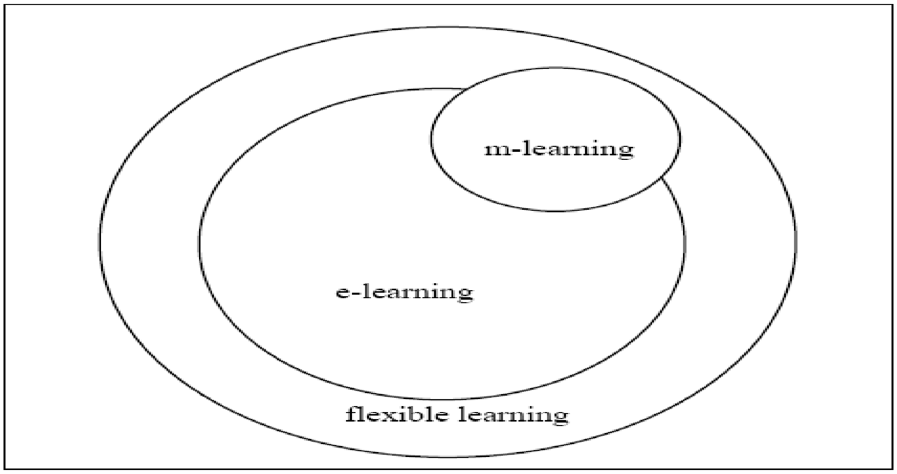

Figure 2.3: Mobile learning's link to flexible learning

Source: Low and O'Connell (2006)

This study approaches the differences between the learning paradigms in terms of possible range of learning space and flexibility available to the learner. When compared to traditional, distance, and e-learning, m-learning has the potential to offer greater range of learning spaces than the other methods. By being ubiquitous, and offering greater ease of access it can reach greater number of students and facilitate a larger learning space. Figure 2.4 represents this view in terms of range of learning space. In particular, m-learning learning space is greater than it is for e-learning as well as distance and traditional learning.

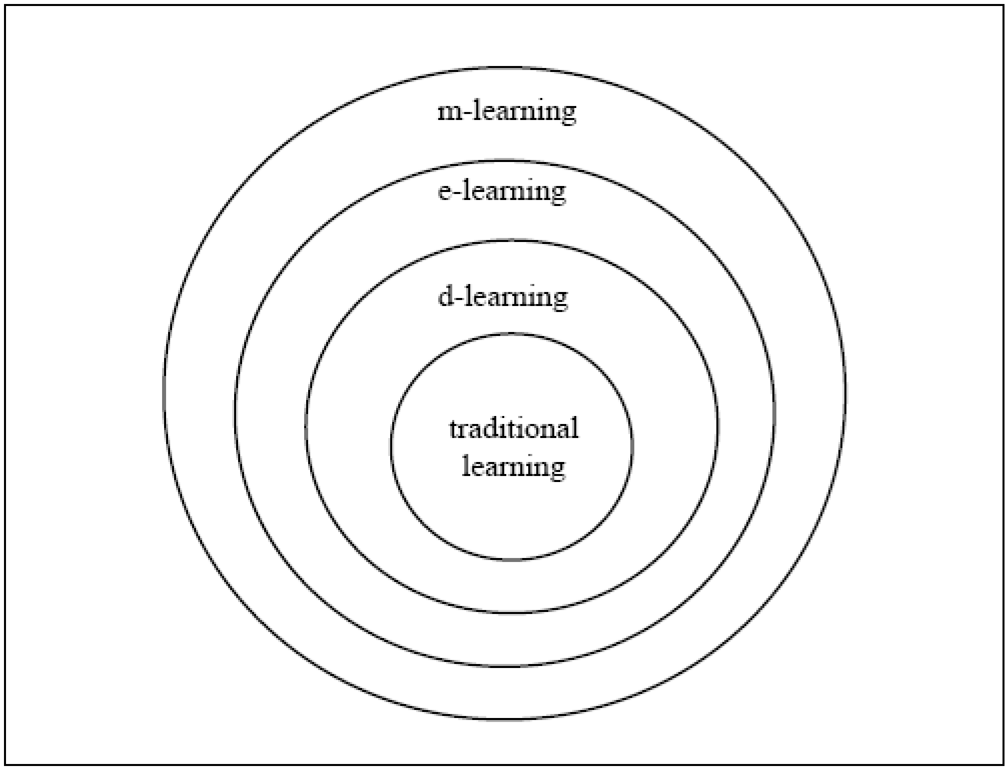

Figure 2.4: Learning space range and ease of access for learning paradigms

It is important to understand the similarities and differences between m-learning and e-learning since as discussed in the previous paragraphs many authors refer to m-learning as e-learning, stating thatm-learning is e-learning using mobile or wireless devices (Pinkwart et al., 2003; Quinn, 2000; Georgiev et al., 2004). As a summary, Table 2.1 lists the terms found in literatures describing the change in terminology between e-learning and m-learning (Laouris & Eteokleous, 2005; Traxler, 2007).

Table 2.1: Differences in terminology between e-learning and m-learning

e-learning	m-learning
Computer - fixed	Mobile device – portable
Broadband - wired	Mobile technologies such as G3, GPRS and Bluetooth – wireless
Intelligent Multimedia	Intelligent Objects
Passive	Interactive – spontaneous
Collaborative	Networked – Personal and private
Media-rich	Light weight bite-sized
Distance learning	Situated learning
Structured – more formal	Informal
Simulated situation	Realistic situation – context aware

Further, Table 2.2 lists the differences in the modes of communication between the instructor and students in both e-learning and m-learning.

Table 2.2: Instructor to Student communication

e-learning	m-learning
Normally Asynchronous	Normally Synchronous
Delayed communication	Instant communication
Scheduled – passive	Spontaneous – Interactive

Nevertheless, Tables 2.3 lists the differences in the modes of communication between student and student communication in both e-learning and m-learning.

Table 2.3: Student to Student communication

e-learning	**m-learning**
Face-to-face or e-mail-to-email	Flexible
Normally audio-teleconference	Video and Audio teleconference
Delayed communication –travel delay	Instant communication – no travel delay
Scheduled – passive	Spontaneous – Interactive
Poor due to group consciousness	Rich due to reduced inhibitions and one-to-one communication
Bound by location and time	Anywhere anytime

2.4.3 The Needs for Mobile Learning

According to Attewell (2005a) as quoted by Yousuf (2007) and Becking et al. (2008), there are several reasons to use m-learning. Particularly, m-learning helps learners improve literacy and numeric skills, recognize their existing abilities, identify where they need assistance and support, overcome the digital divide, make learning informal and raise self-esteem and self-confidence. Moreover, it is a portable form of learning from one place to another. In addition, m-learning provides real time and location independence and can be used for independent and collaborative learning experiences.

The outcomes of many of the projects and trials indicate that m-learning and mobile technologies and devices can support different learning activities in different settings and for different ages. As well as enhances the quality of traditional lessons by adding a blended approach (Naismith, Lonsdale, Vavoula, & Sharples, 2004). Additonally, Vovoula (2005) states that m-learning is more interactive; it involves more ‘bustle’, more contact, and more communication and collaboration between people. According to Attewell (2005a), m-learning offers unique learning opportunities that are personalized and that truly can be anywhere anytime. In fact, it offers convenience (Parsons & Ryu, 2006), personalized and secure content (Turker, Gorgun, & Conlan, 2006), and flexible and easy access to learning resources through personalized devices (Caudill, 2007). With the advantages it has, m-learning is applicable in educational institutions such as schools and universities. The portability of mobile technology allows the learning environment to be extended beyond the classroom. The personal nature of mobile devices makes them well suited for learning applications outside of formal education.

2.4.4 The Acceptance of M-learning

In the area of technology acceptance, the term 'technology acceptance' is used by researchers from different aspects and in variety ways. A numbers of models have been developed to investigate and predict the factors affecting users' acceptance of IT in different contexts rather than only define the concepts of acceptance. Dillon and Morries (1996)define students' acceptance of technology as "*the demonstrable willingness within a user group to employ IT for the tasks it is designed to support*". In conjunction, this study deduces that the definition by Dillon and Morries (1996) suits well with the acceptance of m-learning. Hence, it is adopted into this study.

This study therefore aims to understand and identify factors that influence the acceptance of m-learning among the students in Jordanian higher education institutions. Therefore, this study examines the effect of demographic, culture, trust, and technology service quality factors on the acceptance of m-learning among students in higher education institution in Jordan.

2.4.5 Mobile Learning in Developing Countries

M-learning implementations in developing countries has increased in the last a few years (Motlik, 2008). In Western countries, the students are increasingly taking advantage of m-learning services, and this phenomenon is regularly studied by researchers. The willingness of students to accept m-learning usually depends on how m-learning provides learning process (Denk et al., 2007). Hence, Jairak et al. (2009) argue that the adoption and the acceptance of m-learning is not similar in all countries.

Some developing countries in Asia adopt m-learning to enhance learning process. In relation, Malaysia is one of those countries, in which the adoption m-learning can be seen in Universiti Utara Malaysia (UUM), International Islamic University Malaysia (IIUM), UniversitiPutra Malaysia (UPM), Universiti of Malaya (UM), University Technology Mara (UiTM), Open University Malaysia (OUM), and College University

Islam Malaysia (KUIM) (Karim, Darus, & Hussin, 2006). M-learning in those universities provide many services for their students such as access to examination results, course registration, class schedule, date and venue of examination, account balance, student intake information, result for continuing education, and help desk.

According to Ramos, Trinona, and Lambert (2006), m-learning has increased dramatically in Philippines. The price drop and functionality increase lead, all students to have a cell-phone. At the same time, the Open University of Philippines has already offered a formal SMS-based mobile course. In relation to that, Ramos and colleagues report that 80 percent of students surveyed embrace the idea of learning through SMS.

There is also a commitment from the government of Mongolia to enhance m-learning (Batchuluun, 2007). The local telecommunication liberalization coupled with partial privatisation have resulted in increased competition, and the mobile phone market has shown a huge boom. With its dispersed population, mobile phones need to be explored as an educational tool. Cost is an important factor for SMS educational use. With regards to that, for Mongolian adult learners, SMS is a less expensive, a popular alternative to landline telephones.

The m-learning implementation has also gained momentum in Africa (Motlik, 2008). Visser and West (2005) found that in South Africa, less than 11 percent of the population own a landline telephone whereas 90 percent of the country's population has access to telephones due to the widespread use of cellular phones. In another study, Brown (2004) investigated the use of mobile phone in supports of and enhancing the learning process at University of Pretoria in South Africa. He found that m-learning "*has already started to* *play a very important role in e-learning in Africa*," and that the growth of m-learning "*has brought e-learning to the rural communities of Africa to learners that we never imagined as e-learning learners just a few years ago*".

In the Middle East, it is well known that organizations and individuals are late adopters of mobile technologies and its implementations in m-learning (Wagner, 2008). While the growth of mobile usage in the Middle East, particularly in Jordan, has been rapid, most of the initiatives are merely communication especially SMS-related. However, since the last a few years, some Jordanian universities have adopted m-learning to support their learning process. Among the universities that have implemented m-learning are Princess Sumaya University for Technology (PSUT), Arab Academy for Banking and Financial Sciences University (AABFSU), Mutah University (MU), and Yarmuk University (YU)(Al-Zoubi et al., 2008; Alksasbeh et al., 2011). However, their students are observed to be unwilling to use m-learning (Alksasbeh et al., 2011; Ismail et al., 2010).

2.4.6 Trends of Mobile Learning in Higher Education

Mobile and wireless technologies have shown great impact on universities and the definition of learning spaces (Johnson & Lomas, 2005; Long & Ehrmann, 2005; Wedge & Kearns, 2005). Additionally, information and communications technology (ICT) expands the boundaries of higher education into "anywhere/anytime" learning. Mobile and wireless communication, along with smart personal mobile devices, are facilitating access to classroom information that is not limited by time or location. Additionally, these devices, which facilitate the communication between the instructors and students, both inside and outside the classroom, have the potential to alter the concept of the classroom (Wentzel, Lammeren, Molendijk, Bruin, & Wagtendonk, 2005).

2.4.6.1 Mobile Learning Implementations in Higher Education

The implementation of m-learning in higher education institutions such as universities, must suit their suitability within the current curriculum. For instance, Keegan (2002) argues that not all teaching purpose are suited for m-learning environment, in which a preference should be given to short courses and theory and information-based classes. Obviously, adoption of m-learning in the university context is influenced by organizational, socio-cultural, and intra and interpersonal factors (Elgort, 2005).

In general, m-learning can be deployed when any form of learning occurs when mediated through mobile devices (Winters, 2006), and a form of learning that legitimizes nomadic learners (Alexander, 2004) happens. It has been described as an emergent paradigm in a state of intense development (O'Malley et al., 2005). However, not many universities have adopted the widespread m-learning technologies. In fact, in those that have, it is not clear that they have pedagogically used it in appropriate ways. For example, lecturers in higher education in the UK have made use of SMS (Short Messaging Service) as prompts for course requirements, polling classes, and pop quizzes with some universities experimenting with phone exams where the users' voice print identified them as the test taker (NMC & Educause, 2006). Kim et al. (2006) reviewed the way universities use personal digital assistants (PDAs), and found that storage and retrieval of information such as e-books, courseware, and timetables are the general uses. Similarly, digital audio players such as Apple's iPod have primarily been used in higher education to 'deliver' lectures that are recorded and subsequently podcast as Rich Site Summary (RSS) feeds to students' computers to be downloaded to iPods (Belanger, 2005). These devices then allow for repeated listening from anywhere, and at anytime.

A framework for classifying educational uses of mobile technologies has been provided by Patten et al. (2006). It suggests that the uses of m-learning relate mainly to the administrative functions such as calendaring and timetabling; reference functions such as e-books and dictionaries; and interactive functions as in response and feedback activities. They argue that the theoretical underpinnings of these activities appear to be either non-existent or principally behaviorist in nature.

On top of that, Becta (2004) suggests that educational institutions need to consider whether they can provide appropriate training and technical supports required for m-learning implementation. Additionally, all stakeholders should also be concerned in the development of the adoption plans (Wood, 2003).

Beside the works described in previous paragraphs, Tables 2.4a and 2.4b summarize various previous m-learning initiatives and projects available in literatures. Although this list is not all inclusive, it does represent a variety of applications of m-learning using a wide range of research subjects: school dropouts, K-12 students, university students, and adult learners (Farrow, 2011; Cochrane, 2010; Alexander, 2004; Attewell & Savill-Smith, 2003; Belanger, 2005; Chinnery, 2006; Colley & Stead, 2003; Klopfer, Squire, & Jenkins, 2002; Little, 2006; Mitchell, Doherty, & Net, 2003; Rogers et al., 2002; Traxler, 2003; Trifonova & Ronchetti, 2003; Wentzel et al., 2005;Cochrane, 2010). The tables outline a brief description of each research or project, sponsor and location of the research, research population, and key outcomes.

Table 2.4a: List of previous studies of research projects in m-learning

Research Project Name	Description	Sponsor - Location	Population
MOTILL (Farrow, 2011)	A taxonomy of ethical issues based on dominant positions in meta-ethical moral theory is proposed. Using categories from the Mobile Technologies in Lifelong Learning (MOTILL) project	The Open University. Milton Keynes, UK	General
Moblogging (Cochrane,2010)	-Mobile Web 2.0 project -The projects were designed to explore the potential of mobile Web 2.0 tools to enhance both the formal and informal teaching and learning environments with a focus upon mobile blogging (moblogging) -Critical success factors identified include: the importance of the pedagogical integration of the technology into the course assessment, lecturer modeling of the pedagogical use of the tools, the need for regular formative feedback from lecturers to students, and the appropriate choice of mobile devices and software to support the pedagogical model underlying the course.	Centre for Teaching and Learning Innovation, Unitec, Auckland, New Zealand	Student and teaching staff
m-learning (Attewell, 2005)	- Pan-European project - Support young adults who are at risk of exclusion from society to become engaged in learning opportunities and facilitate delivery of information technologies that are inexpensive and accessible such as mobile phones - measure changes in attitude towards learning and not specific learning gains	European Commission Information Society – UK, Italy, Sweden	Young Adults not in full time education or training
MOBIlearn (Naismith et al., 2004)	- Worldwide European led project that uses mobile technologies to explore context-sensitive approaches to learning - Produce a reusable architecture for m- learning - Field trials to include blended learning (i.e. part of a formal courses), location dependent learning (such as during visits to	European Commission Information Society - Europe, Switzerland, Israel, USA and Australia	General

	museums) and information interpretation learning (medical information for everyday needs)		
GIPSY / Manolo projects (Wentzel et al., 2005)	- Develop a more flexible and location-based way of learning - Main objective to explore the wireless supported learning environments - Student focus groups influenced the development of courses used in the project - Individual and collaborative learning were designed into the courses - Field trips were made to collect geo-referenced data - While GIPSY focused on m-learning Manolo was the next phase to integrate electronic, wireless, and m-learning	SURF (an ICT partnership organization for all Dutch universities) - Netherlands	University students in Geographic Information Systems (GIS) departments
Duke's Digital Initiative (Belanger, 2005)	- Investigate the Pedagogical uses of iPods. Audio based Podcasting and RSS (really simple syndication) feeds - Encourage faculty to design curricula that incorporated the technology - Provide portable access to course material for reference and review - Support collaboration and field research	Duke University and Apple Inc.	University students and faculty
Wireless Instruction Initiative (WII) (Little, 2006)	- Exploit existing UT wireless network relevant educational technologies. - Instructors integrate wireless technology into their courses - Instructors participate in summer institute for pedagogical consultation - Classroom and field based	University of Tennessee	University Students and faculty
Stanford Learning Lab (Chinnery, 2006)	- Language study programs utilizing mobile phones - Included vocabulary practice, quizzes and access to live talking tutors - Fragmented short learning modules for use by the learner	Stanford University	University Students

MIT Games-to-Teach project – Environmental Detectives (Klopfer et al., 2002)	- Augmented reality educational gaming to develop skills of environmental inquiry - Hand held gaming using a pocket PC to supplement real world interactions through context-sensitive data and social interactions - Goal to discover source of contamination and develop a suitable remediation plan - Can do simulated data collection and interviews with experts through 5 trials	MIT	Secondary and first year under-graduate students

Table 2.4b: Key outcomes of research projects in mobile learning

Research Project Name	Key Outcomes
MOTILL	Proposed a framework accommodates applications as diverse as policy review, lesson design, evaluating institutional activities and describing the ethical importance of research projects
Moblogging	-Identify critical success factors for mobile learning wich include: the importance of the pedagogical integration of the technology into the course assessment, lecturer modeling of the pedagogical use of the tools, the need for regular formative feedback from lecturers to students, and the appropriate choice of mobile devices and software to support the pedagogical model underlying the course.
m-learning	- Learners were mostly enthusiastic about m-learning - 62% would participate in future learning after trying m-learning - Of the above 80% expressed preference to using mobile devices - M-learning can contribute to attracting young people to learning and maintaining interest
MOBIlearn	- Developed an m-learning architecture that includes requirements of end-users, pedagogical experts, mobile operators and mobile device manufacturers, content and technology providers and market analysts
GIPSY / Manolo	- From students perspective, they were very satisfied and preferred using PDAs - Although screen size presented a problem students preferred mobility - Technical problems such as battery life and bandwidth - Personalization is crucial but not yet implemented, many courses make tailoring material to personal preferences difficult - Wireless and m- learning have logistical, resource and cost impact that should be considered in future implementations
Duke's IPod	- iPod use increased from 19 in spring 2005 to 47 in spring 2006 - Faculty demand for iPods is rapidly increasing - Documented success from students and faculty - Expanding initiative to include video and other multimedia
Wireless Instruction Initiative	- Faculty and students expressed satisfaction - Faculty and technical support is critical - 100% administrative sustained change at faculty level, 80% at departmental level, pursuing institutional level change - Independent and self directed learning achieved

Stanford Learning Lab	- Mobile phones were effective for quiz delivery if delivered in small chunks - Automated voice vocabulary lessons and quizzes had great potential - Live tutoring was effective - Poor audio quality could negatively affect comprehension - Screen sizes are a hindrance for learning new content but are effective for review and practice
MIT Games-to-Teach project – Environmental Detectives	- Students responded very favorably to the investigative experience and the experience of interacting with technology

The outcomes of many of the projects and trials indicate that m-learning and mobile technologies and devices can support different learning activities in different settings and for different ages. In fact, m-learning can also enhance the quality of traditional lessons by adding a blended approach (Naismith et al., 2004). The next section discusses different mobile wireless devices that are being used in higher education.

2.4.6.2 Mobile Wireless Technology in Higher Education

Many higher education institutions such as colleges and universities have adopted mobile wireless technologies as teaching and learning tools. Swett (2002) pointed out that more than 90% of public universities and 80% of private universities in the US have had some level of m-learning implementations and mobile wireless technologies. In support of that, Oliver and Wright (2002) states that *"Louisiana State University (LSU) implemented Cisco CTE 1400, an application enabling the transformation of web page into a format appropriate for mobile wireless devices*". This application enables LSU to deliver its web content and applications to mobile wireless devices mainly because of the increasing number of mobile devices users;76% used mobile phones, 14% used PDAs, and 9% had devices enabled for wireless connectivity (Cisco System, 2003). Other universities, such as the University of Minnesota (UM) and the University of South Dakota (USD) even require their students to have mobile wireless devices for their school assignments (Oliver & Wright, 2002).

Similarly, a few universities in Jordan have also been providing various wireless phone-based services. Among the universities are Princess Sumaya University for Technology (PSUT), Arab Academy for Banking and Financial Sciences University (AABFSU), Mutah University (MU), and Yarmouk University (YU) (Al-Zoubi et al., 2008; Alksasbeh et al., 2011).These universities provide a few services for their students such as access to examination results, course registration, class schedule, date and venue of examination, student intake information, and results for continuing education and help desk. In the future, mobile wireless devices and wireless networks may be required for all students and universities. Besides that, Table 2.5summarizes colleges and universities that undertakes projects using different mobile wireless technologies in teaching and learning activities (Bartel & Meerts, 2002).

Table 2.5: Mobile Wireless Technologies Uses in Higher Education

Schools	Users	Tool	Key Uses
North Carolina State University College of Veterinary Medicine, Raleigh, NC	Students	PDA	▪ Accessing to many medical references ▪ Participating in wireless polling during class
University of Central Oklahoma College of Education, Edmond, OK	Faculties and Students	PDA	▪ Accessing to information ▪ Supporting innovative teaching practices ▪ Enhancing collaboration and builds relationships
UC Berkeley School of Education K-12 Schools, Berkeley, CA	Students	PDA	▪ Offering students mobile data-gathering tool ▪ Allowing for new types of curricular activities ▪ Helping students understand difficult science concepts
Stanford University, Stanford CA	Faculty, students and staff	PDA	▪ Accessing data ▪ Enableing on-going communication among faculty, students, and staff ▪ Data exchange
Carnegie Mellon University, Pittsburgh, PA	Students	Wireless Computer	▪ Collaboration
University of California, San Diego, San Diego, CA	Faculty and students	Wireless LAN	▪ Providing better networking service for laptops and PDAs
Florida State University, Tallahassee, FL	Faculty and Law and MBA students	Wireless LAN	▪ Providing better teaching and learning environment
Wake Forest, Winston-Salem, NC	Faculty and students	Wireless LAN	▪ Providing innovative technology ▪ Others

Source: Bartel and Meerts (2002)

A number of different mobile wireless devices are being used in higher education such as smart phones, palmtop, tablet computers, wireless laptop computers, and Personal Digital Assistants (PDAs).In the learning environment, many researchers argue that mobile wireless computers, PDAs and handheld devices are used most often (Boggs, 2002; Fryer, 2002; Kim, et al., 2006; Lauricella & Kay, 2010; McGhee & Kozma, 2001; McKenzie, 2001). In response to the descriptions in this and previous paragraphs, this study focuses only on three mobile wireless devices that include mobile wireless computer, Personal Digital Assistants (PDAs), and mobile wireless phones (with SMS and MMS) because of their widespread use in higher education.

- **Mobile Wireless Computer**

According to Kim et al.(2006), mobile wireless computers which are commonly called wireless laptops, are the most popular mobile wireless technologies used in higher education. Wireless laptops have an integrated wireless card that enables short-range wireless voice and data communications. Unlike wired laptops that use an Ethernet card (also called Network Interface Card (NIC)) or Network card to connect to a network, mobile wireless laptops use a wireless network interface card (WNIC) to connect to a network (McKimmy, 2003). WNIC uses a very low radio frequency instead of a wired connection for connection to the network (Kim, Holmes, & Mims, 2004). There are a number of universities and programs in higher education that require students to use wireless-enabled laptops in class such as the University of Jordan and Princess Sumaya University for Technology (Al-Zoubi, Kahhaleh, Hasan, & Kharouf, 2007; Khwaileh & AlJarrah, 2010).

According to Demb et al.(2004), mobile wireless computers offer students the opportunity to engage in peer-to-peer communication via email, chat rooms, bulletin boards, and instant messaging. This kind of mobile communication, including multimedia messaging, web access, email and voice/text messaging, provides short learning activities that are attractive to students and foster collaboration (Shih, 2007). In addition, Gay, Stefanone, Grace-Martin and Hembrooke (2001) suggest that within a collaborative learning environment, students working in groups recognise and use social communication for the exchange of information, and that wireless connections increase the ability for students to collaborate whenever and wherever they want.

- **Personal Digital Assistants (PDA)**

Personal Digital Assistants or PDAs is another category of devices that has been investigated heavily in the literatures. Some of the reasons for investigating PDAs extensively are its screen size and the functions they offer that are not previously available. Now these devices are mostly integrated into smart phones. Livingston (2004) divides PDAs into two categories by the operating system they run. The first category is the Palm handhelds or PDAs which run the Palm operating system (OS). The second category is the Pocket PC which runs Windows Mobile OS and applications. Other operating systems not mentioned in literatures but in use are the Nokia Internet Tablet OS and Microsoft Windows CE. Today, PDAs can support Wi-Fi connections, Bluetooth, and GPS functions.

According to Yuen and Yuen (2003), students use the PDA to send and receive documents, spreadsheets, data, and even applications to other group members without wiring and downloading processes. Also, it is very famous for medical information (Winkelstein, 2002).

- **Mobile wireless phone**

According to Livingston (2004), mobile wireless phones such as smartphones have all the features of extensible phones in addition to PDA functions such as the personal information management (PIM) featureslike calendars, address books, notepads, and to-do lists that can all be synchronized with a PC. They run on an OS and associated applications such as Palm OS, Windows Mobile OS, Symbian OS, and Blackberry OS. Apple has introduced the iPhone (in 2007), which runs the OS X, in which all these OS support touch screens and handwriting recognition. Additionally, Blackberry supports a full miniature keyboard. In fact, programs are written for the OS as opposed to the restriction of BREW and J2ME platforms. These programs can be downloaded or customized and written by enterprises or educational institutions for their respective uses.

According to Kim et al.(2006), mobile wireless phone provides students with freedom of location and time. Furthermore, students improve their learning processes by using wireless handset that is a type of mobile wireless phone in a group discussion or teamwork. In such a case, wireless handsets can be used to collaborate in-group discussions easily and more efficiently. For example, students use a numeric keypad on wireless handsets, and then a handset sends a signal to a receiver that is linked to a wireless computer loaded with Global Positioning System (GPS) software. It is used to communicate with other software simultaneously. In this manner, wireless handsets provide a discussion environment where all responses and opinions are anonymous so students can address their opinion more freely without any offense from other students.

2.4.6.3 Current Issues and Challenges of Mobile Learning Implementations in Higher Education

Despite the many advantages of m-learning, there are challenges to overcome, whether technical, pedagogical, or administrative. Keegan (2002) states that although learners in Finland use mobile phones extensively, the adoption of m-learning in educational settings was still lacking. The reasons were mainly technical, stemming from the screen size of the mobile devices and the cost of mobile services. In response to that, Naismith et al. (2004) identified the following key issues and challenges of m-learning and teaching:

- Context: M-learning provides the ability to personalize the learning opportunity and information about the users' environment. This can pose ethical issues.
- Mobility: M-learning offers anywhere anytime capabilities to learning activities, inside and outside the classroom. This poses challenges to conventional teaching practices.
- Informality: M-learning encourages informal learning. This can make m-learning lose its benefits if it is too widespread.
- Ownership: Mobile devices offer personal access and ownership to support both personal and group learning. Personal ownership is important to commitment and engagement but poses challenges to institutional control.
- Learning over time: Mobile devices offer the challenge of providing effective tools to lifelong learners to reflect on their m-learning experience.

Further, Wagner (2005) offered three "catalysts for change" in terms of m-learning adoption in the United States. First catalyst is the explosive growth of wireless networks, services, and devices as evidenced by growth in spending on wireless communications (Dekleva, Shim, Varshney, & Knoerzer, 2007). Second, people want "anytime, anywhere" connections more than ever before; people want access, when and where they need it, to information, performance support, instruction, training, and education. Third, customers are demanding better mobile experiences; experiences need to be as direct and engaging as possible while at the same time not requiring too much incremental effort. After all, what is the point of automation if more effort is required with it than without it?

In order to be an effective and popular method of pedagogy, these devices, along with the infrastructure, must offer robust and reliable services through different platforms and transport mechanisms. Content and delivery will depend on the contexts of usage in education and learning. Hence, Wagner (2005) listed the following as necessary attributes to having a rich Internet mobile experience:

- Ubiquity – availability of a media player for the mobile device
- Access – availability of the network and content
- Richness – a smooth flow of content to the device
- Efficiency – of device media player client; application loading speed
- Flexibility – portability of application to different devices
- Security – from software and human spying and attacks
- Reliability – consistency of content display regardless of device
- Interactivity – freedom to interact with display and content

Previous sections claim that m-learning implementation in many developing countries is still not encouraging and looks less impressive (Adesope et al., 2007; Al-Zoubi et al., 2008; Ismail et al., 2010). This is because most developing countries are located at the South and far from technologically advanced countries. The distance and other issues have prevented the countries from receiving and deploying m-learning at the same rate as the advanced countries. On top of that, Sharples (2006) identified a number of key issues related to m-learning implementation such as recording of experiences in tension with privacy/security, social issues, trust issues, attentional aspects, technological issues, and the different perceptions of technology acceptance between the young and older people.

Previous studies and the preliminary study have shown that there are multiple issues and challenges in m-learning implementation such as culture (Bachmair, Pachler, & Cook, 2009; Kurubacak, 2007; Shao, Crook, & Koleva, 2007), trust (Attewell, 2004; Pirttiaho, Holm, Paalanen, & Thorstrm, 2007), and technology service quality (Al-Mushasha & Hassan, 2009; Al-Zoubi et al., 2008). The problems in m-learning acceptance are greatly magnified and have become more complicated in developing countries (Motlik, 2008). In order to encourage the acceptance of m-learning among students, a variety of services and social issues must be addressed by the parties involved. In response to this, Chapter three discusses the main possible factors that influence the acceptance m-learning acceptance reported in some developing countries.

2.4.6.4 Mobile learning in Jordanian Higher Education

Nowadays, Jordan is witnessing a comprehensive development in all fields and in different sectors. Higher Education is among the most important sectors, gaining a lot of Intention from the Jordan government. University education has an advantage with the generous support including the construction of new universities, scientific and applicatory colleges and a huge financial allocation of the budgets. The universities in the Jordan include ten public universities (Ministry of Higher Education and Scientific Research, 2010). In current implementation, out of ten public universities in Jordan, five of these universities have adopted m-learning.

- **University of Jordan**

  University of Jordan was established in 1962. It is the largest and oldest institution of higher education in the Hashemite Kingdom of Jordan. The university has the highest admission averages in the country and is considered the premier university in Jordan and one of the most prestigious in the Arab World. It is located in the Jubaiha area of the university District in Amman. The university currently include 18 fields and employs about 1400 faculty staff and has 37,720 students which 13,654 (36.2%) are male students and 24,066 (63.8%) are female students (Ministry of Higher Education and Scientific Research, 2010). University of Jordan has adopted m-learning since 2007 by providing a few services for their students such as an access to examination results, course registration, class schedule, date and venue of examination, assignments, quizzes, student intake information, and results for continuing education and help desk.

- **Yarmouk University (YU)**

Yarmouk University was established in 1976. It is located in the northern town of Irbid. The university has several international partnerships with overseas universities and many international students. The university currently includes 12 fields and employs about 764 academic staff besides a technical and administrative cadre of 420 employees and has 32,871 students (Ministry of Higher Education and Scientific Research, 2010). Furthermore, Yarmouk University has been introducing m-learning since 2007 by providing a few services for their students such as an access to examination results, course registration, class schedule, assignments, quizzes, date and venue of examination, student intake information, and results for continuing education and help desk.

- **Mutah University (MU)**

Mutah University was founded on 22nd March 1981 by Royal Decree. It is located in Karak Governorate in Jordan. The university currently includes 12 fields and employs about 528 faculty staff and has 16,252 students. (Ministry of Higher Education and Scientific Research, 2010). Mutah University has adopted m-learning since 2007 by providing a few services for their students such as an access to examination results, course registration, class schedule, assignments, date and venue of examination, student's account information, and help desk.

- **Jordan University of Science and Technology (JUST)**

JUST is a fast growing and dynamic university in Jordan. The university has dramatically expanded since its inception in 1986. A total of 2,300 students were enrolled in 1986. As of the academic year 2009/2010, about 20,000 undergraduate students and 1599 graduate students were enrolled at the university. Moreover, JUST include 11 fields and employs about 814 academic staff (Ministry of Higher Education and Scientific Research, 2010). Nowadays, JUST adopt m-learning by providing a few services for their students such as an access to examination results, course registration, class schedule, assignments, date and venue of examination, quizzes, student's account information, and help desk.

- **Hashemite University (HU)**

Hashemite University was established in June 1996. Teaching started at the onset of the academic year 1995/1996. Students were admitted to three faculties: Sciences and Arts, Economics and Administrative Sciences and Educational Sciences. As of the academic year 2009/2010, about 17,000 undergraduate students and 832 graduate students were enrolled at the university. Moreover, Hashemite University includes 12 fields and employs about 508 academic staff (Ministry of Higher Education and Scientific Research, 2010). Nowadays, Hashemite University adopts m-learning by providing a few services for their students such as access to examination results, course registration, class schedule, date and venue of examination, student's account information. Table 2.6 outline a brief description of each university.

Table 2.6: Brief description for the 5 universities that adopt m-learning in Jordan

Name	Establish	Total of undergraduate students	Total of all students	Male	Female	Total of academic staff	M-learning services
University of Jordan	1962	32767	37720	13654	24066	1394	(Examination results, course registration, class schedule, date and venue of examination, assignments, quizzes, student intake information, and results for continuing education and help desk)
Yarmouk University	1976	27298	32871	14135	18736	764	(Examination results, course registration, class schedule, assignments, date and venue of examination, student's account information, and help desk)
Mutah University	1981	14458	16252	7968	8284	528	(Examination results, course registration,

							class schedule, assignments, date and venue of examination, student's account information, and help desk)
Jordan University of Science &Technol-ogy	1986	20606	22205	11071	11134	814	(Examination results, course registration, class schedule, assignments, date and venue of examination, quizzes, student's account information, and help desk)
Hashemite University	1996	17668	18500	7584	10916	508	(Examination results, course registration, class schedule, date and venue of examination, student's account information)

Figure 2.5 shows examples of m-learning in university education in Jordan. Specifically, an electromagnetic engineering course was deployed and delivered through m-learning environments as shown in Figure 2.5(a). Students can access and perform quizzes anywhere anytime using the PDA as shown in Figure 2.5(b). The third example is mobile virtual laboratory developed, to help students perform virtual experiments using mobile devices as shown in Figure 2.5(c). In addition, students can share resources and equipment created using mobile devices via the Internet and the GPRS telecommunication networks as shown in Figure 2.5(d).

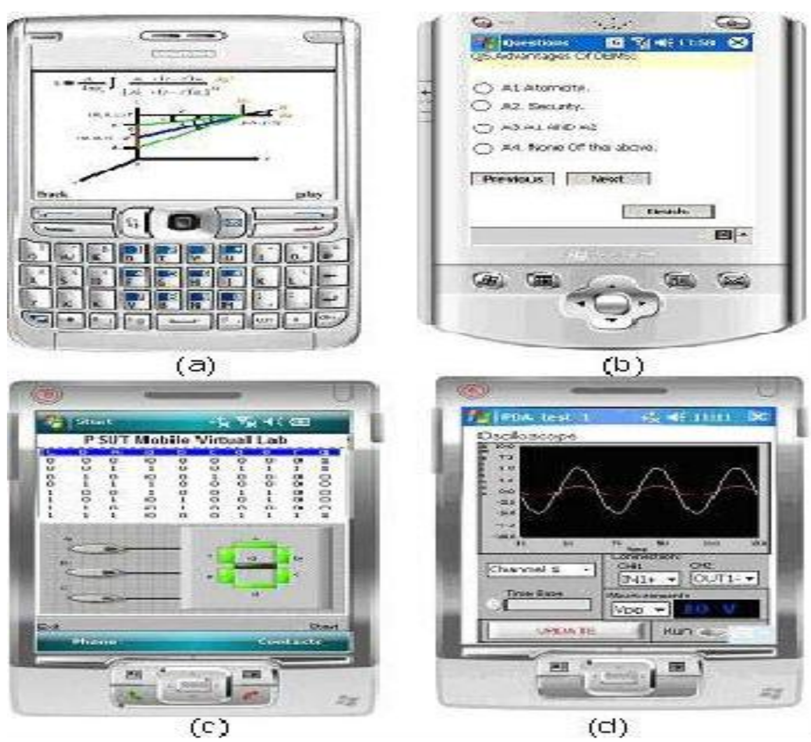

Figure 2.5 Examples of Mobile Learning in University Education in Jordan

Source: Al-Zoubi et al. (2008)

2.4.6.5 The Implications of the Trend of Mobile Learning Implementations in Higher Education on the Research

Encouraging students to make more use of m-learning is becoming a necessity for all countries that want to be successful in education (Al-Mushasha & Hassan, 2009; Al-Zoubi et al., 2007). There is a lack of research and development in relation to the acceptance of m-learning broadly, particularly in Jordanian universities (Al-Zoubi et al., 2008; Alrai, 2010; Ammon, 2010). After reviewing the different trends of m-learning implementation in higher education institutions (Section 2.4.6), issues and challenges of m-learning implementation in higher education institutions (Section 2.4.6.3) such as universities, and the low level of m-learning acceptance among students (Section 1.3), it is more convincing that there is indeed a need to identify the main factors that influence the students' acceptance of m-learning in Jordanian universities. In conjunction, there is also a need to determine the suitable theoretical basis of this study. Hence, appropriate theories and models of acceptance are discussed in the next sections.

2.5 Theories and Models of Technology Acceptance

In order to achieve various benefits that can be derived from m-learning, users must accept and use the m-learning implementation. Therefore, there is a need to study different aspects of this necessary phenomenon of individual reactions to computing technology from a variety of theoretical perspectives, from widely used technology acceptance theories including: Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Diffusion of Innovation (DOI), and Unified theory of acceptance and use of technology (UTAUT). The following sections discuss the theories and models applied in the previous researches of technology acceptance.

2.5.1 Diffusion of Innovation (DOI)

The acceptance process model was first introduced by Rogers(1962), based on the fact that an individual goes through a series of steps which are: knowledge, persuasion, decision, implementation, and confirmation. The theory perceives that new technologies are used depending on specific channels and social norms. The users have varying degrees of willingness to use the technology; and with the passing of time, the users normally adopt the technology (Rogers, 1995).

In DOI, Rogers defines diffusion as a process by which an innovation is communicated through certain channels over time among the members of a social system. Meanwhile, innovation has been described as an idea, a product, a technology, or a program that is new to the adopting unit. Hence, in general, the DOI theory proposes that perceptions of technology characteristics, such as its relative benefits, compatibility, complexity, trialability, and observability influence the adoption and the acceptance of any new product.

Many researchers have applied Rogers' DOI theory in their studies, for instance Raisinghani and Schkade (1998) in explaining the acceptance of Internet, intranet, and extranet technologies for electronic commerce applications. Also, Tan and Teo (2000) used it in describing the factors influencing the adoption of internet banking in Singapore. Additionally, Elgort (2005) used it in describing the influencing factors for the adoption of e-learning. It was followedwith the Flexible learning leaders inuniversities in New Zealand.

DOI on the other hand has limitation in terms of emphasis on the innovative characteristics of technologies, which equips the model with unsatisfactory explanations (Liu & Chen, 2009). It has been argued that DOI has the lowest explanatory power compared to other relating theories in technology acceptance domain such as TAM, UTAUT, TPB, and TRA (Khasawneh & Ibrahim, 2008). It tries to explain the innovation decision process, factors determining the rate of adoption, and categories of adopters. It helps in predicting the likelihood rate of adoption of an innovation. Nevertheless, it has been argued that the theory does not provide evidence on how attitude evolves into accept/reject decisions, and how innovation characteristics fit into this process (Karahanna et al., 1999; Chen et al., 2002). Yet other theories found in DOI a way to implement changes or make new ideas acceptable among students to accept or reject new technology such as m-learning.

2.5.2 Theory of Reasoned Action (TRA)

TRA is a well-developed and tested behavioral prediction model that has been successfully used since the middle of 1970s. Developed in 1967, It has been revised and expanded during the early 1970s by Ajzen and Fishbein (1980). The theory suggests that in order to understand attitudes and their relation to intentions, it is important to understand consumers' subjective norms. As an example, the reference group influences on consumer decision making, regarding a particular action (Fishbein & Ajzen, 1975).

In this theory, an individual's performance of a specific behaviour is determined by his/her behavioural intention (BI) to perform the behaviour. In particular, BI is determined by an individual's perception of personal factors, such as attitude (A) towards the behaviour and subjective norm (SN). SN can simply be defined as what the consumer believes other people would think of the behaviour being performed, which is the social pressure of the behaviour in question (Fishbein, 1979; Fishbein & Ajzen, 1975).

According to TRA, attitudes are a function of beliefs. The belief that performs an act would lead to a positive outcome, making individuals hold a positive attitude towards performing the behaviour. On a contrary, a person who believes that performing would lead to mostly negative outcomes would hold an unfavourable attitude. In this relationship, the belief that underlie individual attitude towards the behaviour is termed as behavioural beliefs (Fishbein, 1979).

In fact, SN is also the function of beliefs, which explains that an individual believes that specific individuals or a group thinks he/she should or should not perform the behaviour. If the person believes that most of the referents think he/she should perform the behaviour, the perceived social pressure to perform would increase the more he/she is motivated to comply with each of the referents. Conversely, if an individual believes that most referents are opposed to his/her performing the behaviour, his/her perception of social pressure not to perform the behaviour will increase with the motivation to comply. In this relationship, the belief underlying a person's beliefs is termed as the normative belief (Fishbein & Ajzen, 1975). Fishbein also demonstrates that one can build new beliefs by performing some behavior; these beliefs provide the basis for the construction of the attitude toward the objects, attitude in turn determines the individual's intention to perform the behavior in future and this intention leads to performance or non-performance of the behavior. This model is mostly used in the health-related fields and medical innovation (Beadnell et al., 2008; Hale, Householder, & Greene, 2002; Hoffman, Novak, & Peralta, 1999). In short, TRA includes three factors to predict system usages: perceived attitude toward behavior, Subjective Norms, and behavioral intention as shown in Figure 2.6.

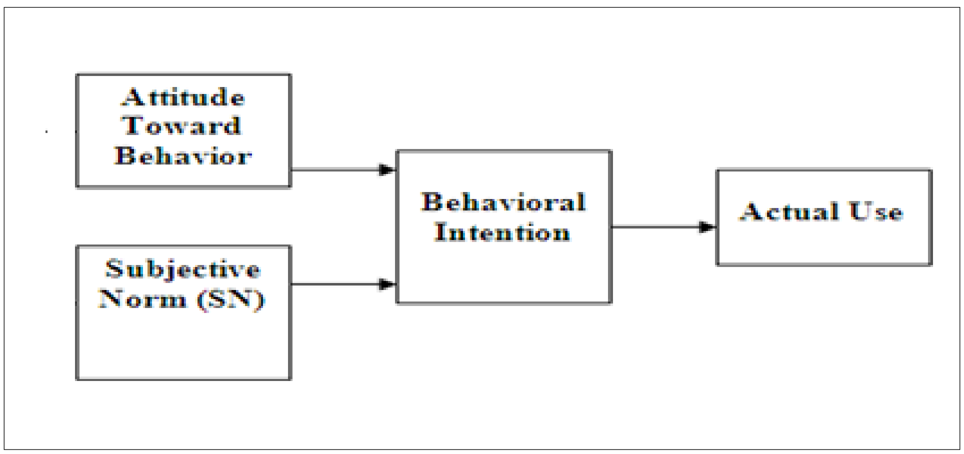

Figure 2.6: The Theory of Reasoned Action (TRA)

Source: Fishbein and Ajzen (1975)

Beside the advantages in the previous paragraphs, TRA, however, has some limitations. First, TRA assumes that users are in full control, and do not account for the influence of control factors. In fact, TRA assumes that adoption behavior will not be impacted by a user’s external support (Qingfei, Shaobo, & Gang, 2008). In reality, m-learning users are not in a full control, and adoption behaviour is impacted by user’s external factors such as culture and trust. Second, Davis (1989) states that TRA is a general model, and as such, it does not specify the beliefs that are operative for a particular behavior. Third, behavior in TRA must be voluntary, which does not work in an organizational context. Besides, TRA has the lowest explanatory power compared to other related theories in technology acceptance domain like TAM and TPB (Khasawneh & Ibrahim, 2008). Additionally, Ajzen (1985) noted that the theory is limited by what is called correspondence. In order for the theory to predict specific behaviour, attitude and intention must agree on action, target, context, time frame, and specificity (Sheppard, Hartwick, & Warshaw, 1988).

Overall, based on a review of TRA factors and usage, it can be said that the main limitation of the theory stems from the assumption that behaviour is under volitional control. This implies that, the theory only applies to behaviour that is consciously thought out beforehand. Irrational decisions, habitual actions, or any behaviour that is not consciously considered cannot be explained by this theory. Further, Taylor and Todd (1995) criticized that TRA requires individuals to be motivated to perform acertain behaviour; In which this assumption may be problematic when studying students acceptance of m-learning. As this study intends to investigate the behavior towards m-learning, TRA can be considered as supporting framework when developing the proposed model for this study.

2.5.3 Theory of Planned Behavior (TPB)

TPB which was developed by Ajzen (1985). It is based on TRA to present a comprehensive yet parsimonious psychological theory that identifies a causal structure for explaining a wide range of human behavior including leisure behavior, health care, and consumer purchasing behavior (Ajzen, 1991). It defines relationships between beliefs, attitudes, norms, perceived behavioral control, intentions, and behavior. Furthermore, attitude toward a behavior, subjective norm, and perceived behavioral control influence an individual's intention to perform a given behavior.

The major difference between TPB and TRA is that TPB introduces the third determinant factor that is perceived behavioral control which is defined as the *"... perceived ease or difficulty of performing the behavior*" (Ajzen, 1991). Perceived behavioral control is divided into two factors: control beliefs (the availability of skills, resources and opportunities) and perceived facilitation (an individual's assessment of the importance of those resources to the achievement of outcomes). In particular, control beliefs are defined as the presence or absence of requisite resources and opportunities necessary to perform a behavior. Many researchers have used this model in their study. As an example, Tan and Teo (2000) used it in identifying the factors influencing the adoption of internet banking, while Spiros and Angelik (2009) used it the issues concerning the acceptance of e-Learning in a major Greek bank. Also Yang et al.(2009) used it in exploring the determinants of acceptance to use the e-health service system. In particular, many studies show that TPB would better help in predicting health-related BI and improved the predictability of intention in various health-related fields such as on condom use (Fishbein, Hibsch-Jetter, Soltis, & Hufford, 2001; Sheeran & Taylor, 1999), leisure (Ajzen & Driver, 1992), exercise (Nguyen, Potvin, & Otis, 1997), and on diet (Conner, Culberson, Packowski, Chiba, & Tuszynski, 2003). In summary, TPB includes four factors to predict actual behavior: perceived behavioral control, subjective norms, attitude, and behavioral intention as shown in Figure 2.7

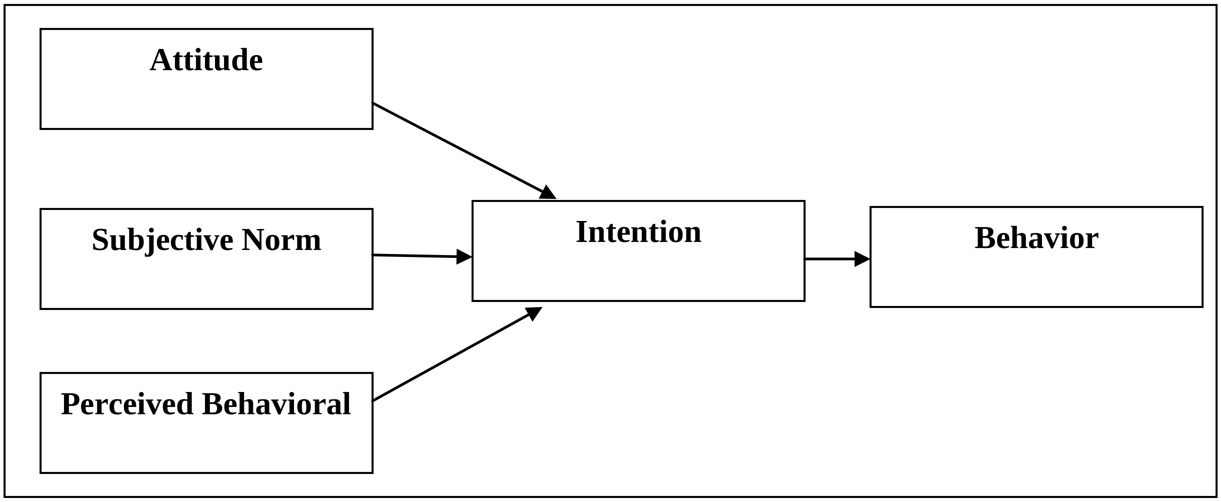

Figure 2.7: Theory of Planned Behavior (TPB)

Source: Ajzen (1991)

However, TPB does not focus on external environment including organization, making the available explanations unsatisfactory (Liu & Chen, 2009). Addionally, TPB has the lowest explanatory power compared to other relating theories in technology acceptance domain such as TAM (Khasawneh & Ibrahim, 2008). In TPB, the lack of operational components or determinants of behavioral attitudes is particularly obvious. Besides, Taylor and Todd (1995), criticized TRA and TPB by stating that the models require individuals to be motivated to perform a certain behaviour; in which this assumption may be problematic when studying students acceptance of m-learning.

In Overall, TPB can serve as an effective tool when examining the acceptance and usage of IT (Benbasat & Zmud, 1999). Therefore, TPB can be considered as a guiding framework when developing the proposed model for this study.

2.5.4 Technology Acceptance Model (TAM)

TAM is one of the most widely employed models of individual acceptance and use of technologies. The model was initially developed and tested in the 1980s (Davis, 1989; Davis et al., 1989). Subsequently, the model has been extensively validated across a variety of settings and subjected to theoretical extensions (Venkatesh & Davis, 2000; Venkatesh et. al., 2003; Davis et al., 1989). Davis et al. (1989) developed TAM as a theoretical basis to explain human computer usage behaviour directly from generic TRA (Fishbein & Ajzen, 1975), in which the objective of TAM is to provide an explanation of the determinants of computer acceptance that is generally capable of explaining the behaviour of users across a broad range of end-user computing technologies and user populations, while simultaneously being both parsimonious and theoretically justified.

TAM uses TRA to specify causal linkages between two relevant sets of constructs among Perceived Usefulness (PU), Perceived Ease of Use (PEOU), user Attitude (A), Behavioural Intention (BI) and Actual computer Usage behaviour (AU). In detail, Davis et al. (1989) define PU as the user's subjective probability that using a specific application system will increase his or her job performance within an organizational context. Besides, they define PEOU as the degree to which an individual believes that using a particular system would be free of physical and mental effort (Davis & Cosenza, 1993). This explains that the more useful and easier to use the technology, the more likely the user would use it. Conceptually, PU is concerned with the expected overall impact of system use on job performance (process and outcome), while PEOU pertains only to those performance impacts related to the process of using the system per se.

Both the key constructs (PU and PEOU) in TAM predict an individual's attitude towards using a computer system. Theoretically, PU and PEOU will influence an individual's Attitude. Further, Attitude will influence BI, and in turn, AU of the system. Hence, AU will be predicted by the individual's BI. From these relationships, it is understood that TAM provides a basis with which one traces how external variables influence belief, attitude, and intention to use. In short, according to TAM, one's actual use of a technology system is influenced directly or indirectly by the user's BI, A, PU, and PEOU. TAM also proposes that external factors affect intention and AU through mediated effects on PU and PEOU. In summary, TAM includes four factors in predicting system usage: PU, PEOU, A, and BI as illustrated in Figure 2.8.

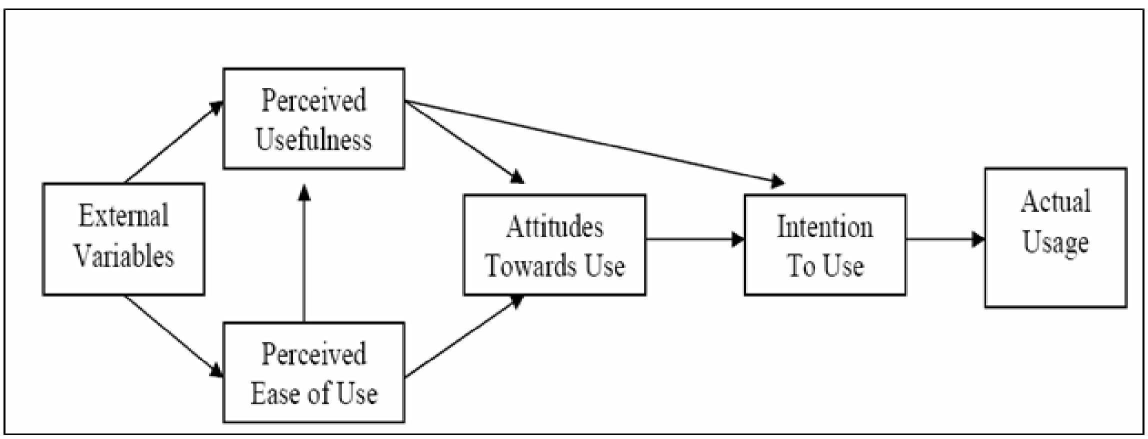

Figure 2.8: Technology Acceptance Model (TAM)

Source: Davis et al. (1989)

According to Stole and Lee (2003), previous studies suggest that TAM could be an appropriate model to examine students' acceptance of learning environment applications over a period of time. As an evidence of TAM's applicability and validity, Abbad et al.

(2009) also recommend that TAM is an appropriate model to examine student's acceptance of learning environment applications over a period of time. Earlier, Lu and Viehland (2008) used TAM as the theoretical grounding model in their study that determines the most significant factors that influence the acceptance of m-learning in universities in New Zealand. Generally, the obtained findings indicate that TAM is a suitable model in determining the most significant factors that affect the students' acceptance of m-learning in university environment. In addition, Khasawneh and Ibrahim (2008) also argued that TAM has been verified to be the most effective among available models in the IS literatures for predicting user acceptance of new technology such as m-learning, particularly in Jordan.

In fact, TAM has obvious strengths in terms of explaining the BI to use m-learning among the students. Particularly, TAM does not account social norms as a determinant of BI, which is a core construct in TRA and TPB. Also, TAM is uncomplicated in predicting usage behaviour (Taylor & Todd, 1995), in which TAM maintains its consistency and validity in explaining users' acceptance of IT.

Venkatesh and Davis modified the TAM model to produce TAM2 in 2000 by eliminating the impact of attitude in the Theory of Reasoned Action (TRA). The present researcher discusses this model because in this research image and subjective norm were used as variables for the social factor. Venkatesh et al., (2000) have extended the TAM on three approaches. Firstly, they extended the TAM model by including additional factors for interrelated constructs. Secondly, they initiated additional factors associated with beliefs and finally they examined the previous circumstances wherein perceived usefulness and ease of use were deliberated. Venkatesh and Davis (2000) explained in TAM2, perceived usefulness and usage intentions in terms of social influence (subjective norm, image, voluntariness, & experience) and cognitive instrumental processes (job relevance, output quality, perceived ease of use &result demonstrability) as illustrated in Figure 2.9.

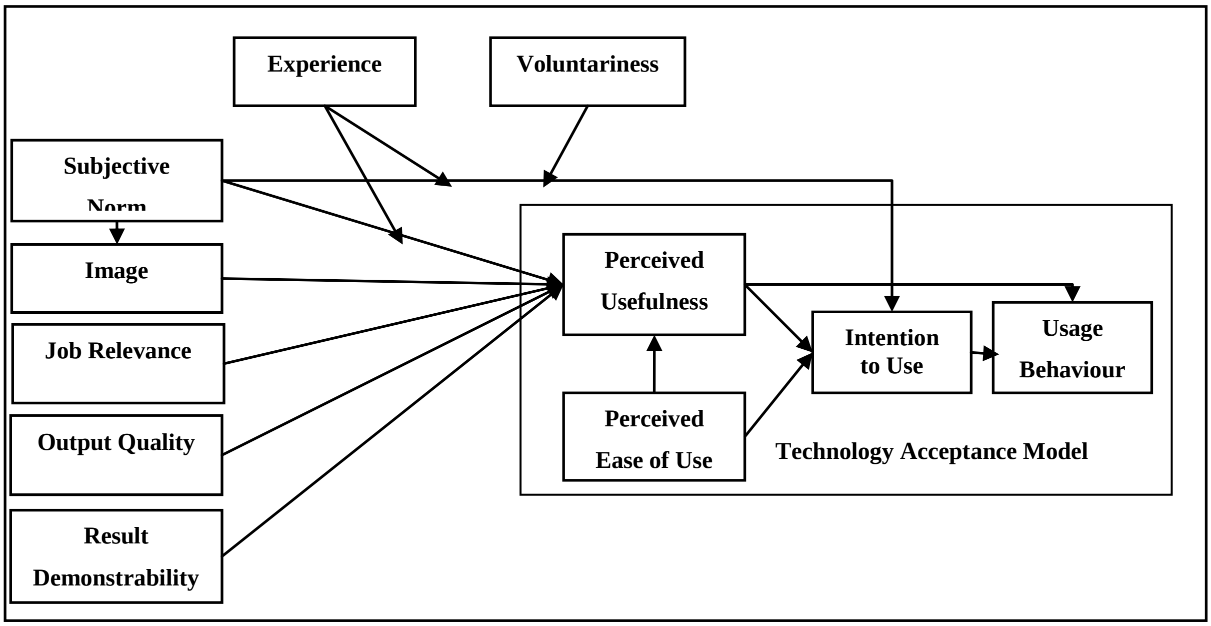

Figure 2.9.: Technology Acceptance Model (TAM2)

Source: Venkatesh and Davis (2000)

Having reviewed the TAM factors and usage as described in the previous paragraphs, TAM is found the most widely used influential model in studies regarding the determinant of IS/IT acceptance. Additionally, TAM is found to be a way to implement changes or make new ideas acceptable among students to accept or reject new technology including m-learning.

2.5.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT (Venkatesh et al., 2003) was introduced and formulated as a result of a meta-analysis of constructs of eight technology acceptance models, intended to explain the usage behavior over IT implementations. UTAUT has four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition, there are four moderators: gender, age, experience, and the voluntariness of use as depicted in Figure 2.10. According to UTAUT, performance expectancy refers to the degree to which an individual believes that using the system will help him or her to attain gains in job. While, effort expectancy refers to the degree of ease associated with the use of the system. Next, social influence refers to "*the degree to which an individual perceives that important others believe he or she should use the new system*", and, facilitating conditions refers to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003). In UTAUT, mediating factors might have certain impacts on the key constructs in use behavior. In addition, the key difference between UTAUT and other models is distinguished between the determining factors and mediating factors. Generally, UTAUT has been applied in a variety of research areas: Internet banking (AbuShanab & Pearson, 2007), wireless LAN technology adoption (Anderson & Schwager, 2004), mobile devices/services (Carlsson, Carlsson, Hyvonen, Puhakainen, & Walden, 2006; Knutsen, 2005).

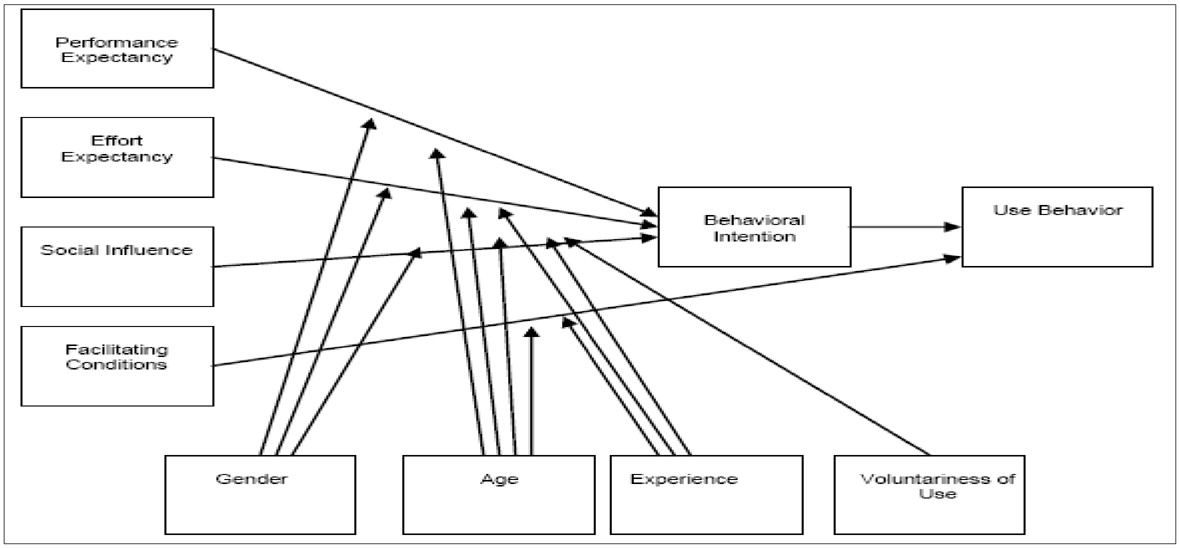

Figure 2.10: UTAUT Mode

Source: Venkatesh et al. (2003)

The strength of UTAUT and why researchers use the theory can be observed in its strong theoretical foundation, comprehensiveness, and the rigor that went into its development (Han, Mustonen, Seppanen, & Kallio, 2004; Schaper & Pervan, 2005). UTAUT does consider social elements, however does not provide an understanding of the dynamics of change in attitudes and behaviour (Venkatesh et al., 2003). While this model seems to be comprehensive, it has not been used by other researchers as widely as anticipated (Naugle, 2011). Besides, LU (2008), examined the applicability of TAM and UTAUT in terms of overall fit, explanatory power, and their causal links in explaining adult self-directed users' acceptance of e-learning system in a blended learning context. Overall, findings suggest that TAM is more appropriate in terms of overall fit, explanatory power, and their causal links in explaining adult self-directed users' acceptance of e-learning system in a blended learning context.

In contrast, TAM, as mentioned earlier, is the most widely used model because of its robustness and has the highest explanatory power compared to other relating theories in technology acceptance domain, which make it flexible for different types of research environments including m-learning acceptance.

In short, UTAUT is a very successful model in terms of studying the individuals' intention of technology acceptance. It's application is yet to be investigated involving students within the educational data context. In this study; there is a need to consider the UTAUT as a supporting framework when developing the proposed model.

2.5.6 Models Discussion

Overall, the acceptance theories and models described in previous sections such as DOI, TRA, TPB, TAM, and UTAUT have numerous factors that determine technology acceptance. They were developed to enhance the ability of individuals and organizations to use new innovation by Psychological/Social factors (Attitude toward Behavior, Subjective Norm, and Behavior control) and Technical factors (The Range of Usefulness, the Range of Ease of Use, Experience, and other external variables). For each predictor variable, explanatory power is ultimately segregated into independent effects (Mac Nally, 2002). As mentioned earlier, DOI, TRA, TPB and UTAUT have the lowest explanatory power to determine the influencing factors in students acceptance of learning applications compared to TAM. Nevertheless, UTAUT incorporate the constructs from TAM and has received widespread support but unfortunately was not published like TAM (Srite, 2006). On top of that, this study include attitude as one of the main factor that could affect the acceptance m-learning in the Jordanian higher education context. However, attitude was not included in UTAUT but is among the main factors included in TAM. In this context, TAM is suggested to be an appropriate model than UTAUT in examining the students' acceptance of learning environment applications, as recommended by Abbad et al. (2009) and Stoel & Lee (2003).

The original TAM measures user acceptance of a technology in terms of internal beliefs, attitudes, and intentions. It also provides the opportunity to build on its core base through discovering the impact of external variables on these core constructs. Empirical replications and validations of TAM in various situations have indicated that the model is very useful for predicting and explaining the use of technology and IS (Davis, 1989; Davis et al., 1989; Davis & Vankatesh, 1996; Adams et al., 1992; Mathieson, 1991; Taylor & Todd, 1995; Thompson, 1991; Vankatesh & Davis, 1996, Dillon & Morries 1996). Conversely, Davis (1989) also states that researchers should explore other variables that could affect the two main constructs in TAM i.e. PU and PEOU. In conjunction, this study is consistence with the recommendation.

TAM is uncomplicated in predicting usage behavior (ALenezi et al., 2010; Davis, 1989). In which DOI, TRA, TPB, and UTAUT are not as feasible as TAM (Alenezi, Karim, & Veloo, 2011; Srite, 2006). On top of that, according to Dishaw and Strong (1999), one of TAM's weaknesses is its lack of explicit inclusion of external factors. External factors contributing to the acceptance of a new IT are likely to vary according to the technology's characteristics, the target users, and the context (Moon & Kim, 2001). Hence, this study adds external factors contributing to the acceptance of m-learning in Jordanian higher education. Thus, TAM is the basis model for this study. Finally, all the reviewed models are summarized in Table 2.6.

Table 2.6: Summary of Models in Acceptance

Models	Author/ Year	Factors	Usage	Researchers
DOI	Rogers (1962)	- Relative advantage -Compatibility -Complexity -Trialability -Observabilty	Acceptance of any new innovation Such as (agricultural tools, TV, Wrist Watch, Democracy, Computer, Internet)	Lawrence & Schkade (1998); Teo(2000); Thomas et al.(2003); Henderson &Dancy (2005); Savery (2005)
TRA	Fishbein &Ajzen (1975)	-Attitudes towards the behavior - Individuals' perceptions -Subjective norms	Most use in medical innovation such as (Dieting, Condom, Limiting sun exposure)	Ajzen, & Fishbein (1980); Sparks,Shepherd, & Frewer, (1995); Greene, Hale, & Rubin (1997); Hoffman (1999); Hale et al.(2003); Beadnell, Blair, Baker, &Sharon (2008)
TPB	Ajzen (1985)	-Attitude toward behaviour -Subjective norms -Perceived behavioural control	Several studies found that the TPB used to improved the predictability of intention invarious health-related fields such as (Condom use, Leisure, Exercise, Diet)	Ajzen & Driver (1992); Nguyen, Potvin, & Otis (1997); Sheeran & Taylor (1999); Albarracin, Fishbein, Johnson, &Muellerieile (2001); Conner, Kirk, Cade, & Barrett (2003).

TAM	Davis (1989)	-perceive usefulness -Perceive ease of use - Attitude	Acceptance of innovation of technology such as (Mobile, PDA, E-Commerce, E-learning, M-learning, Internet Banking)	Davis et al. (1989); Adams, Nelson & Todd(1992); Hendrickson, Massey & Cronan (1993); Segars & Grover (1993); Subramanian (1994); Szajna (1994); Straub et al.(1997); Moon & Kim(2001); Hwang (2005); Shih (2004); Yi et al.(2006).
UTAUT	Venkatesh et al.(2003)	-Effort expectancy - Performance expectancy -Social influence - Facilitating conditions	Acceptance of technology such as (online stocking, mobile, Internet Banking)	Wang & Yang (2005); Carlsson et al.(2006); Al-Qeisi, (2009).

2.6 The Role of Demographic Characteristics in Students' Acceptance of m-learning

Many researchers have extensively examined the role of demographic characteristics in the level of students’ acceptance of using m-learning. Many researchers have also proven that gender and age play an important role in the individuals’ behaviour towards the use of technology (Akour, 2009; Gefen & Straub, 1997; Ong & Lai, 2006; Venkatesh & Morris, 2000; Whitley, 1997). The prior experience in using new technology was a crucial determinate of users’ BI, and thus acceptance (Akour, 2009; Gefen et al., 2003a). In previous studies of TAM, the demographic factors were examined as external factors and moderating factors in order to observe whether these factors affect the technology acceptance or not.

In another study, Kim et al., (2006) mentioned that there is lack of academic research on the use of mobile wireless technologies in the higher education setting. Particularly, the mobile device differences could affect the students' acceptance of m-learning. Besides, Akour (2009) inspected the gender differences in perception and its relationship with the acceptance of m-learning. The authors show that gender has significant effect on students' utilisation of m-learning, in which males were found to have more knowledge than females in using mobile. Also, they found that the male students had more experience than female students. In particular, they also found a significant gender deference that affects the main predictors' construct of TAM. It also shows that male rating of PU and PEOU are better than female rating.

Mobile Internet usage can be defined as the extent of person's experience to perform specific tasks using mobile devices to browse the Internet. Several studies have adapted the experience as an antecedent in the technology acceptance model and they have tested the relationship between PU and PEOU (Akour, 2009; Wolk, 2007). At the same time, some studies have tested internet experience as an external variable with the intention to use e-learning and m-learning (Jairak, Praneetpolgrang, & Mekhabunchakij, 2009; Akour, 2009; Rezaei, Mohammadi, Asadi, & Kalantary, 2008).

On top of that, Taylor and Todd (1995) found that users with prior experience have intention to use IT more than the users who are not experienced. This is consistent with Akour (2009), who investigated the effect of student experiences on the acceptance of m-learning using TAM as the basic framework. The results revealed that the experience was directly related to students' PU, PEOU, and intention to use m-learning. In terms of field enrolment differences, the previous studies confirmed that there were significant differences in students’ acceptance of new technology based on their majors or faculties (Alexander & Golja, 2007;Pascarella & Terenzini, 1991).

In conclusion, the studies described in the above paragraphs suggest that the demographical factors play a significant role in determining the students’ acceptance of m-learning in higher education. In short, the students’ gender, mobile devise ownership, mobile learning usage, mobile internet usage, and field enrollment should be addressed in order to investigate its influence on the students’ acceptance.

2.7 Conclusion

This chapter reviews the m-learning literatures. The reviews show different aspects have been investigated by other researchers in enhancing the acceptance of m-learning in higher education institutions. One important aspect is the studies on different issues that have contributed to less effective m-learning in developing countries. Developing countries have to face social and technical challenges such as culture, trust, and elements of quality in technology usability and service on the university side; in which this study adds these issues to TAM as external variables. These external variables appear to be critical for technology acceptance, which is in turn a crucial factor for deriving the benefits of IT in multinational and transnational organizations and the transfer of technology to developing countries.

This study reviews the existing literatures in technology acceptance and intends to extend the TAM to make it more applicable for m-learning in developing countries such as

Jordan. Several models were reviewed before choosing the model. Then, it was found that DOI, TRA and TPB have lower explanatory power in determining the influencing factors compared to TAM. Also, UTAUT incorporate the constructs from TAM and has received widespread support but was unfortunately not published like TAM. Furthermore, TAM is an appropriate model more than UTAUT to examine the student acceptance of learning environment applications (Abbad et al., 2009; Stoel & Lee, 2003). On the top of that, the previous studies in Arab countries and Middle East (Al-Sukkar, 2005; Lowry, 2004; Srite & Karahanna, 2006; Yousafzai, Foxall, & Pallister, 2007) have shown that TAM had a slightly better predictive ability than others. Besides, TAM is also chosen as the basis of this study since it is a widely accepted yet practical model of the phenomenon and a robust model of technology acceptance covering the issues that emerged from the preliminary study.

CHAPTER THREE
CONSTRUCTING RESEARCH MODEL

As described in Chapter 2, this study proposes an extension of TAM in studying the acceptance of m-learning in Jordanian universities. In supports of that, this chapter examines the relevant literatures regarding the selection of TAM in studying the acceptance of technology in developing countries such as Jordan and the potential to expand the theory with additional factors (culture, trust and technology services quality).It is discusses the aspects involved in constructing the research model. This includes a description of external independent variables (culture, trust, and technology services quality) and a description of TAM variables represented by perceived usefulness and perceived ease of use as internal independent variables. In addition, it discusses also about the attitude variable towards intention to use m-learning system as a dependent variables.

3.1 Culture Factor (CF)

3.1.1 Definitions of Culture

Hofstede (1991) defines culture as "*the collective programming of the mind which distinguishes the members of one group or category of people from another*". In a simpler form, culture refers to any shared values of a particular group of people (Erez & Earley, 1993), and it reflects the core values and beliefs of individuals, formed during childhood and reinforced throughout life (Shore & Venkatachalam, 1996). Additionally, Hasan and

Ditsa (1999) states that "*Culture can be thought of as the beliefs, philosophy, shared values, attitudes, customs, norms, rituals, common practices, and traditions which govern the ways of living of a group of people*".

In addition, culture can be described in terms of values and norms. Values are defined as what is worth doing or having, and are formed from experience with parents, school, religion, and the media (Laurent, 1993). Meanwhile, norms are any shared beliefs about behavior (Hill, Loch, Straub, & El-Sheshai, 1998; Straub et al., 2002; Straub et al., 1997; Straub , Loch, & Hill, 2001). Besides, culture can also refer to the differences between the beliefs, values, and motivations of different groups (Goodman & Green, 1992). Other researchers recognize culture as the deposit of knowledge, experience, beliefs, values, attitudes, hierarchies, meanings, religion, spatial relationships, notions of time, roles, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations by individuals and the group (Samovar, Porter, & McDaniel, 2009).

3.1.2 Culture and Acceptance of New Technology

Cultural beliefs are the key independent variables in predicting the success or failure of technology acceptance (Straub et al., 2001). This is due to the fact that the acceptance and use of new technologies vary in different social and cultural contexts. Culture and technology are related; they are interdependent, the former determines the latter and is a determining factor in the networks of interaction in any society (Straub et al., 2001).

In the literatures, culture and IT are linked in many studies. Tricker (1988) provides an excellent framework linking IS and culture using Hofstede's work. Also, Ein-Dor et al. (1993) lists cultural factors in IS, which includes attitude towards technology progress, interpersonal relations and social commitment, and social norms. In another study, Hassan and Ditsa (1999) observed that culture factor is probably the most difficult factor to isolate, define, and measure. They contrast the West Africa, the Middle East and Australia, Hofstede's and Hall's indices, and conclude that most IT products and projects suit cultures with low Power Distance, low Uncertainty Avoidance, and strong Long-Term Orientation. On top of that, two models have been extensively used in the education world: (i) Hofstede's 5 Dimensions (1980; 1991) (ii) Hall's perception of time and high-context/low-context models (Hofstede & Geert 1984).

Also, Culture has been widely studied in determining its relationship with IS. Edberg et al. (2001) identified culture as one of the five key issues for the global IS management. They pointed out that Japanese culture did not fully accept computer technologies and social group as well as the dynamics of action-oriented decision-making. At the same time, Straub, et al. (2001) studied the influence of cultural beliefs and values on the inference of IT in the Arab world including Jordan. The surveys deduced that cultural beliefs in Arab world are very strong predictors of resistance to systems and to Information Technology Transfer (ITT). Besides, Gefen and Straub (1997) and Straub (1994) found that perceptions and use of IT differ between Japanese and US workers. Earlier, Goodman and Green (1992) argued that cultural and political factors are the main explanations for the lack of IT diffusion in the Middle East since Western assumptions that the free movement of information has positive connotations does violate the cultural environments of many countries in the Middle East including Jordan.

Cultural factors differ significantly between students in the Middle East and those in developed countries. Therefore, it is important to study the cultural variables that foster and impede the acceptance of new technologies such as m-learning. In a survey including five Arab nations, Rose and Straub (1998) used TAM to compare PU and AU of computers across national borders. They concluded that cultural biases play a role in TAM when measuring the use of personal computer (PC). In another study, Harris and Davison (2002) identified considerable differences in PC involvement surveys across users in China, Hong Kong, Malaysia, Tanzania, New Zealand, and Thailand, and attributed those differences, in part, to culture.

Similarly, Al-Khaldi and Wallace (1999) observed some differences in PC utilization between Saudi Arabia and Canada. They identified the factors influencing the use of PC in a survey involving 200 knowledge workers. Their findings suggest that, in addition to culture, factors such as differing perceptions caused the dissimilarities in education and in prior use, may affect the use of PC in different nations. Besides, Straub (1994) studied the effect of culture on e-mail and FAX technologies in Japan and the US. He found that US companies preferred to use email while in Japanese firms preferred to use fax. Accordingly, he concluded that culture is one possible explanation for this.

On top of that, TAM is influenced by a more general system of beliefs, including cultural beliefs, which can be inferred from several recent studies outside the cross-cultural domain. For example, some studies aimed at integrating individual differences in variables such as age, education, and gender into the TAM (Agarwal & Prasad, 1999; Gefen & Straub, 1997; Khasawneh & Ibrahim, 2008) and were based on connections between the beliefs produced by a groups' common socialization experience and their attitudes towards IT. In relation, Srite (2006) states that "*culture's influence in the acceptance and use of technology, in the context of Asia, has not been comprehensively examined*". However, several studies have already examined the relationship between the TAM and Hofstede's cultural dimensions (Al-Gahtani et al., 2007; Anandarajan et al., 2002; Calantone et al., 2006; Hasan et al., 1999; Srite, 2006;). Specifically, Hofstede (1991) developed five cultural dimensions, namely uncertainty avoidance, power distance, individualism/collectivism, masculinity/femininity, and Long-term versus Short-term Orientation. The foundation was based on surveys involving over 116,000 respondents from over 60 countries in 3 regions, in about 20 languages. In conjunction, this study the researcher examine the external influence and the direct relationship of Hofstede's cultural dimensions and the core construct of TAM (PU and PEOU) in order to explain a greater proportion of the variance in the acceptance of m-learning which is represented by the BI.

This study makes use of Hofstede's dimension of culture (1980, 1991) for three reasons; (i) it has been proven as stable and useful in numerous studies across many disciplines, (ii) his research and arguments are compelling to organizational researchers because, even before empirical testing, links can be seen between his five dimensions and many aspects of behavior, and (iii) Hofstede's framework explicitly links the national cultural values to communication practices; communication practices using new IT are central. Furthermore, many researchers have used Hofstede's culture in their attempt to explain the role of adopting and accepting new technologies such as m-learning in western culture (Ess & Sudweeks, 2005; Kofod-Petersen, Bye, & Krogstie, 2009; Koivisto, 2009). All the studies attempt to represent approximate expected behavior of individuals in a specific culture, while conceding that not everyone in that culture acts alike. Indeed, variations within a single culture are often greater than those between cultures (Hofstede, 1991). In addition, a few researchers have used Hofstede's culture in their attempt to explain the role of accepting new technologies in one culture such as Jordan culture and Arab Saudi culture (Al-Sukkar, 2005; Alenezi et al., 2011). Thus, this study investigates the ability of TAM in predicting the acceptance of m-learning in a non-western culture (Jordan).

3.1.3 Hofstede's Dimensions of Culture

Hofstede's (1980) notion of culture is referred as "*the collective programming of the mind which distinguishes the members in one human group from another*". In a cross national research, people from different cultural and ethnic backgrounds are referred to as having "different mindsets," in which "mindsets" refers to all those concepts relating to cultural similarities and differences (Hofstede, 1991). One important assertion by Hofstede is that culture "is learned," and not only "inherited." This supports the theory of beliefs that states that individuals can both learn and unlearn cultural traits, depending on environmental influences such as the adoption of new IT (Hofstede, 1991).

After more than 30 years of use, both academics and management groups still use Hofstede's dimensions of culture to understand the differences between national cultures and also used them to measure the acceptance of new technology including m-learning (Kofod-Petersen et al., 2009; Nan, Xunhua, Guoqing, & Gang, 2009; Rahmati, 2008; Srikes, Guildford, Louvieris, & Collins, 2009). In particular, Hofstede's (1991)dimensions include (a) Uncertainty Avoidance (b) Power Distance (c) Masculinity versus Femininity (d) Individualism versus Collectivism. Further, the fifth dimension was later added by Hofstede (1991), which is (e) Long-term versus Short-term Orientation. Each dimension is described as in the follow:

a. Uncertainty Avoidance (UA)

Uncertainty avoidance (UA) refers to "*the extent to which the members of a culture feel threatened by uncertain or unknown situations*" (Hofstede 1991). UA dimension describes the degree to which members of a society feel uncomfortable with uncertainty and ambiguity, preferring structured over unstructured situations (Kovačić, 2005).

Kovačić (2005) conducted a study to investigate the impact of national culture on the web E-government readiness. The researcher indicated that countries with strong uncertainty avoidance would have less acceptance and readiness with adopting new

ICTs. However, the countries with weak UA will be willing to adopt the new ICTs because of their ability to take the risk of unsuccessful implementation. Moreover, the country with strong UA would have a negative attitude towards using new ICT tools and vice versa.

Straub et al. (1997) examined the TAM across three different cultures: US, Switzerland and Japanese culture. The researchers proved that the TAM was not capable of explaining the users' acceptance of new technology in different settings and different cultures. E-mail is highly accepted in the US, reasonably accepted in Switzerland and not accepted in Japan. They assumed that UA seems to be crucial in making the new technology acceptable. However, the researchers did not collect any cultural data from the countries of study. Thus, there is no empirical evidence for their assumptions related to cultural values differences.

In conclusion, UA could have an impact on students' acceptance of m-learning due to the uncomfortable, uncertain and ambiguous situation. Thus, this dimension will be tested and its related findings may be able to shed light on the overall results.

b. Power Distance (PD)

Power Distance (PD) refers to "*The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally"* (Hofstede, 2001). Srite et al. (2000) found that a culture with higher power distance is found to be less innovative and trusting in its perceptions towards information system usage. The study also found that a culture with high level of collectivism seems to be influenced by its subjective norm values. Myers and Tan (2002) indicated that PD seems to have a strong impact on the web design and users' interface acceptance.

Srite et al. (2000) studied the cultural dimension on the IT system use in the Arab world. They developed an Information Technology transfer model and the survey was distributed in five Arab countries. The researchers affirmed that PD seems to be a significant variable in stimulating the users' acceptance or resistance to use the proposed system. In addition, Al-Khaldi and Wallace (1999) examined computer usage in two different cultures: Saudi Arabian and Canadian. Their study aimed to identify the influencing factors that may affect computer usage in both cultures. The researchers found that dissimilar culture generate different perceptions towards using a particular system. It also creates different attitudes.

In brief, PD appeared as a critical dimension of Hofstede model. The current study will investigate the impact of the power distance on Jordan culture and its impact on students' acceptance of m-learning in Jordanian universities.

c. Masculinity/Femininity (MF)

Masculinity/Femininity (MF): "*Masculinity stands for a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and* *concerned with the quality of life ….. Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life".* It is a fact that the cultural dimension can be influenced by the gender role. In other words, the role of gender and its impact on technology acceptance has been cited extensively in the literature (Gefen & Straub, 1997; Jackson, 2001; Ong & Lai, 2006; Speier & Venkatesh, 2002; Tolhurst & Debus, 2002; Yuen & Ma, 2002). However, a society is described as masculine when the society prefers achievement, assertiveness, and material success in their tasks. On other hand, a society can be described as feminine when it prefers perfect relationships with its supervisors or peers, caring for the weak, and caring about the value of life.

Sundqvist, Frank, and Puumaliainen (2005) investigated the effect of cultural similarity on the adoption of wireless communication tools. They hypothesized that countries with higher masculinity would have faster diffusion of wireless communications. However, their assumption was not substantiated by the findings and yet to be proven. They concluded that a high level of UA will negatively affect the new technology adoption and that their acceptance will depend on the country's previous success and experience.

Bagchi, Cerveny, Hart, and Peterson (2003) indicated that the Information Technology encourages a cooperative relationship and a better life quality which, indicate a high level of masculinity. In contrast, using m-learning can be masculine but, it can also be aimed at promoting the successful study stages, increasing the students' performance which can all be described as feminine. Thus, the study will investigate the influence of the Hofstede dimensions on m-learning acceptance based on Jordan culture and its related values. The current study aims to prove whether the cultural factor and its related constructs have influence over students' acceptance in higher education institutions in Jordan or not.

d. Individualism/Collectivism (IC)

Individualism/Collectivism (IC) can be defined as "*societies in which the interests of the individual prevail over the interests of the group*" versus "*societies in which the interests of the group prevail over the interests of the individual*" (Hofstede, 1991). In other words, the individualism and collectivism dimension can describe the relationship between individuals and the group in a specific society based on their values, customs and norm. Basically, we can assume that if the Jordan culture has a high level of collectivism, the groups will reflect their identity and vice versa. Many studies on the national culture and its impact on technology acceptance have been extensively concluded (Al-Gahtani, Hubona, & Wang, 2007; Calantone, Griffith, & Yalcinkaya, 2006; Srite, 2006). Thus, the current study will try to identify whether the Jordan culture reflects individualism or collectivism based on the future analysis and their influence on m-learning acceptance will be assessed.

e. Long-term Versus Short-Term Orientation (LST)

The dimension was identified through an additional research derived from a non-Western input. As such, Hofstede's value dimensions are promised to be more appropriate for cross-national research that encompasses non-Western societies. Hofstede (1991) describes this dimension as follows:

"*Long-term orientation stands for the fostering of virtues oriented toward future rewards, in particular perseverance and thrift* "

"*Short-term orientation stands for the fostering of virtues related to the past and present, in particular respect for tradition, preservation of 'face' and fulfilling social obligations".*

Both positively and negatively rated values of this dimension are found in the learning environments (Hofstede, 1991), for instance, Brazil. Long-term orientation needs not be correlated with collectivism, as it is in the very collectivist Southeast Asian countries. Within Europe, Finland and the Netherlands are fairly long-term oriented, whereas Sweden and Germany are more short-term oriented (Hofstede, Jonker, & Verwaart, 2008). Thus, the current study will try to identify whether the Jordan culture reflects Long-term orientation or Short-term orientation based on the future analysis and their influence on m-learning acceptance will be assessed.

3.1.4 Summary

Having reviewed the literatures, this study is certain to adapt the culture into the proposed model. It is hypothesized that the culture-TAM causal relationships may potentially explain a greater proportion of the variance in user BI towards m-learning implementation. It is expected that the research will show that Uncertainty Avoidance, Power Distance, Masculinity versus Femininity, Individualism versus Collectivism and Long-term versus Short-term Orientation will have some effect on the acceptance of m-learning. Thus, the study investigates the influence of the Hofstede's dimensions on the acceptance of m-learning in the context of Jordanian culture and its related values. This study aims to prove whether the cultural factor and its related constructs have influence over students' acceptance of m-learning in higher education institutions in Jordan or not. Overall, culture factor will be examined to have or not an indirect impact on BI and thus acceptance of m-learning through being a direct antecedent of ease of use and usefulness.

3.2 Trust Factor (TF)

3.2.1 Definitions of Trust

Trust is an indicator of a positive belief about the perceived reliability of, dependability of, and confidence in a person, object or process (Fogg & Tseng, 1999). It is an essential ingredient for successful long-term business relationships with individuals (Doney & Cannon, 1997; Garbarino & Johnson, 1999). Gefen et al. (2003a) define trust as the expectation that the trusted party will behave in an ethical, dependable, and socially appropriate manner and will fulfill their expected commitments in conditions of interdependence and potential vulnerability.

3.2.2 Trust and Acceptance of New Technology

The use of wireless technology in the 21st century has been explosive. It is believed that the increased trust in technology leads to more effective utilization and rapid acceptance of this technology. Further, technology trust elements can have a profound effect on speed and efficiency of technology adoption, use, and acceptance. This makes individuals rely on internet security and privacy systems for safeguarding personal information and to protect against unauthorized use (Lippert, 2002). While these systems focus on safety, security, and privacy, the infrastructures that support predictability, reliability, and utilization of technology, which are jointly classified as technology trust, are all underdeveloped and are especially important to the higher education institutions sector.

According to Bandyo-padhyay (2002), trust is an important factor since users need to have a trust in providers. The lack of the trust in the online context has been identified by providers as one of the most important obstacles in the adoption and acceptance of transaction in a large number of discussions (Hoffman et al., 1999). Also, trust has been one of the most important factors of the acceptance of mobile internet services and trustworthiness has significant and positive impacts on the learners' perceived acceptance and satisfaction (Kaasinen, 2005, 2007; Zeithaml, Parasuraman, & Malhorta, 2000).

Several studies have focused on various issues of trust over mobile technology (Al-Mushasha & Hassan, 2009; Ghosh & Xu, 2010; Mahatanankoon, Wen, & Lim, 2006; Siau & Nah, 2006; Siau, Sheng, & Nah, 2003; Termsnguanwong, 2010; Wang, Lin, & Luarn, 2006; Wickramasinghe & Misra, 2004). Most of these studies agree that mobile transactions can only be successful if individuals can trust the institutions and products they are not able to see or touch, as well as the new virtual channel of transaction with which they may have had little previous experience. Therefore, the issue of trust may be even more important to the investigation of m-learning than to traditional learning. It is because m-learning is based on the individual's trust in processes. In contrast, traditional learning usually involves face-to-face learning, in which trust is based on personal relationships and on interactions between individuals and the institution.

Trust has been proposed as an additional acceptance criterion for mobile services by Kindberg, et al. (2004) and Barnes and Huff (2003). It has also been included in studies of personalization in mobile services (Billsus, Brunk, Evans, Gladish, & Pazzani, 2002) and studies of context-aware services (Antifakos, Schwaninger, & Schiele, 2004). Additionally, trust is the key for the success of both e-learning and m-learning (Lawless & Allan, 2004; Robertson, 2005). Also, trust is a main facilitator of mobile wireless transactions because human beings need to understand the social surroundings of the virtual environment (Jaradat, 2011). In response to that, a few studies have proposed trust to be included as an additional acceptance criterion for mobile technology and studies (Fogg & Tseng, 1999; Gefen et al., 2003a; Kaasinen, 2005, 2007)

In detail, trust in the institutions such as university appears to consist of trust in managerial competence and trust in the organizations support of IT (Filstad & Gottschalk, 2010; Lewicki & Bunker, 1996; Tyler & Degoey, 1996). This dimension gives positive views for users who might be using and interacting with IT (Lewicki &

Bunker, 1996; Powell, 1996; Tyler & Degoey, 1996). In fact, trust in IS is becoming more important to academics (Lippert, 2001c)and practitioners (Lippert, 2001b, 2001d). The notion of technology trust attempts to quantify the user's trust in the inanimate IS, either hardware or software employed in daily life (Lippert, 2001a). Many institutions provide privacy assurance services, including TRUSTe and Web Trust. Each of these assurance seals are designed to increase trust in the privacy and security associated with educational website applications. Some studies related to IS have investigated the trust of m-learning as a factor of quality of services in university environment (Al-Mushasha & Hassan, 2009).

It is worth to note that trust in the electronic channel such as mobile channel is the major determinant of the acceptance of new technology (Malaysian Administrative Modernisation and Management Planning Unit, 2003). In fact, Al-Sukkar (2005) also agrees that trust in the electronic channel influenced the acceptance and use of technology, in the context of Jordan. Therefore, it is important to study trust in the mobile channel variable that fosters and impede the acceptance of new technologies particularly m-learning.

Extrapolating from the literatures on attitude change (Eagly & Chaiken, 1993; Fishbein & Ajzen, 1975), technology acceptance (Agarwal & Prasad, 1997; Davis, 1989; Kaasinen, 2005, 2007; Lucas & Spitler, 1999; Mathieson, Peacock, & Chin, 2001; Parasuraman, Zeithaml, & Malhotra, 2005; Venkatesh & Davis, 2000; Wang et al., 2006) and trust and distrust (reviewed earlier), this study proposes that trust in technology acceptance requires an environment with two key ingredients: (i) Trust in the university as institution (ii) Trust in the mobile channels as electronic channels.

3.2.3 Summary

Having review the literatures (as described in the previous sections), this study adapts the trust into the proposed model. It is hypothesized that the trust-TAM causal relationships may potentially explain a greater proportion of the variance in user BI towards m-learning implementation. This study expects to show trust in the mobile channel and trust in the university will have some effect on the acceptance of m-learning. Overall, trust factor will be examined to have or not an indirect impact on BI and thus acceptance of m-learning through being a direct antecedent of ease of use and usefulness.

3.3 Technology Service Quality Factor (TSQF)

3.3.1 Definitions of Technology Service Quality

The definition of technology service quality is based on the definition customer led quality,in which quality is defined as satisfying customer's requirements (Krüger, 2001; O'Neill, Palmer, Charters, & Fitz, 2001) and relies on the ability of the organizations or the institutions to determine customers' requirements and then meet these requirements (Al-Mushasha & Hassan, 2009). From organizations' point of view of, it means that customers have to be seen as individuals having individual requirements which they expect to be fulfilled. If a standard level of service quality is defined as having these requirements satisfied, then in an organization or institution claiming to provide high quality services, the customer's requirements will be exceeded and the organization or institution will have satisfied customers, creating a more positive image in the marketplace. Furthermore, high quality service does not mean the minimizing the negative quality such as poor service or inconsistency, instead it is about maximizing the positive quality such as luxury and fun, thus, this creates value (Al-Mushasha & Hassan, 2009; Grohmann, Hofer, & Martin, 2005; Lee, Lee, & Yoo, 2000; Mazur, 1993; Yoo & Donthu, 2001).

With the prosperity of mobile wireless technology, a huge number of institutions such as universities have adopted m-learning implementation. Mobile technology service quality is one of the most important factors related to user behavior and has led to the measuring of mobile service quality becoming the critical issue of the day (Al-Mushasha & Hassan, 2009; Parsons & Ryu, 2006). Certainly, understanding more about the acceptance of m-learning service quality can lead to significant improvements in the design of both software and hardware with a corresponding increase in Perceived Value and Users' Satisfaction (Yi, Liao, Huang, & Hwang, 2010).

3.3.2 Technology Service Quality and Acceptance of New Technology

Measuring quality gaps provide strategic advantage in knowing where an institution stands in the market in terms of product/service. Also, it provides impetus to the institution to act in improving the position in the competitive environment. However, a few previous works revealed that measuring quality, objectively, in service sector is difficult since services have been described as intangible, heterogeneous, and inseparable

(Bebko, 2000). Further, Sachdev and Verma (2004), in their assessment of the relative importance of quality dimensions in selective service industries, identified two perspectives of quality measurement: internal and external. While internal perspective is defined as zero defect or conformance to requirements, the external perspective understands service quality measurement in terms of customer perception, satisfaction, attitude, and delighting the customer.

The technology service quality factor appears to have a strong influence with the area of technology acceptance (Liu & Ma, 2006). With regards to that Tan and Chou (2008) extended the TAM perspective in order to explore the effect of mobile service quality and its compatibility to mobile technology on users' perceived playfulness toward these services. They found that mobile service quality and perceived technology compatibility influence the users' perceived playfulness. Also, perceived technology compatibility significantly mediates the relationship between mobile service quality and perceived playfulness. This suggests that service attributes need to be aligned with mobile phone functionalities to enhance user's perceived playfulness. In addition, perceived usefulness, ease of use, and personalization are the three most important service quality aspects that influence perceived playfulness. Nevertheless, Li and Yeh (2009) discuss the status of users' perception of service quality for 3G mobile devices and the results revealed that user BI to use 3G service is influenced by satisfaction and trust. In addition, the technology service quality is one of the important factors that influences the acceptance of m-learning implementation (Akour, 2009).

Many measurement instruments have been applied in the previous studiesin the development of quality perception studies (Llusar & Zornoza, 2000). Particularly, Llusar and Zornoza (2000) argue that these measurement tools contribute to the measurement of technology quality and to the study of quality because it influences an institution's income. There have been numerous studies identifying the key service quality dimensions of the traditional university environment, where personal interaction between students and university staffs or lecturers, is a primary service delivery and communication channel. However, relatively fewer literatures have investigated service quality attributes in the m-learning sector, in which non-human interaction via the mobile wireless technology is a main service delivery and communication channel.

Technology service quality refers to (i) acceptability, (ii) interface design, (iii) reliability/response, (iv) content quality, (v) personalization, and (vi) privacy/security. Many of these concepts are derived from Human Computer Interaction (HCI) and usability research (Kuan, Vathanophas, & Bock, 2003; Nielson, 1993) and IS success models (DeLone & McLean, 1992; Rai, Lang, & Welker, 2002). Other concepts are derived from service quality research that was adapted for the Internet and the web such as SERVQUAL (Parasuraman, Zeithaml, & Berry, 1994) and its derivatives such as E-S-QUAL (Parasuraman, Zeithaml, & Malhotra, 2005) and WebQual (Barnes & Vidgen, 2002). Besides, some other concepts are derived from m-learning service quality in university environment model (Akour, 2009; Al-Mushasha & Hassan, 2009). All of these variables can act as either inhibitors or facilitators of acceptance and use.

(i) Accessibility

Accessibility in traditional marketing literature, speed of delivery is defined as the time it takes to actively perform the service (Dabholkar, 1996). However, accessibility in the m-learning environment refers to the availability of the system where and when the learners need to search or download any data (Al-Mushasha & Hassan, 2009). The potential benefit of using m-learning system cannot be successfully achieved without having reliable speed on line access because learner expect the m-learning services to be available on demand. M-learning applications and services depend heavily on the underlying network support. Two of the most significant variables that affect the development and the quality of m-learning service are the available bandwidth offered by the wireless networks as well as network coverage (Katerina & Stephanos, 2006; Lim, 2001). Thereafter, accessibility is included in this study as one of substantial dimensions of technology service quality factor that could bring positive significant impact on the students' acceptance of m-learning in higher education institution in Jordan.

(ii) Interface Design

Interface design refers to the appearance of mobile portal and is consistence with tangibility dimension in the SERVQUAL model. While Parasuraman et al. (1988) define a tangible dimension as the physical appearance, such as facilities, equipment, and personal, many researchers replace this definition with the use interface required for the e-service context (Lee & Lin, 2005;Loiacono, Watson, & Goodhue, 2002; Wolfinbarger & Gilly, 2003). Earlier, Ghose and Dou (1998) argued that the greater attractiveness of an interface increases the level of user satisfaction and thus technology acceptance. Furthermore, interface design is very important in the m-learning environment, because the interface substitutes in the role of personal contact in the physical class room (Al-Mushasha & Hassan, 2009). In relation to this, interface design is included in this study as one of substantial dimensions of technology service quality factor that could have positive significant impact on the acceptance of m-learning among the students in higher education institution in Jordan.

(iii) Reliability and Response

Reliability and response in the SERVQUAL model is composed of consistency, dependability, accuracy, and ability to support customer with the appropriate information when a problem occurs (Parasuraman et al., 1988). Previous studies of new service-delivery option available with computer technology found that consistency and dependability of performance is an important dimension in the measurement of service quality, because of the user's consideration of performance risks based on new technology service quality (Cox & Dale, 2001; Dabholkar, 1996). This is very relevant for the acceptance of m-learning services considering the fact that learners are on the move and are often in time-critical situations. Akour (2009) found that the reliability/response dimension has a direct positive effect on the PU and PEOU. Consequently, in order to achieve high acceptance of m-learning among students, the university should particularly focus on the dimension of reliability/response (Akour, 2009; Al-Mushasha & Hassan, 2009; Lee & Lin, 2005; Parasuraman, 2004; Zeithaml et al., 2000). Therefore, reliability/response is included in this study as one of dimensions of technology service quality factor that could bring positive significant influence on the acceptance of m-learning among students of higher education institutions in Jordan.

(iv) Content Quality

Content quality is identified based on the consumers' evaluation. For example, content quality is identified as the extent to which users think that the information is useful, good, current and accurate (Rieh, 2002). Loiacono et al. (2002) describe the content quality as the concern that information provided is accurate, updated, and appropriate. According to Landor (2003), the mobile's content quality is at the infant stage. He also mentions that the skill in making good quality mobile content is one of the most important variables in determining the acceptance of mobile technology. Similarly, Kim and Ong (2005) also identify content quality as one of the three key issues for the m-learning that promote and hinder the acceptance of m-learning. Therefore, content quality is included in this study as one of the dimensions of technology service quality factor that could yield positive significant impact on the acceptance of m-learning.

(v) Personalization

Personalization on the web has been widely studied (Ho & Kwok, 2002). Personalized services refers to the ability to customize the user interface, the information channels, and the services provided according to the individual user's needs, personal interests, and preferences (Hyldegaard & Seiden, 2004; Reamy, 2001). In this way, the user is given the opportunity to construct a personal information space with relevant information sources and services and interact with the user interface in a personal manner. Alternatively, personalization is the process of a system using a user's information to deliver a targeted solution based on that user's personal preferences. Personalized web services, which are very common now, are an important part of e-commerce. According to Kellereret al. (2003), one of the most compelling features of future mobile communication systems is considered to be personalization. Thus, personalization is one of the dimensions of technology service quality factor and has positive significant impact on the acceptance of m-learning implementation.

(vi) Security and Privacy

Security and privacy is a complex social phenomenon that reflects technological, behavioral, social, psychological, and organizational aspects of interactions among human and non-human agents (Lu, Yu, Liu, & Yao, 2003). Security and privacy has been investigated by many researchers in the online or web domain (Lin & Wu, 2002; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004). In fact, a study of assurance in the service quality research of e-commerce has included security and privacy as quality items (Swaid & Wigand, 2007).Also, Consumers of online banking and online commerce believe that security and privacy are very important and even form obstacles to adoption of online banking (Howcroft, Hamilton, & Hewer, 2002; Lu et al., 2003; Viega, Kohno, & Potter, 2001). As universities place greater emphasis on building long-term relationships with their students, security has been assumed a central role (Kim & Tadisina, 2005; Swaminathan, Lepkowska-White, & Rao, 1999). In the e-learning environment, the importance of security has been documented by many researchers (Sparta, 2009). In short, security issues include protection against intrusion, unauthorized access, editing, and alteration and removal of files or documents. These same concepts can be translated into the m-learning environment, especially if web services are used on WAP-enabled or smart phones.

Alatalo and Siponen (2002) suggest that people will accept the loss of privacy as long as there is a positive net outcome from such information disclosure. The popularity of social networking websites such as Facebook, YouTube, and Myspace suggest that students are far less apprehensive about giving their private information online and are willing to sacrifice privacy information if they see benefit in doing so. Thus, it is reasonable to expect that if the students believe their information is collected and treated fairly for certain purposes such as m-learning, they will not oppose sharing personal information. Therefore, privacy/security is included in this study as one of substantial dimensions of technology service quality factor and that could bring positive significant impact on the acceptance of m-learning among the students in higher education institutions in Jordan

Additionally, Kleijnen et al.(2004) studied about consumer acceptance of wireless finance. They found that system quality attributes such as speed of connection and downloading time seem to be of great concern to consumers. Although mobile network speeds and reliability have increased greatly during the last decade, they still have some limitations compared to wired counterparts, such as lower network speeds and higher delays. On the other hand, mobile devices suffer from limitations such as small screens, low bandwidths, and cumbersome input methods; these are features that can impact user satisfaction and acceptance (Chae & Kim, 2004; Kleijnen et al., 2004; Lu et al., 2003).

These limitations could have an impact on ease of navigation and understandability of content. The literature review provides examples of resolving device interface issues by including built-in projectors or simply larger screens in mobile devices, which are available in some of today's phones (Anderson & Blackwood, 2004; The Horizon Report, 2007).

3.3.3 Summary

In fact, applying TAM to m-learning service quality can also lead to a better theoretical understanding of possible important differences between the quality of m-learning service and that of other types of end user systems. With regards to this study, technology service quality will be introduced as an additional construct in the proposed model. Technology service quality is hypothesized to have an indirect impact on BI and thus the acceptance of m-learning through being a direct antecedent of ease of use and usefulness.

3.4 Perceived Usefulness (PU)

PU is defined as "*the degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis, 1989). In other words, when students perceive m-learning system as useful, they will use it to improve the performance of their tasks. Adam et al. (1992)found that the acceptance of computer technology is driven to a large extent by PU which is consistent with Igbaria (1990).

Further, Segars and Grover (1993) provide practical definitions of the usefulness by its determinant factors. Their study indicated that the main determinants of usefulness as constructs are the ability to work more quickly, to make learning a meaningful process, to make jobs useful, to increase the tasks' productivity and effectiveness, as well as performance (Ong & Lai, 2006). Additionally, m-learning system in university environment has demonstrated the usefulness of context-awareness support, and providing appropriate information to support a student's university life at the right time and in the right place (Brown, Ryu, & Parsons, 2006; Lu & Viehland, 2008). In addition, use of mobile devices as an interactive tool in education has proven useful for increasing the communication between learner-learner and learner-instructor (Markett, Sánchez, Weber, & Tangney, 2006). Therefore, the m-learning system with a high level of PU significantly influences the students' acceptance of using its tools. This is consistent with Akour (2009) who indicated that PU has a significant effect on students' attitude toward using m-learning and BI to use m-learning.

In short, the literatures visualize the importance of PU as a construct in determining students' acceptance of m-learning in the higher educational environment. It also plays a significant role in encouraging students to use any particular system. With regard to this study, PU is hypothesized to have direct impact on attitude and BI and thus the acceptance of m-learning.

3.5 Perceived Ease of Use (PEOU)

PEOU refers to "*the degree to which a person believes that using a particular system would be free of effort*" (Davis, 1989). Venkatesh (2000) believes that for any emerging IT or IS, PEOU is an important determinant of users' intention of acceptance behavior.

Likewise, a study by Clarke (2000) found that ease of use is one of the top five significant factors that determine the general use of wireless handheld devices. This mean an individual might have a higher intention to accept m-learning if he/she thinks m-learning is easy to operate.

Many studies have confirmed that the level of acceptance is increased by the ease of use of a particular system (ALenezi et al., 2010; Davis, 1989; Davis & Venkatesh, 1996; Kaasinen, 2005; Ong, Lai, & Wang, 2004). PEOU can also clarify the users' perception of the amount of effort necessary to employ a particular system and how using a particular technology will be effortless (Davis et al., 1989). Besides, many studies have also proven that PEOU has influenced the PU and attitude (Akour, 2009; Babenko-Mould, Andrusyszyn, & Goldenberg, 2004; Gefen & Straub, 2000; Masrom, 2007; Ngai, Poon, & Chan, 2007; Ong et al., 2004; Saade & Kira, 2006). Thus, the m-learning designers must take this into consideration and design a more friendly, easy to use and simple m-learning system in order to ensure that all kinds of students would be able to use the system effectively. In fact, Heijden (2004) stated that PEOU and perceived enjoyment have a more significant effect than PU. Nevertheless, Davis has confirmed that PU is more important than PEOU. On top of that, Venkatesh and Morris(2000) extended the TAM and its related constructs with gender, playfulness, and anxiety that influence the perception of ease of use of the system. They indicated that women seemed to be motivated and driven by the ease of use of the system. Their model has been supported by many studies and the model explains up to 60% of the variability of PEOU.

Besides, many studies have also proven that PEOU has a positive relationship with BI to use a particular system (Chau, 1996), and in using PC (Moore & Benbasat, 1991). While, some of these researches tested the direct relationship between PEOU and BI (ALenezi et al., 2010; Davis, 1989; Venkatesh & Morris 2000; Venkatesh & Davis, 2000), other studies tested indirectly through PU (Davis, 1989, Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Venkatesh & Davis, 2000).

In a nutshell, the literatures show that PU and PEOU are two keys that determine and predict the users' intention to use any particular system. In this study, both PU and PEOU are the main determinates of the students' acceptance of m-learning (Davis, 1989). In conjunction, the PEOU is hypothesized to have an indirect impact on BI and thus the acceptance of mobile learning through being a direct antecedent of usefulness and attitude.

3.6 Attitude Towards Using (ATU)

Attitude is an individual's positive or negative feelings about performing the target behavior (Fishbein & Ajzen, 1975). The Theory of Reasoned Action (TRA) is the theoretical basis of the Technology Acceptance Model (TAM). Thus, this is also the core construct of the TRA. Nonetheless, the Theory of Planned Behavior (TPB) has also adapted this construct from the original TRA. In the TAM, attitude was originally formulated (Davis, 1989). Regarding technology acceptance, many studies have proven that attitude has positive relationships with PEOU, PU and intention to use m-learning in a mandatory setting (Akour, 2009; Jacob & Issac, 2007; Park, Nam, & Cha, 2011). However, Lu and Viehland (2008) argue that the relationship between attitude and BI was not supported. Consistent with this, Davis et al. (1989) have also proven that attitude may not be a strong determinant of intentions in workplace settings compared to other factors such as PU. Based on the arguments in this paragraph, the TAM in this study would include attitude in order to confirm that attitude could have a positive relationships between PU, PEOU and BI to use m-learning in the Jordanian higher education context.

Previously, Brown(2002) investigated factors affecting PEOU of web-based learning technologies in South African University. The author extended the TAM to include different individuals and technological factors such as ease of finding, ease of understanding, self-efficacy, and computer anxiety. The proposed factors were directly tested with constructs in TAM. The findings indicated that attitude has an important role in enhancing the students' ease of using the web-based learning. Then, Lee, Cheung, and Chen (2005) modeled the students' acceptance by extending TAM with extrinsic factors (perceived usefulness and ease of use) and intrinsic factors (perceived enjoyment). The study which was conducted in Hong Kong involving 544 universities found that the proposed factors relate with attitude.

Similarly, Ngai et al. (2005) also conducted a research in Hong Kong, with the purpose of examining the adoption of WebCT using TAM. The authors extended TAM with technical support as an external variable. The results indicated that usefulness and ease of use were the main factors affecting the attitude of students using WebCT. Besides, they found that the additional factor had a direct effect on both the PEOU and PU. On top of that, Akour (2009) conducted a study to determine the determining factors of the acceptance of m-learning acceptance. The results indicated that the two main constructs of the TAM explain up to 61% of the students' attitude. Thus, additional factors should be examined in order to explore more components that could determine and affect the students' attitude towards using m-learning.

In conclusion, the literature revealed that attitude is a crucial factor in TAM, which links between the major keys that determine the acceptance, PU and PEOU. This could predict in some extent the students' acceptance of m-learning in the higher education environment. Accordingly, the study on the individual's attitude illustrated the extent of students' intention to use m-learning.

3.7 Behavioral Intention to Use (BI)

Fishbein and Ajzen (1975) defined a person's BI as the strength of the intent to perform a specified behavior. They also consider BI to include the individual's goals, aspirations, and expected responses to the target object. According to Davis et al. (1989), actual system use is determined by the BI to use a particular system and the intention to use a particular system is determined by the PU and PEOU of the system. Thus, BI is the main factor that determines the construct of technology acceptance. In other words, the students who are willing to use m-learning may have a high level of intention to use it. Additionally, according to Davis and Venkatesh (1996), the BI to use is the single best predictor of actual system usage.

Many studies have shown the ability of TAM in predicting the students' acceptance to use a particular system through measuring their intention (Akour, 2009; ALenezi et al., 2010; Ong & Lai, 2006; Selim, 2003). As an example, Selim (2003) employed TAM in evaluating the students' acceptance of online courses. The findings indicated that ease of use and usefulness of using the online courses can determine the students' intention to use them. Selim also ascertained that the intention to use online courses was the main predictor for their acceptance. Similarly, Akour (2009) employed TAM to evaluate the students' acceptance of m-learning. The findings revealed that ease of use and usefulness of using m-learning can determine the students' intention to use them. Akour also confirmed that the intention to use m-learning was the main predictor for their acceptance. Also, Zhao and Zhu (2010) agree that PU and attitud have positive relationship with intention to use m-learning. Nevertheless, some prior studies showed that PU has a positive influnce on BI to use (Davis, 1989; Ngai et al., 2007; Venkatesh, 2000; Venkatesh & Morris, 2000).

As a summary, the intention to use a particular system as a major criterion of technology acceptance should be investigated through more internal and external factors in order to model the factor that could affect the students' acceptance of new technologies positively. Hence, for the purpose of study, the BI to use is examined directly through PU and indirectly through PEOU.

3.8 Research Model

There has been a long history of research and development in the acceptance of m-learning in developed countries compared to those in developing countries. In conjunction, the initiatives of this study are carried out in Jordan, one of the developing countries. Particularly, TAM is used as the foundation model, as has been used and extended with different additional factors (Akour, 2009; Landry, Rodger & Hartman 2006; Masrom, 2007; Ngai et al., 2007; Roca, Chiu, & Martínez, 2006; Saade & Bahli, 2005; Saade& Galloway, 2005; Selim, 2003). Akour (2009) built a mobile learning acceptance model based on TAM with external variables encompasses different aspects of a university system that can influence student acceptance of mobile learning including university administrative and management commitment, social and superior influence, and service and technical aspects. Particularly, this study has similarity with (Akour, 2009) *in terms of technology service quality variables and demographic variables in context of acceptance of m-learning*. However, Akour's study was different in terms of expanding TAM with another variables such as extrinsic drivers and student readiness.

The extension of TAM in this study is derived from Davis's (1989) suggestion. Accordingly, includes additional external factors in order to gain better insight and understanding on the issue of technology acceptance. In particular, this research also seeks to confirm the effects of attitude on the relationships between the main predictors in TAM and the acceptance of m-learning. The proposed factors' relationships with the acceptance issue and TAM have been cited extensively in the body of current study literature. Specifically, the proposed external factors included in the model are culture factors, trust factors, and technology service quality factors. Most of these factors and their related variables have been derived from well known theories and models as mentioned earlier in the literature review and the preliminary study (in the Jordan context).

Conceptually, the proposed model consists of two parts. The first part represents the main constructs of the TAM. The dependent variable (DV) is represented by the behavioral intention to use m-learning, which is considered as "Students' m-learning acceptance". The internal independent variables (IVs) are perceived ease of use and perceived usefulness. It also has attitude variable towards intention to use m-learning. Meanwhile, the second part proposes the external factors that could affect the internal independent variables. This part includes three factors which are the culture factor (CF) which includes five variables, namely individualism/collectivism, uncertainty avoidance, power distance, Masculinity/Femininity, and long-term versus short-term orientation. The second factor is trust (TF) which includes two variables, namely trust in the mobile channel and trust in the university. The third factor is technology service quality factor (TSQF) which consists of six variables, namely acceptability, interface design, reliability/response, content quality, personalization, and privacy/security. The proposed factors are considered as external independent variables (IVs). As a summary, Table 3.1 lists the main TAM variables and the proposed independent external factors and their related variables. The proposed factors have been extensively defined, investigated and discussed in the body of the literature review. Further, Figure 3.1 illustrates the proposed model.

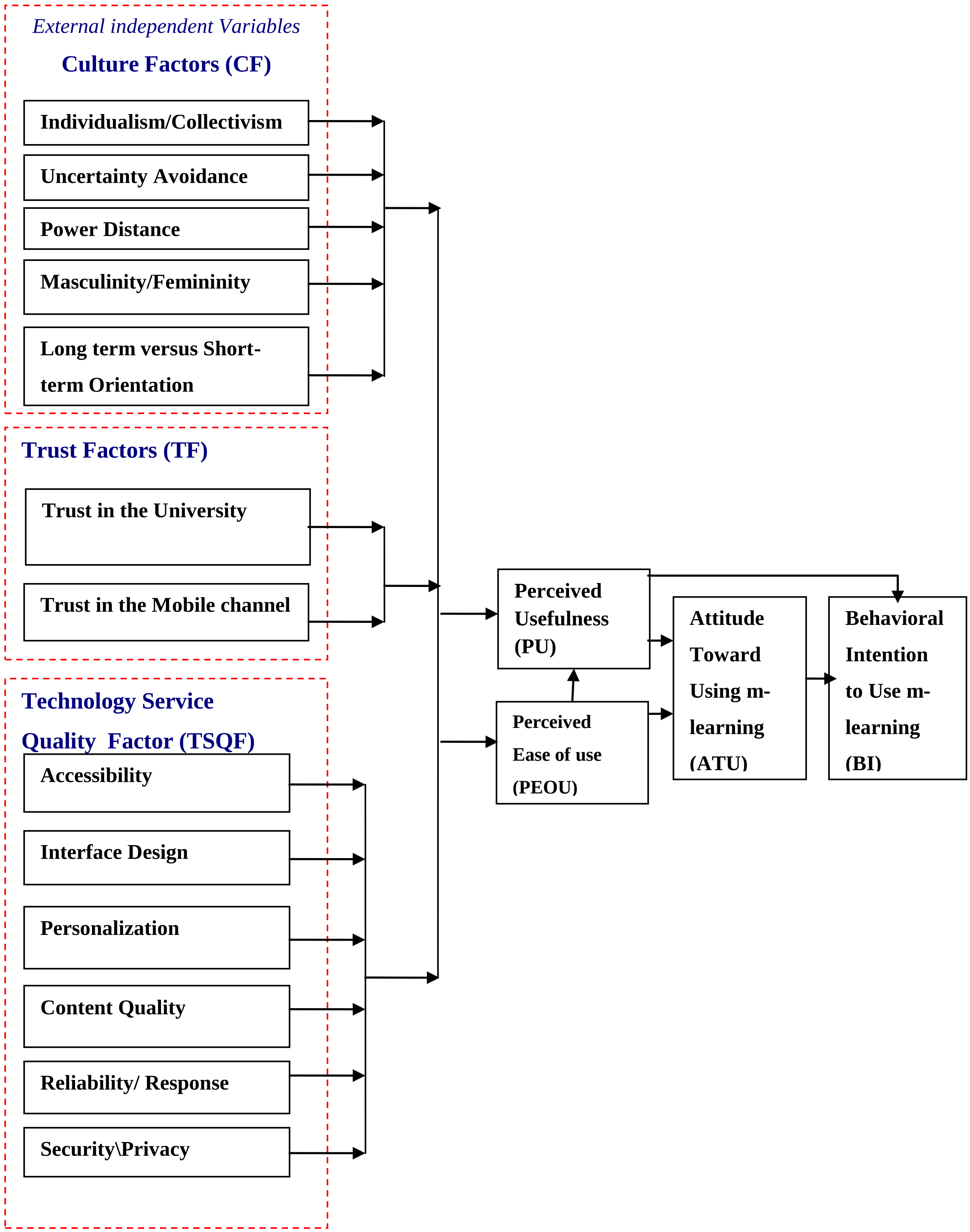

Figure 3.1: Proposed Research Model

Table 3.1: Research model constructs and variables

Construct	Variables	Sources
Culture Factor (CF)	Uncertainty Avoidance Power Distance Masculinity/Femininity Individualism/Collectivism Long term versus Short-term Orientation	Hofstede & Geert 1980; Hofstede, 1991; McCoy, 2002; Srite, 2000; Linjun, 2003; Al-Sukkar, 2005; Ess & Sudweeks, 2005
Trust Factor (TF)	Trust in the university Trust in the mobile channel	Kim & Prabhakar, 2000; Pavlou, 2003; Al-Sukkar, 2005.
Technology Service Quality (TSQ)	Accessibility Interface design Reliability and Response Personalization Content quality Security\Privacy	Al-Mushasha & Hassan, 2009; Parsons & Ryu, 2006; Yang, Cai, Zhou, & Zhou, 2005, Lederer et al. ,2000; Abbitt ,2006;Rai et al. 2002; Doll & Torkzadeh ,1998; Palmer ,2002; Jarvenpaa & Todd ,1997; Chae & Kim ,2004; Howcroft et al. ,2002; Sparta ,2002; Sathye ,1999; Pagani ,2004; Kleijnen et al. ,2004; Lu et al. ,2003; Ho & Kwok , 2003;Parasuraman et al. ,1994
Usefulness (U)	Perceived Usefulness (PU)	Davis ,1989; Venkatesh & Davis ,1996, Akour, 2009
Ease of Use (EOU)	Perceived Ease of Use (PEOU)	Davis ,1989; Venkatesh & Davis ,1996, Akour, 2009
Attitude (A)	Attitude toward system (ATU)	Davis et al. 1989; Bagozzi et al. 1992; Al-Sukkar, 2005
Behavioral Intention (BI)	Behavioral Intention towards system use (BI)	Venkatesh&Davis,1996;Bagozzi et al. ,1992; Akour, 2009

3.9 Research Hypothesis

Based on the problem described earlier and the related aspects concerned in this study; eleven research hypotheses are formulated. They are utilized to explain the nature of certain relationships, to establish the differences between groups or to establish the independence of more factors in a study (Sekaran, 1992). Accordingly, several testable statements, or hypotheses, can be drawn from the theoretical model. Based on the research model, the research hypotheses are formulated as follow:

H1: There is a positive relationship between Culture and Perceived Usefulness of m-learning.

H2: There is a positive relationship between Culture and Perceived Ease of Use of m-learning.

H3: There is a positive relationship between Trust and Perceived Usefulness of m-learning.

H4: There is a positive relationship between Trust and Perceived Ease of Use of m-learning.

H5: There is a positive relationship between Technology Service Quality and Perceived Usefulness of m-learning.

H6: There is a positive relationship between Technology Service Quality and Perceived Ease of Use of m-learning.

H7: There is a positive relationship between Perceived Usefulness and Attitude Toward using m-learning.

H8: There is a positive relationship between Perceived Usefulness and Behavioral Intentions to use m-learning

H9: There is a positive relationship between Perceived Ease of Use and Perceived Usefulness of m-learning.

H10: There is a positive relationship between Perceived Ease of Use and Attitude Toward using m-learning.

H11: There is a positive relationship between Attitude Toward using and Behavioral Intentions to use m-learning.

All hypotheses are interconnected, forming a model in which this study proposes. It is proposed that the model is called Mobile Learning Acceptance Model, which is illustrated in Figure 3.2.

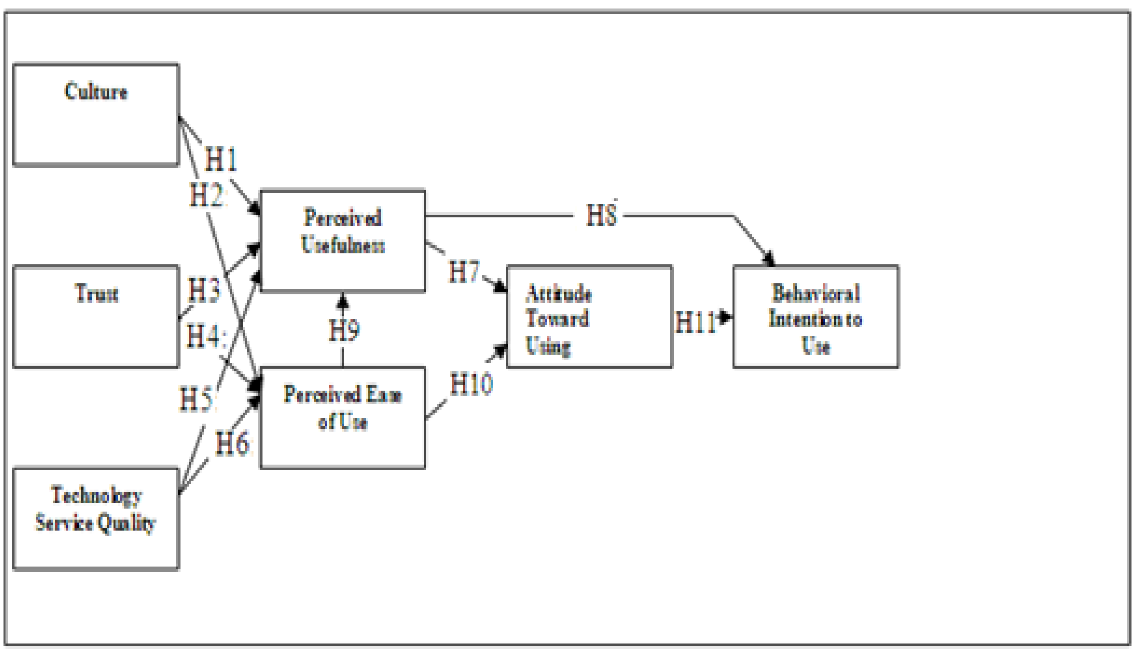

Figure 3.2: Research Hypothesis of Mobile Learning Acceptance Model

3.10 Conclusion

User acceptance of technology has been researched extensively in different settings with reliable results. In those studies, TAM has been the predominant model for researching the acceptance and user perceptions of different technologies and settings with high reliability. On a contrary, research on the acceptance of m-learning in higher education has not been extensively done in developing countries as those in developed countries. Hence this study is carried out in developing country to fill the gap. The underlying theoretical concepts used in this study as the foundation of the research model and its variables are presented in this chapter. Factors influencing the acceptance of m-learning are identified through literature reviews. The chapter concludes with hypotheses formulation.

CHAPTER FOUR
RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

Eleven hypotheses have been formulated in studying the acceptance of the m-learning among the students in higher education institutions. In testing these hypotheses, specific research methodology is needed. Hence, this chapter outlines the research design and methodology. It includes the descriptions of the research design, population, sampling methods and sample size, research procedures, and methods for data analysis. The well-known TAM is used as the basis in this study. However, it has been extended with external factors namely culture, trust, and technology service quality. In this chapter, reliability for pilot study as well as content validity are tested and discussed. Other validity and reliability tests are discussed in Chapter 5.

4.2 Research Design and Approach

According to Gay et al. (2006), research is the formal, systematic application of the scientific method to the study of problems. The scientific method involves developing hypotheses based on observation, deducing the implications of the hypotheses, testing the implications, and confirming or disconfirming the hypotheses. In particular, a hypothesis is an explanation of the occurrence of certain behaviors, phenomena, or events. In this study, the inductive reasoning is used in developing hypotheses based on previous research and literature.

Oppenheim (1998) states that research design is aimed at making the research problem researchable through setting up a research process in a way that generates specific answer to particular questions. Universally, there are two main research approaches; quantitative and qualitative. A particular approach is used upon and based on the nature and the requirement of the research questions and research objectives. According to Yin (2003), the types of research can be categorized based on research purpose: Exploratory, Descriptive or Exploratory research. Therefore, based on the purpose of research questions and the nature of the research objectives, this study can be categorized into a quantitative descriptive survey design.

Gay et al. (2006) define quantitative research as the collecting and analyzing of numerical data in order to explain, predict, and/or control a phenomena of interest. This study is concerned with finding the determinants of m-learning acceptance and understanding how different factors relate to student perception and acceptance of m-learning. With the needs to determine the factors, thus quantitative methods are used to investigate behavior intention, discover factors and relationships between the factors, and compare similarities and differences across student groups in different colleges and different gender and age groups.

On top of that, Nueman (2003) states that survey methods are suitable for research questions or research objectives that deal with beliefs or behaviors. In consistency with this view, Zikmund (2003) affirms that surveys are better methods for measuring awareness, opinions, and behavior. In this study, studying the students' acceptance towards a particular system will involve their opinions and behavior (Davis et al., 1989).

Thus, in order to obtain the required information from the appropriate sample, survey design is used as the main strategy for this research.

4.3 Population and Sampling Method

A research population is generally a large collection of individuals or objects that is the main focus of a scientific query (Castillo, 2009). It is for the benefit of the population in which the research is done. However, due to the large sizes of populations, researchers are often not able to test every individual in the population because it is too expensive and time consuming. This is the reason why researchers rely on a sample techniques (Sekaran, 2003). The size of sample depends on the accuracy required, the number of variables in the study and the appropriate statistical tools to be used.

4.3.1 Sampling Frame

The target population of this study comprises all undergraduates enrolled in 2009/2010 academic year in public universities that have adopted m-learning in Jordan. As mentioned in Chapter 2 (Section 2.4.6.4), Jordan has 10 public universities, in which only five of them have adopted m- learning. The five universities are The University of Jordan (UJ), Yarmouk University (YU), Mutah University (MU), Jordan University of Science & Technology (JUST), and The Hashemite University (HY). The universities are spread across the three zones of Jordan as shown in Table 4.1.

Table 4.1: Distribution of the five public universities that adopt m-learning in Jordan

Geopolitical Zone	**City**	**University**
North	Irbid	Yarmouk University (YU)
	Irbid	Jordan Uni. Of Science &Technology (JUST)
Center	Amman	The University of Jordan (UJ)
	Zarqa	The Hashemite University (HY)
South	Karak	Mutah University (MU)

Sources: Ministry of Higher Education and Scientific Research (2010)

Then cluster with Probabilities Proportional to Size (PPS) was utilized in this study because the population consists of homogenous members from five public universities. These universities are similar in the context of adopting m-learning applications and services (Teck, 2005). In this study the five universities are the cluster. The steps taken for choosing the sample started with the selection five universities from the list of 10 public universities. Table 4.2 shows Number of undergraduate students from each university.

Table 4.2: Number of undergraduate students from each university

University	**N. of students**
The University of Jordan (UJ)	32767
Yarmouk University (YU)	27298
Mutah University (MU)	14458
Jordan Uni. Of Science &Technology (JUST)	20606
The Hashemite University (HY)	17668
Total	112797

Sources: Ministry of Higher Education and Scientific Research (2010)

Secondly, proportionate random sampling was used to determine the number of students that formed the sample scope for the current study (Table 4.3). The number of students from the University of Jordan is the largest number with about 29.05% of the total number of undergraduate students that formed the sample scope for the current study. Yarmouk University has 24.20%, Mutah University with 12.82%, Jordan University of Science &Technology has 18.27%, and finally the Hashemite University has 15.66%.

Table 4.3: Proportion of universities students sample with the corresponding percentage

	University	**Number of students**	**% of sampling**
1	The University of Jordan (UJ)	32767	29.05%
2	Yarmouk University (YU)	27298	24.20%
3	Mutah University (MU)	14458	12.82%
4	Jordan Uni. Of Science &Technology (JUST)	20606	18.27%
5	The Hashemite University (HY)	17668	15.66%
	Total	112797	100%

Sources: Ministry of Higher Education and Scientific Research (2010)

4.3.2 Sample Size

According to Gay et al. (2006), sampling is the process of selecting the participants for a study in such a way that they represent the larger group (population) from which they were selected. It is very important in selecting the sample to determine the adequate sample size which represents an appropriate quantity of the entire population (Bless & Higson, 1995). Hence, according to Krejcie and Morgan (1970) as quoted by Sekaran (2003), if the population is more than or equal to 100,000, then the sample should be at a minimum of 384. As a result, in this study, it is appropriate to select a sample of not less than 384 students from the target research population. Based on that recommendation, this study managed to employ 500 students from the target population as detailed in Table 4.4. Table 3.4.4 shows the modality used in distributing the questionnaires.

Table 4.4: The sample distribution on each university based on its percentage from entire population

University	Percentage from target population	Population of students	Allocated sample	Systematic random sampling
The University of Jordan (UJ)	29.05%	32767	145	225
Yarmouk University (YU)	24.20%	27298	121	225
Mutah University (MU)	12.82%	14458	64	225
Jordan Uni. Of Science & Technology (JUST)	18.27%	20606	91	225
The Hasemite University (HY)	15.66%	17668	79	225
Total	**100 %**	**112797**	**500**	

4.3.3 Systematic Sampling Design

According to Sekaran (2003) the systematic sampling design involves drawing every n^{th} element in the population starting with randomly chosen element between 1 and *n*. In this study the researcher chose a random sample by which 500 respondents were systematically identified from the five universities in Jordan as represented in Table 4.4. The list of students from each university was used to ensure randomness. Every 225^{th} students at every university were chosen as respondents in the study.

4.4 Research Instrument

This section discusses about the research instrument and its development for data collection on the students' acceptance of m-learning through the measurement of the factors: perceived ease of use, perceived usefulness, attitude towards using, behavioral intention to use m-learning, culture, trust, and technology service quality. The perceptions of m-learning and mobile technologies are measured in the demographics section of the instrument. Purpose, context and appropriateness of the instrument are discussed with regards to the sample and the measurement of the intended variables.

4.4.1 Instrument Development

Instrument development is vital in achieving quality data (Eccles et al., 2011). This study applies guidelines by Gay et al. (2006) for constructing the questionnaire. It is important that the questionnaire is attractive and brief, contains only items that relate to the study's objectives, collects demographic information as necessary, focuses on items based on single topics or ideas, defines and explains ambiguous terms, words the questions clearly, avoids leading questions, organizes items from general to specific, keeps items and response options together, and finally be pilot tested. Also, careful attention is given to the length of the questionnaire, as well as the length, content, order, and type of individual questions. This study develops the questionnaire by adapting questionnaires from the previous studies. Specifically, that constructs in TAM are adapted from Davis (1989), Akour (2009), and Al-Sukkar (2005); culture factors are adapted from Hofstede (1991) and Linjun (2003); trust factors are adapted from Al-Sukkar (2005); and technology service quality factors are adapted from Al-Mushasha and Hassan (2009) and

Akour (2009). In detail, the number of original adapted items, Reliability coefficients and its sources are attached in Appendix D.

4.4.2 Questionnaire Design

The questionnaire is divided into nine major sections and comprises 74 items. It was originally written in English as attached in Appendix A. However, majority of the respondents are native Arabic speakers. Thus, the questionnaire was translated into Arabic.

4.4.3 Initial Instrument Structure

The very crucial step before organizing the survey questions is to draft clear and understandable instructions. To ensure this, the questionnaire is provided with a cover page contains the research title and a brief explanation of the research. Also, a consent page that contains anonymity and confidentiality explanations, procedure and risks, participant rights, contact information, length of time the survey is expected to take, and description of an incentive offered is also provided. Overall, the nine-section in the instrument are:

- Section 1: contains a demographic background including gender, age, mobile technologies experience and use, and academic major.
- Section 2: contains twenty one items on construct culture (CF).
- Section 3: contains thirteen items on construct trust (TF).
- Section 4: contains twenty one items on construct technology service quality (TSQ).

- Section 5: contains five items on construct perceive ease of use (PEOU).
- Section 6: contains five items on construct perceive usefulness (PU).
- Section 7: contains five items on the construct attitude (A).
- Section 8: contains four items on the construct behavioral intention (BI).
- Section 9:open-ended section for respondents to give additional subjective.

On the other hand, the Likert scale was developed by Rensis Likert in 1932. Questions using Likert scales usually present a statement and the respondents are given an opportunity to express their agreement or disagreement on a scale based on their own opinion. In this study, other than demographic questions, all the survey questions make use of the Likert scale format, in which a five-point scale is used as specified in Table 4.5.

Table 4.5: The research Likert scale

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Items	**1**	**2**	**3**	**4**	**5**

The questionnaire comprises of 74 items, except for demographic characteristics measurements. In detail, Table 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, and 4.12 depict the constructs and the items which were developed for use in the pilot test.

Table 4.6: Construct Items of Culture Variables

Variable	Code	Statement
Uncertainty Avoidance(UA)	**UA1**	It is important to have study requirements and instructions spelled out in detail so that students always know what they are expected to do.
	UA2	It is better to study in a university with specific rules and regulations.
	UA3	Rules and regulations are important because they inform students what the university expects of them.
	UA4	Students should avoid making changes because things could get worse.
Power Distance (PD)	**PD1**	Lecturer should be careful not to ask the opinions of students too frequently, otherwise the lecturer might appear to be weak and incomplete.
	PD2	Lecturers should make most decisions without consulting students.
	PD3	Students should not question their lecturer's decisions.
	PD4	Students should pay high respect for their lecturers.
	PD5	Students should not show their disagreement to their lecturers.
Masculinity/ Femininity (MF)	**MF1**	It is advisable for male students to pursue their study in vocational fields while females to pursue their study in academic ones.
	MF2	Female students do not value recognition and promotion in their learning as much as male students do.
	MF3	It is preferable for male students to have majors different from females.
	MF4	There are some study fields that male students can always perform better than female students.

Individualism /Collectivism (IC)	**IC1**	Individual achievement is not as important as group achievement.
	IC2	Group success is more important than individual success.
	IC3	Being accepted as a member of a group is more important than having autonomy and independence on learning.
	IC4	It is more important for a lecturer to encourage loyalty and a sense of responsibility in students than it is to encourage individual initiative.
Long vs. Short-Term Time Orientation (LST)	**LST1**	It is important to have a conscience in learning.
	LST2	Personal stability is not critical to success in education.
	LST3	Respect for tradition hampers performance in the education environment.
	LST4	Upholding one's personal image makes little difference in goal achievement.

Table 4.7: Construct Items of Trust Variables

Variable	Code	Statement
Trust in The University (TU)	**TU1**	The performance of mobile learning implementations makes me confident in my university.
	TU2	My university is honest with me.
	TU3	My university has a good reputation.
	TU4	I feel loyal towards my university.
	TU5	I am happy about the efforts my university is making towards a regular student like me.
	TU6	I am satisfied with the relationship I have with my university.
	TU7	My university is one that keeps promises and commitments.
	TU8	Overall, I trust my university.

Trust in the Mobile channel ®	**TM1**	I expect that using the mobile to access my university will perform as well as other technologies which include as e-learning.
	TM2	I expect that using the mobile to access my university will be available without interruption of service.
	TM3	I am very confident that when I use the mobile to access my university, it will perform as reliably as I expected it to perform.
	TM4	I think that when I use the mobile to access my university, it has the capability to provide a desired level of service in adverse or hostile conditions (e.g., natural disaster)
	TM5	I trust the mobile to do functions such as (registration, results, assignments.....).

Table 4.8: Construct Items of Technology Service Quality Variables

Variable	Code	Statement
Accessibility (AC)	**AC1**	For m- learning to be effective it is important to accomplish my studies at a time that is convenient for me (quickly).
	AC2	For m- learning to be effective it is important to perform my studies any place (whenever i need).
	AC3	For m- learning to be effective it is important to provide me with convenience in performing my studies(does not crash)
	AC4	For m-learning to be effective it is important to increase access to learning and education.
Interface Design (ID)	**ID1**	For m-learning system to be effective it is important for the interface design to provide me visually appealing features.
	ID2	For m-learning to be effective it is important for the interface design to provide site colors, graphics, and fonts.
	ID3	For m-learning to be effective it is important for the interface design to provide a good page layout.
	ID4	For m-learning to be effective it is important for the interface design to provide a well designed site menus.

Reliability & Response (RS)	**RS1**	For m-learning to be effective it is important for the service to be accurate (error free).
	RS2	For m-learning to be effective it is important for the service to be reliable.
	RS3	For m-learning to be effective it is important for the service to be adequately fast (fast download).
Content Quality (CQ)	**CQ1**	For m-learning to be effective it is important for the content to be easy to navigate.
	CQ2	For m-learning to be effective it is important for the content to be understandable
	CQ3	For m-learning to be effective it is important for the content to be current (up to date).
Personalization(P)	**P1**	It is important that m-learning services are personalized to control my learning progress
	P2	It is important that m-learning services are personalized to choose what I want to learn.
	P3	It is important that m-learning services are personalized to record my learning progress and performance.
	P4	It is important that m-learning services are personalized to provide learning support.
	P5	It is important that m-learning services are personalized to understand my needs.
Privacy & Security (PS)	**PS1**	I would likely not be worried about security when using m-learning.
	PS2	I trust the ability of the university to protect my privacy.

Table 4.9: Construct Items of Perceived Ease of Use variable

Variable	Code	Statement
Perceived Ease of Use (PEOU)	**PEOU1**	I would likely find m-learning easy to use.
	PEOU2	It would likely be easy for me to become skillful at using m-learning.
	PEOU3	I would likely find my interaction with m-learning to be clear and understandable.
	PEOU4	I would likely find m-learning flexible to interact with.
	PEOU5	I would likely find it easy to get m-learning to do what I want it to do.

Table 4.10: Construct Items of Perceived Usefulness variable

Variable	Code	Statement
Perceived Usefulness (PU)	**PU1**	Using m-learning would likely be useful in my academic life.
	PU2	Using m-learning would likely enable me to accomplish learning tasks more quickly.
	PU3	Using m-learning in my academic life would likely increase my productivity (do more things).
	PU4	Using m-learning would likely enhance my effectiveness in my academic life (do things better and smarter).
	PU5	Using m-learning would likely improve my academic life performance.

Table 4.11: Construct Items of Attitude Toward Using variable

Variable	Code	Statement
Attitude Toward Using (ATU)	**ATU1**	Using the mobile learning is a good idea.
	ATU2	I like the idea of using the mobile learning.
	ATU3	Using the mobile learning would be pleasant.
	ATU4	I dislike the idea of using the mobile learning.
	ATU5	Using the mobile learning would be unpleasant.

Table 4.12: Construct Items of Behavioral Intention to Use variable

Variable	Code	Statement
Behavioral Intention to Use (BI)	**BI1**	I intend to use m-learning in my academic life.
	BI2	I would enjoy using m-learning.
	BI3	I intend to use m-learning frequently.
	BI4	I would recommend that others use m-learning

4.4.4 Questionnaire Translation

The questionnaire was translated into Arabic language using a back translation technique in order to achieve the measurement equivalences in both languages (Brislin, 1970). The questionnaire was sent to two bilingual experts (English/Arabic) in order to ensure that the two versions are harmonized as close as possible. The Arabic version was translated later back into English by another bilingual expert in order to remove or solve any differences. The Arabic questionnaire is depicted in Appendix B.

4.5 Pilot Test

Pilot test is considered as a significant step in developing the measurement scales. According to Zikmund (2003), pilot test is an experimental study aimed at enhancing particular research instrumentations. In addition, a pilot test has the ability to detect the weaknesses and the possible failure especially the instrumentation. Thus, it would be useful for this study to conduct a pilot test in order to increase the accuracy and consistency of the measurements. The purpose of the pilot is to test content validity as well as conduct initial reliability analysis. Each of them is discussed in subsequent sections.

4.5.1 Content Validity

According to Gay et al. (2006), content validity is the degree to which a test measures an intended content area. Content validity, which is determined by expert judgment, requires both item validity and sampling validity. Item validity is concerned with whether the test items are relevant to measuring the intended content area, while sampling validity is concerned with how well the test samples the total content area being tested. In this study, the researcher presented the questionnaire to the five of reviewers to validate the questionnaire. The first reviewer was an associate professor from Universiti Utara Malaysia (UUM), the second reviewer is an associate professor from Universiti Sains Malaysia (USM), the third and fourth reviewers were a senior lecturer from Universiti Utara Malaysia (UUM), and fifth reviewer is a senior lecturer from Aljouf University. The detailed profiles of the reviewers involved in content validity are attached as Appendix I. The questionnaire was thoroughly reviewed to ensure adequacy, comprehensibility, quality, clarity, comfort level, and appropriateness of the questions for the topic. The suggestions from the reviewers have given the researcher the opportunity to do changes in terms of the items' arrangement, flow and sequencing of the questionnaire.

4.5.2 Instrument Reliability

To determine the reliability of the measurement instruments before the main empirical study, a pilot test was performed the questionnaire in Arabic. According to Hunt, Sparkman, and Wilcox (1982), the sample size for a pilot test is at least 30. In response to that, this study managed to randomly employ a sample of 70 students from Mutah

University. The returned responses were 60 questionnaires; eight of them were exempted from the analysis, because there were many questions left unanswered. Therefore, 52 questionnaires were used in the analysis.

Reliability refers to the degree to which a test consistently measures whatever it is measuring (Gay & Airasian, 2000). Theoretically, initial internal consistency reliability is assessed on the pilot data using Cronbach's alpha (Cronbach, 1984). Then, a more detailed reliability analysis is performed on the complete data set, in which a high reliability coefficient indicates a highly reliable instrument. As a threshold, the minimum acceptable reliability coefficients range from 0.70 to 0.80 (Devellis, 1991; Nunally, 1978). More specifically, Nunnally (1978) recommends that it must be greater than 0.7. The Cronbach alpha can be increased in either the average correlation or the number of items (Zander & Kogut, 1995). Henryson (1971)notes that an "item-to-total-test correlation should fall between 0.3 to 0.7 for inclusion" in a survey test. The conditions in this paragraph were used as the threshold for the reliability tests in this study, in which they are discussed in the following paragraphs.

In terms of culture which is the CF, the results of the tests are exhibited in Table 4.13. It is seen that all items for uncertainty avoidance (UA), power distance (PD), masculinity/femininity (MF), individualism/collectivism (IC) are included. However, item LST4 for long vs. short term time orientation (LST) construct is not included because it makes the construct unreliable.

For the trust factor (TF), the trust in the university (TU) and trust in the mobile channel ® were tested separately also. It was found that all TU items are reliable (alpha = 0.864; item-to-total-test > 0.3). In contrast, the first test for TM reveal unreliability because the item-to-total-test was less than 0.3. Hence, the TM3 (0.121) was omitted. Then, the alpha for TM is 0.801, which is reliable. This makes the overall alpha without TM3 for TM is 0.906, which is high reliable.

Similarly, a slight charge also happens in technology service quality factor (TSQF), all items for accessibility (AC), interface design (ID), reliability/response (RS), and content quality (CQ), were included their alpha values are greater than 0.7 (0.753, 0.774, 0.831, and 0.735 respectively) and the item-to-total-test are greater than 0.3. However, for personalization (P), the alpha value was only 0.691, which was unreliable. Hence, P4 (0.150) was omitted and tested again. Then, the alpha value increase to 0.748, making the alpha value for the whole P is 0.856. At the end, the alpha value for TSQF without P4 is 0.718, which is reliable.

Further, all items for PEOU (alpha = 0.844), PU (alpha = 0.812), and BI (alpha = 0.914) are included because they meet the conditions. However, ATU with item-to-total-test less than 0.3 was not accepted. Hence, the ATU5 (0.139) was omitted. Then, the alpha increase to 0.861 and item-to-total-test is greater than 0.3, which is reliable.

The previous paragraphs outline the results of reliability test, which reveal that some items are omitted to make sure the constructs are reliable. As a summary, all reliability are exhibited in Table 4.13.

Table 4.13: Scale reliability alpha – pilot test

Variables		**No. of Items Before Reliability**	**No. of Items After Reliability**	**Before Reliability**	**After Reliability**	**Final Reliability**
Culture	UA	4	4	0.879	0.879	0.838
	PD	5	5	0.854	0.854	
	MF	4	4	0.792	0.792	
	IC	4	4	0.893	0.893	
	LST	4	3	0.647	0.849	
			LST4 deleted			
Trust	TU	8	8	0.864	0.864	0.906
	TM	5	4	0.717	0.801	
			TM3 deleted			
Technology Service Quality	AC	4	4	0.753	0.753	0.718
	ID	4	4	0.774	0.744	
	RS	3	3	0.831	0.831	
	CQ	3	3	0.735	0.735	
	P	5	4	0.691	0.748	
			P4 deleted			
	PS	2	2	0.856	0.856	
Perceive Ease of Use	PEOU	5	5	0.844	0.844	0.844
Perceive Usefulness	PU	5	5	0.812	0.812	0.812

Attitude Toward Using	ATU	5	4 ATU5 deleted	0.778	0.861	0.861
Behavior Intention	BI	4	4	0.914	0.914	0.914
TOTAL		74	70			

4.6 Final Instrument

After performing validity and initial reliability tests, the final version of the instrument was developed for use in actual data collection. Throughout the process of instrument development and testing, the emphasis was on the proper instrument design for the statistical analysis methods to be used. As a result, the sections used in the initial instrument were retained. The final instrument is found in Appendix C.

4.7 Data Collection Procedure

The developed questionnaire was used to collect data from students of the identified universities after obtaining permission from the dean ship of research and postgraduate studies in each university. According to Sekaran (2003), a structured questionnaire is an appropriate method for data collection when "*the researcher knows exactly what is required and how to measure the variables of interest*". Similarly, he also points out that a questionnaire is an efficient data collection mechanism when (1) there is a need to protect the privacy of the respondents, and (2) the responses are expected to be in a standardized way. Furthermore, a questionnaire is usually easy to analyze, of low-cost to administer, familiar to most people, and can help to reduce bias as researcher's influence on the respondents' answers is minimized. In this study, one month was given to the universities to distribute the questionnaires, and after the stipulated period, this study self-collected the questionnaires.

4.8 Technique of Data Analysis

Different analysis techniques were performed in order to examine the obtained information from the respondent. The demographics information was analysed using one way Analysis of Variance (ANOVA) and T-test in order to examine any mean differences. In addition, correlation analysis using Pearson correlation matrix was performed to test the direct relationship (positive or negative) and the strength of the relationships between the hypothesized factors or variables. On top of that, multiple regression analysis was performed in order to assess the influences of independents variables (Ivs) on the dependent variables (DVs), while stepwise regression was performed in order to obtain the most significant predictors' variables that have a strong influence on acceptance of the m-learning.

4.8.1 Descriptive Statistics Analysis

Descriptive statistics are used to explore the data collected, and summarised and describe those data. Pallant (2007) states that descriptive statistic is aimed at depicting the different attributes of data, verifying any violation of the principal assumptions for the statistical methods to be used in the study, and addressing particular research questions. In this study, the descriptive statistics are undertaken using central tendency and variation statistics such as means, ranges, and standard deviation.

4.8.2 Factor Analysis

One important step in data analysis is to understand the dimension of the variables in the proposed model or relationships in empirical research (Hair, Anderson, Tatham, & Black, 1998). In other words, factor analysis is usually performed to identify the structure of interrelationship (correlation) among a large number of items. This is done by defining common underlying dimensions, known as factors (Hair et al., 1998).

The main purposes of factor analysis in this study are 1) to examine the construct validity of the measuring concept (Cooper, Schindler, & Sun, 2003); 2) to reduce the number of variable, and 3)to identify the structure in the relationship between variables by defining a set of underlined dimensions. Thus, factor analysis can be utilized as a method of data reduction or structure detection (Hair et al., 1998).

In detail, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are two common types of Factor analysis. According to Coakes, Steed, and Dzidic (2006), EFA is commonly utilized when a researcher wishes to summarize a set of structure variables. It can also be used when a researcher wants to identify the underlying dimensions of a set of constructs that are assessed by a specific instrumentation. Conversely, CFA is used when a researcher seekes to confirm a theory about the structure of a particular domain (Hair, et al., 2006; Coaks et al., 2006). Based on that, this study is aimed at conducting the factor analysis techniques in order to identify and observe the underlying dimensions of a set of variables, EFA is considered as justifiable and suitable.

Hence, in this study, EFA using the principal components method was used to assess the dimensions from the instrument items. Principal components analysis is a factor extraction method used to form uncorrelated linear combinations of the observed variables. It is variance-based, and the first component has maximum variance. The procedure of removing items and performing the factor extraction was iterative to achieve simple factor structure using the following criteria in the following paragraphs (Coakes & Steed, 2003; Hair et al. 1998).

Firstly, determine the appropriateness of proceeding with factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy tests whether the partial correlations among variables are small and thus are likely to factor well. For factor analysis, the KMO value should be higher than 0.60 while a value of 0.90 or higher is considered excellent (George & Mallery, 2007). Bartlett's test of sphericity (BTS) is a measure of multivariate normality and tests whether the correlation matrix is an identity matrix indicating that the factor model is inappropriate. In this study, The KMO measure of sampling adequacy is far greater than 0.6 and the BTS is significant, indicating that factor analysis was appropriate.

Secondly, items that do not load with any other item should be removed. For this purpose the factor matrix of loadings, or correlation between the items and factors is used. Additionally, items should be removed if they have loadings less than 0.40 since Hair et al. (1998) classify loadings below 0.40 as low (loadings above 0.6 are considered high).

Thirdly, items that load on more than one factor should be removed due to violation of the simple structure factor solutions (only one loading on any factor for each variable); double loading makes interpretation of output difficult. Double loading occurs when the factor score is at least 0.50 on more than one factor. Additionally, items should be removed if an item loaded on a factor where theoretically it seems unreasonable for that item to be associated with other items in the factor (Hair et al., 1992; Nunnally, 1978).

Fourthly, items with a measure of sampling adequacy (MSA) less than 0.50 in the anti-image matrix should be removed. The anti-image correlation matrix contains the negatives of the partial correlation coefficients. In a good factor model, most of the off-diagonal elements will be small. The measure of sampling adequacy for a variable is displayed on the diagonal of the anti-image correlation matrix; with acceptable level is above 0.5.

4.8.3 Reliability Analysis

Hayes (1998) defines reliability as "*the extent to which measurements are free from random-error variance*" (p. 36). Random error decreases the reliability of the measurement. High questionnaire reliability is required in order to feel confident that the scores on the questionnaire reliably reflect the underlying dimension. Alternatively, reliability is the degree to which a test consistently measures whatever it is measuring. There are two benefits of having a scale with high reliability (Hayes, 1998): First, it distinguishes between varying levels of satisfaction better than a scale with low reliability. Second, it makes it more likely to find significant relationships between variables that are truly related to each other. A scale with high reliability can detect true differences that are either very large or very small, while a scale with low reliability can only detect true differences that are very large.

There are three general formats of reliability: test-retest reliability, equivalent form reliability, and internal consistency. Since this study is cross-sectional and conducted one time, it is important to test the internal consistency reliability. Particularly, internal consistency reliability is the extent to which items in a single test are consistent among themselves and with the test as a whole. Three different approaches can measure the internal consistency reliability: Split-half reliability, Kuder-Richardson, and Cronbach's alpha (Cronbach, 1984). Reliability is expressed numerically by a reliability coefficient which is obtained by using correlation (Gay et al., 2006), in which a high reliability coefficient indicates high reliability. If items have multiple score choices such as the Likert scales, then internal consistency reliability can be determined using Cronbach's alpha, which is based on the average correlation of items within a test if the items are standardized, and based on the average co-variance among the items if the items are not standardized. Because Cronbach's alpha can be interpreted as a correlation coefficient, it ranges in values from 0 to 1.

Two common factors that affect the reliability of scales are the number of items in the scale and the sample of people in which the reliability is calculated. The higher the number of items, the more reliable the instrument but the additional items must be representative of the same concept being measured. Besides, the sample should be heterogeneous with respect to the concept being measured (Hayes, 1998).

Reliability affects the magnitude of the correlation between any two scales; the correlation is reduced if the reliability of the scales is low. Incorrect conclusions about the relationship between two variables are likely when the reliability of either, or both, scales is low (Hayes, 1998). According to Nunnally (1978) basic research reliabilities should be 0.80 or higher. However, increasing reliabilities above 0.80 will not dramatically affect the correlation between scales. Generally, alphas of at least 0.70 are widely advocated (Netemeyer et al., 2003). However, some authors argue that higher alphas of at least 0.80 are necessary (Clark & Watson, 1995). In response to this issues, Devellis (1991) suggests the following criteria for alpha levels: below 0.60 is unacceptable; between 0.60 and 0.65 is undesirable; between 0.65 and 0.70 is minimally acceptable; between 0.70 and 0.80 is respectable; and between 0.80 and 0.90 is very good. In this study, the threshold an acceptable level of reliability is at least 0.70.

4.8.4 Correlation Analysis

Correlation analysis is a statistical method used to describe the strength and direction of the linear relationship between two variables (Pallant, 2001). Pearson's correlation coefficient (r) is utilized to describe the strength and direction of the relationship between two variables. Correlation is appropriate for interval and ratio scales and is the most common measure of linear relationship. This coefficient has a range of possible values from –1 to +1. The value indicates the strength of the relationship, while the sign (- or +)

indicates positive or negative relationship. It has been proposed that the lower limit of substantive regression coefficients is 0.05 (Compeau & Higgins, 1995), although researchers prefer a critical value of 0.10 and higher ($r > 0.10$) for substantive correlations. While the correlation coefficient value could range between –1.0 and +1.0, researchers need to know whether any relationship exist found between two variables is significant (i.e. if it has occurred by chance alone or if there is a high probability of its actual existence). In social science research, a significance of 0.05 is a generally-accepted conventional level. In response to this, Cohen (1988) provides a guideline to explain the strength of the relationship between two variables (*r*) as shown in Table 4.14.

Table 4.14: Cohen's Guideline of Correlation Strength

r values	Strength of relationship
r = +.l0 to .29 or r = -0.l0 to -0.29	Small
r = +.30 to .49 or r = -0.30 to -0.49	Medium
r = +.50 to l.0 or r = -0.50 to -0.l.0	Large

4.8.5 Regression Analysis

For the purpose of answering the research questions in this study, multiple linear regressions and stepwise regressions were performed. Multiple regression is a statistical method that is used to model a linear relationship between a dependent variable (predictand) and one or more independent variables (predictors) (Aksornsingchai & Srinilta, 2011). Multiple linear regression attempts to find the best fit plane. The fit can be evaluated by the coefficient of multiple determinations (R^2). However, several assumptions must be met in order to conduct multiple regression analysis. There are mainly normality, linearity, multicollinearity and multivariate outliers (Hair et al, 1998).

In statistics, stepwise regression includes regression models in which the choice of predictive variables is carried out by an automatic procedure (Draper & Smith, 1981). In addition, stepwise regressions are the step-by-step iterative construction of a regression model that involves automatic selection of independent variables. Stepwise regression can be achieved either by trying out one independent variable at a time and including it in the regression model if it is statistically significant, or by including all potential independent variables in the model and eliminating those that are not statistically significant, or by a combination of both methods. In both multiple regression test and stepwise regressions test, the probability of obtaining a test statistic (P-value) with a value ranging from zero to one. In this study, if the P value is less than or equal to 0.05 probability level, it is considered significant (Stengel, Bhandari, & Hanson, 2009).

4.8.6 Differences Analysis

T-test was used to see if there is a statistically significant difference in the mean scores for two groups of variables in terms of their acceptance level of m-learning implementation. The assumption of homogeneity of variance was first examined through Levene’s test for equality of variance. In the case where the assumptions of equal variances were violated, the t-value reported for equal variances not assumed is used.

One way analysis of variance (ANOVA) is used to examine whether there exist any differences in the acceptance level of m-learning by demographic variables with more than two categories. As ANOVA tests the assumed equal variances, the Levene's test for homogeneity of variance was first examined in order to ensure that the assumptions of homogeneity of variance have not been violated. Further, one way ANOVA is used to test the same hypothesis when two or more groups are compared. Particularly, the hypotheses for the comparison of the means in this are as follows:

H_0 (Null Hypothesis): The population means for all the groups are the same.

H_A (Alternative Hypothesis): The population means for at least two groups are different.

Based on the descriptions in the previous paragraphs, the main data analysis techniques used in this study are depicted in Table 4.15.

Table 4.15: The data analysis techniques used in the research

	Research Questions	Analysis Techniques
1	What are the factors that could influence the acceptance of m-learning among the students in Jordanian higher education institutions?	Pearson product-moment Correlation & Multiple regression analysis
2	Which variables from each external factor have the most influence on the acceptance of m-learning among the student in Jordanian higher education institutions?	Stepwise regression analysis
3	How do the acceptance of m-learning different across the student groups in Jordanian higher education institutions?	T-test and One way ANOVA

4.9 Conclusion

This chapter describes the research design and methodology. Additionally, it discusses the pilot study for refining the instrument based on reliability analysis results, combined with consideration of the content validity of the construct in question. In addition, a description of data collection procedure is outlined. It also describes the data analysis techniques involved in this study.

CHAPTER FIVE

FINGDINGS

5.1 Introduction

This chapter discuss about the data analysis and findings of this study. The primary focus of the data analysis is at the individual level but some analyses were performed at the group level. The group analysis serves to determine the differences among student groups. In section 5.2, data quality is investigated through initial data inspection for missing and outlier data, and normality conformance. Section 5.3 investigates the underlying constructs and dimensions of the model using factor analysis, followed by reliability analysis. Section 5.4 presents the profile of the respondent. Descriptive statistics are discussed in Section 5.5. Hypothesis testing and research model path analysis using multivariate correlation and regression analysis as well as stepwise regression analysis are presented in Section 5.6, followed with Section 5.7 that presents the results of Group analysis.

5.2 Data Screening

Data were inspected through descriptive and visual means for missing data patterns, for adherence to statistical assumptions by identification of outliers, and for skewness and kurtosis. Three cases were removed for having double answers for questions (two answers were selected for each question), making them not usable.

5.2.1 Missing Data

No action was taken on data missing from the demographic section: only two items in two different cases were missing and these items did not affect the analysis of the data (only 0.0072%). Based on that, it was concluded that missing data was not a problem (DiLalla & Dollinger, 2006). According to Sekaran (1992) there are multiple ways of handling missing data. One of the common methods, which is used in SPSS (George & Mallery, 2007) is to use the mean of the responses to the particular item, referred to as the "series mean."

5.2.2 Normality Assessment and Outliers

The initial screening of the data includes checking for normality and outliers were conducted in this study. According to Zikmund (2003), an outlier is related to the data which has values that lie outside the normal range of data. Therefore, the usable questionnaires obtained for further analysis were 395. Furthermore, the collected data were also examined to assess the univariate outliers cases because of main concern of the factor analysis is the outliers. The main technique used in assessing the univariate outliers was standard scores (Z-score). All the variables' scores were converted to standard scores. The cases were considered as outlier when the Z-score values were greater than +3 or less than -3 as a result of the current study's large sample size (Coakes & Steed, 2003). As a result of the univariate outliers test, the obtained data was valid in proceeding with factor analysis.

For the purpose of this study, the test of normality distribution of the data was conducted using Skewness and Kurtosis. The test was done on all construct. In conjunction, Table 5.1 provides a sample of the results, in which they explain about the culture factor. The remaining results are available in Appendix E.

Table 5.1: Skewness and Kurtosis for Culture factor

Culture	**N**	**Skewness**		**Kurtosis**	
	Statistic	Statistic	Std. Errors	Statistic	Std. Errors
Culture 1	395	.496	.123	-.299	.245
Culture 2	395	.550	.123	-.117	.245
Culture 3	395	.652	.123	-.140	.245
Culture 4	395	.526	.123	-.222	.245
Culture 5	395	-.644	.123	-.062	.245
Culture 6	395	-.912	.123	1.037	.245
Culture 7	395	-.606	.123	.156	.245
Culture 8	395	-1.087	.123	1.634	.245
Culture 9	395	-.635	.123	-.275	.245
Culture 10	395	-.571	.123	-.722	.245
Culture 11	395	-.073	.123	-1.146	.245
Culture 12	395	-.611	.123	-.800	.245
Culture 13	395	-1.223	.123	1.044	.245
Culture 14	395	.121	.123	-.384	.245
Culture 15	395	.128	.123	-.328	.245
Culture 16	395	.485	.123	-.817	.245
Culture 17	395	.158	.123	-.303	.245
Culture 18	395	-.136	.123	-.422	.245
Culture 19	395	-.051	.123	-.781	.245
Culture 20	395	-.497	.123	-.022	.245

As indicated in Table 5.1, there is no value exceeding the acceptable range of skewness suggested by Hair et al. (2006), which is between -2.58 and + 2.58 at the 0.01 significance level or between -1.96 and +1.96 at 0.05 significance level. As for kurtosis, the normal range is between -3 and +3. Based on the kurtosis and skewness results, there is no serious concern about the normality distribution of the data, so they are sufficient to be used for further analysis.

5.3 Goodness of Measures

The goodness and suitability of the measurement tool can be examined by testing the reliability and validity of its constructs.

5.3.1 Construct Validity

As mentioned in the previous chapter (Section 4.4.1), most of the items used to measure the variables in this study have been adapted from the previous literatures which have been confirmed through discriminant and convergent validity (Bianchi & pike, 2009). Literatures show that most studies on the acceptance of m-learning and its antecedents factors were carried out in western countries particularly, USA, UK, Netherlands, and Canada, in which the environment and culture are entirely different from those in Jordan. Because these previous studies may differ from this study in terms of the context of the investigation (Jordan) as well as the respondents (students), it is necessary to reexamine the validity of these measures. Accordingly, exploratory factor analysis was conducted on all items to ensure that these items measure what they are supposed to measure and are suitable for the purpose of this study.

5.3.2 Exploratory Factor Analysis (EFA)

In this study, a separate exploratory factor analysis was undertaken to determine the variables of the seven major concepts namely culture factor, trust factor, technology service quality factor, perceive usefulness, perceive ease of use, attitude toward using m-learning, and behavioral intention to use m-learning. The reason behind that is to ensure the ratio of variables to sample size is maintained at 1:10 (Hair et al. 2003).In addition, to ensure the stability of the factor loading of various constructs, the same procedure was performed in previous studies (Thi, 2006).

5.3.2.1 Exploratory Factor Analysis on Culture Factor (CF)

In terms of culture, a total of 20 items were used to assess the cultural influence on students' acceptance of m-learning. It contains the original five dimensions of Hofstede's culture factors (Hofstede, 1991): (i) uncertainty avoidance (UA), (ii) power distance (PD), (iii) masculinity/femininity (MF), (iv) individualism/collectivism (IC), and (v) long versus short term time orientation (LST).

To test whether factor analysis was appropriate for the five culture factors, the KMO and BTS were carried out on the variables, in which the results are shown in Table 5.2. The KMO value for culture factors is 0.79, higher than 0.60. The observed BTS value (5177.281) very large and its' associated significance value is very low ($P<0.001$). In a nutshell, the results of KMO and BTS tests clearly indicate that the twenty cultural items have fulfilled the conditions required and thus are suitable for subsequent factor analysis.

Table 5.2: KMO and Bartlett's tests of Culture

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.791
Bartlett's Test of Sphericity	Approx. Chi-Square	5177.281
	df	190.000
	Sig.	.000

Further, Table 5.3 exhibits the result of the extracted components for culture factors. It shows five factors with eigenvalue exceeding one. These five factors were adopted using the latent root criterion which explains about 72% of the variance.

Table 5.3: Extraction of Components for Culture factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.168	25.841	25.841	5.168	25.841	25.841	3.159	15.794	15.794
2	3.116	15.582	41.423	3.116	15.582	41.423	3.082	15.411	31.205
3	2.587	12.935	54.358	2.587	12.935	54.358	3.075	15.377	46.581
4	2.135	10.676	65.034	2.135	10.676	65.034	3.018	15.089	61.670
5	1.345	6.727	71.762	1.345	6.727	71.762	2.018	10.091	71.762
6	0.853	4.265	76.026						
7	0.666	3.329	79.355						
8	0.578	2.888	82.243						
9	0.523	2.616	84.859						
10	0.463	2.314	87.173						
11	0.413	2.067	89.240						
12	0.377	1.887	91.126						
13	0.362	1.809	92.935						
14	0.342	1.710	94.645						

15	0.300	1.499	96.144
16	0.292	1.460	97.604
17	0.246	1.229	98.833
18	0.110	0.552	99.385
19	0.078	0.392	99.778
20	0.044	0.222	100.000

In addition, the eigenvalues for each factor in the screen plots further support the extraction result (see Figure 5.1). It is seen that the curve flattens out from the factor five which indicates that there are five factors.

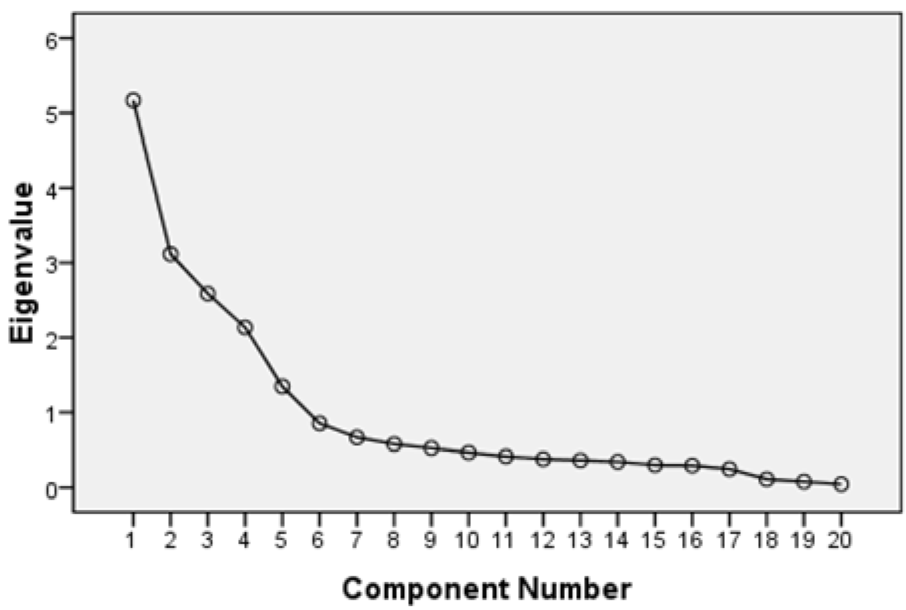

Figure 5.1: Screen plot for culture factors

In an effort to obtain a theoretically meaningful pattern from culture factors, the factors were orthogonally rotated using varimax rotation. This technique is the most widely used to make the pattern of culture variables associated with a given factor more distinct (Kim, 1975).The factor loadings of each of the five culture factors and factor structures after rotation are shown in Table 5.4. For the twenty items, factor analysis has extracted five factors that explains71.762% of the variance. All the twenty rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factors in the scale and their validation.

Table 5.4: Factor Analysis Loadings of Culture Using Varimax Rotation

	Component				
	1	**2**	**3**	**4**	**5**
PD5	0.873				
PD1	0.862				
PD3	0.741				
PD2	0.728				
PD4	0.678				
UA1		0.936			
UA2		0.876			
UA4		0.848			
UA3		0.783			
IC4			0.917		
IC1			0.909		
IC2			0.798		
IC3			0.654		
MF4				0.876	
MF3				0.860	
MF1				0.845	
MF2				0.839	
LST1					0.809
LST3					0.785
LST2					0.733

5.3.2.2 Exploratory Factor Analysis on Trust Factor (TF)

A total of 12 items for trust factor (TF) were examined by principle component and Varimax rotated analysis. The trust factor has two main variables: trust in the university (TU) and trust in the mobile channel (TM).

As defined previously, to test whether factor analysis is appropriate for the trust factors, the KMO and BTS were carried out on the dimensions. In conjunction Table 5.5 shows that the KMO value for trust variables is 0.852 and BTS value is very large (4071.606). Additionally, its' associated significance value is very low ($P<0.001$). These clearly indicate that the twelve items in trust factor fulfill the conditions required and thus are suitable for subsequent factor analysis.

Table 5.5: KMO and Bartlett's tests of Trust

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.852
Bartlett's Test of Sphericity	Approx. Chi-Square	4071.606
	df	66.000
	Sig.	.000

Further, Table 5.6 exhibits the results of extracted components for trust factors. It seen that s two factors have eigenvalue exceeding one. Hence, these two factors were adopted using the latent root criterion which explains about 70 % of the variance.

Table 5.6: Extraction of Components for Trust factors

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.281	52.343	52.343	6.281	52.343	52.343	5.442	45.348	45.348
2	2.064	17.204	69.547	2.064	17.204	69.547	2.904	24.199	69.547
3	0.948	7.903	77.450						
4	0.539	4.488	81.938						
5	0.504	4.197	86.135						
6	0.398	3.314	89.449						
7	0.348	2.898	92.347						
8	0.340	2.836	95.184						
9	0.299	2.490	97.674						
10	0.130	1.082	98.756						
11	0.104	0.869	99.625						
12	0.045	0.375	100.000						

Then, the eigenvalues for each factor in the screen plots support the extraction result. Apparently, the curve flattens out from the factor two which indicates that there are two factors (see Figure 5.2).

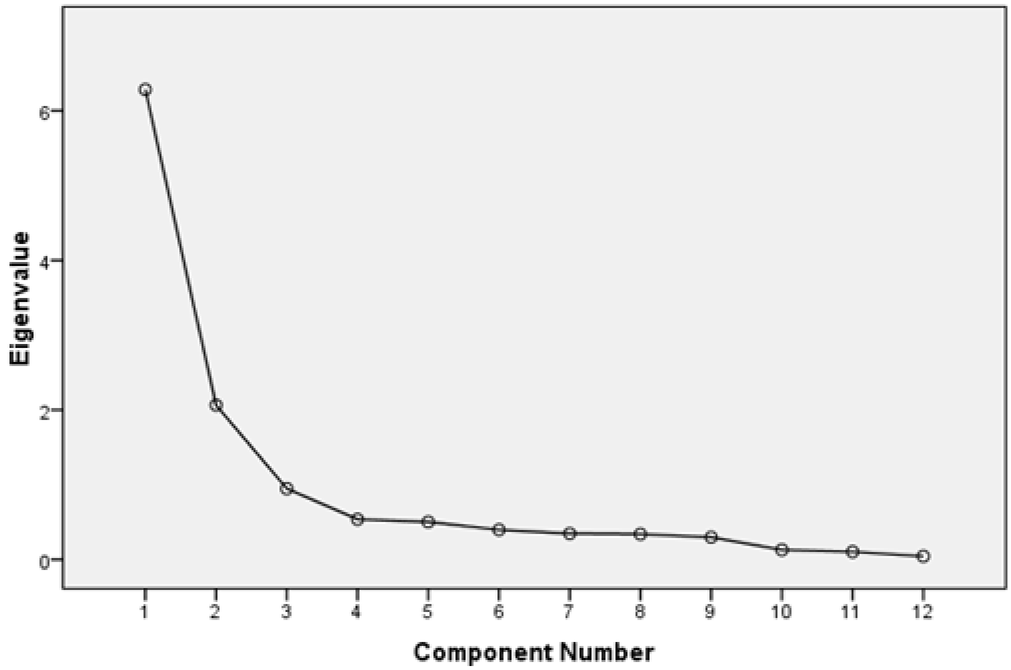

Figure 5.2: Screen plot for trust factors

The factor loadings of each of the two trust factors and factor structures after rotation are shown in Table 5.7. For the twelve items; factor analysis has extracted two factors that explains 69.547% of the variance. As a result, all the twelve rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factors' scale and its validation.

Table 5.7: Factor Analysis Loadings of Trust Using Varimax Rotation

	Component	
	1	2
TU4	0.908	
TU2	0.890	
TU6	0.889	
TU7	0.847	
TU8	0.794	
TU5	0.728	
TU3	0.724	
TU1	0.714	
TM1		0.842
TM2		0.826
TM3		0.820
TM4		0.768

5.3.2.3 Exploratory Factor Analysis on Technology Service Quality Factor (TSQF)

A total of 20 items were used to assess technology service quality factors (TSQF). The technology service quality is related to the issues of m-learning used, which consists of six main variables including (i) accessibility (AC), (ii) interface design (ID),(iii) reliability and response (RS),(iv) content quality (CQ), (v) personalization (P) and (vi) privacy/security (PS).

The results of KMO and BTS are shown in Table 5.8. It is seen that the KMO is 0.659 and BTS value is very large (4179.106) with very low associated significance value

(P<0.001). These results clearly indicate that the twenty trust items fulfill the conditions and thus suitable for subsequent factor analysis.

Table 5.8: KMO and Bartlett's tests of Technology Service Quality

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.659
Bartlett's Test of Sphericity	Approx. Chi-Square	4179.106
	df	190.000
	Sig.	0.000

Further, Table 5.9 shows the results of extracted components for technology service quality factors. There are six factors with eigenvalue exceeding one, which were adopted using the latent root criterion which explains about 72 % of the variance.

Table 5.9: Extraction of Components for Technology Service Quality factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.543	17.713	17.713	3.543	17.713	17.713	2.706	13.529	13.529
2	3.136	15.682	33.395	3.136	15.682	33.395	2.630	13.149	26.679
3	2.293	11.465	44.860	2.293	11.465	44.860	2.620	13.100	39.778
4	2.122	10.612	55.471	2.122	10.612	55.471	2.374	11.870	51.648
5	1.823	9.113	64.584	1.823	9.113	64.584	2.280	11.402	63.050
6	1.524	7.622	72.206	1.524	7.622	72.206	1.831	9.156	72.206
7	0.816	4.080	76.285						
8	0.689	3.444	79.729						
9	0.618	3.088	82.817						

10	0.548	2.738	85.554
11	0.533	2.663	88.217
12	0.458	2.288	90.504
13	0.375	1.876	92.380
14	0.328	1.639	94.019
15	0.315	1.577	95.596
16	0.263	1.316	96.912
17	0.238	1.188	98.100
18	0.191	0.956	99.056
19	0.146	0.730	99.786
20	0.043	0.214	100.000

Additionally, the eigenvalues for each factor in the screen plots further support the extraction result. Particularly, Figure 5.3 shows that the curve flattens out from factor six which indicates that there are six factors.

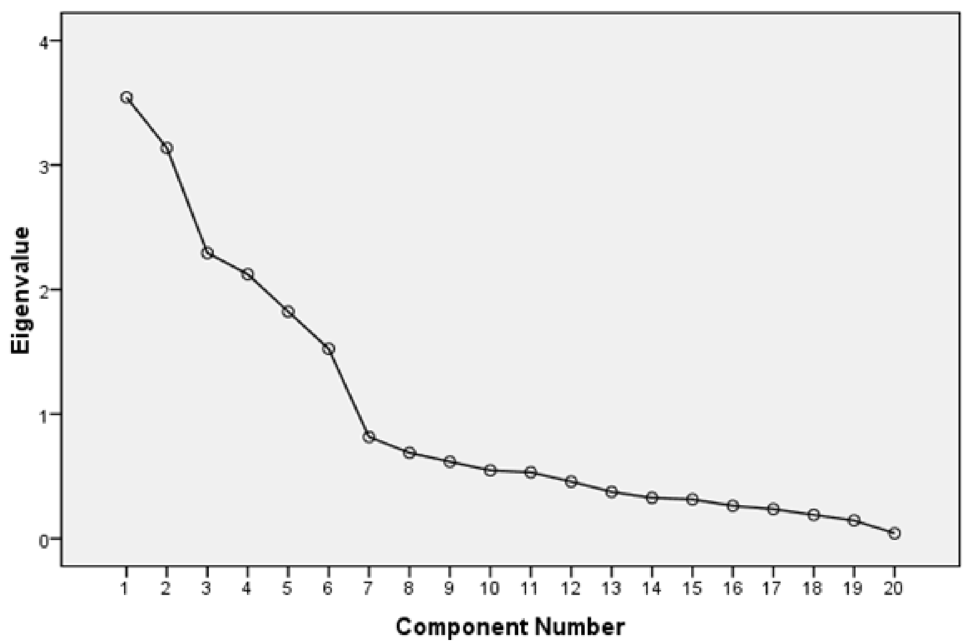

Figure 5.3: Screen plot for technology service quality factors

Consequently, Table 5.10 exhibits the factor loadings of each of the six technology service quality factors and factor structures after rotation. For the twenty items, factor analysis extracts six factors that explain 72.206% of the variance. Additionally, all the twenty rotated items are retained because there is no cross-loading of items of more than 0.5 observed. Therefore, the table shows no any excludes for items. Overall, the results indicated a goodness of the factors' scale and its validation.

Table 5.10: Factor Analysis Loadings of Technology Service Quality Using Varimax Rotation

	Component					
	1	2	3	4	5	6
ID2	0.863					
ID1	0.828					
ID3	0.777					
ID4	0.758					
P3		0.826				
P2		0.794				
P1		0.774				
P4		0.771				
AC2			0.851			
AC1			0.844			
AC3			0.722			
AC4			0.701			
RS2				0.955		
RS3				0.934		
RS1				0.707		
CQ2					0.922	
CQ1					0.915	
CQ3					0.710	

PS2	0.936
PS1	0.920

5.3.2.4 Exploratory Factor Analysis on Perceived Usefulness Factor (PU)

The perceived usefulness consists of five items, reflecting students' perception on the usefulness of m-learning. Table 5.11 shows that the KMO is 0.695 and BTS is significant ($P < 0.001$). This clearly indicates that the five perceived usefulness items fulfill the conditions and are suitable for subsequent factor analysis.

Table 5.11: KMO and Bartlett's tests of Perceived Usefulness

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.695
Bartlett's Test of Sphericity	Approx. Chi-Square	882.802
	df	10.000
	Sig.	0.000

Then, as can be seen in Table 5.12, there is only one factor with eigenvalue exceeding one. This factor was adopted using the latent root criterion which explains about 56 % of the variance. The trend is also seen in the screen plot in Figure 5.4.

Table 5.12: Extraction of Components for Perceived Usefulness

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.794	55.873	55.873	2.794	55.873	55.873
2	0.993	19.870	75.743			
3	0.647	12.942	88.686			
4	0.430	8.598	97.283			
5	0.136	2.717	100.000			

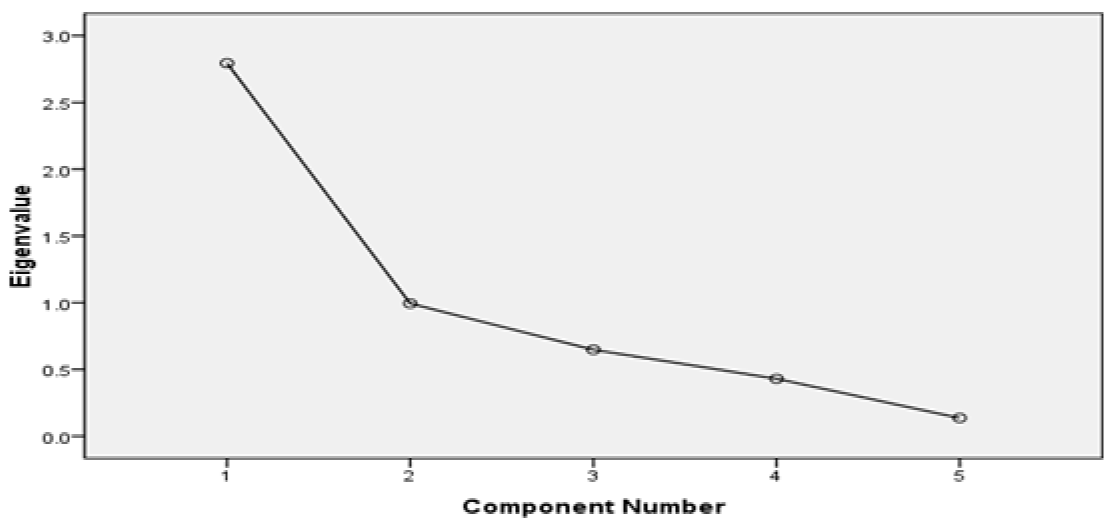

Figure 5.4: Screen plot for perceived usefulness

For the five items of the perceived usefulness factor analysis extracts one factor that explain 55.873% of the variance. All the five rotated items are retained, as there is no cross-loading of items of more than 0.5 observed.

Table 5.13: Factor analysis loadings of Perceived Usefulness Using Varimax Rotation

	Component
	1
PU1	0.840
PU5	0.835
PU2	0.716
PU3	0.678
PU4	0.647

5.3.2.5 Exploratory Factor Analysis on Perceived Ease of Use Factor (PEOU)

Similar with perceived usefulness, perceived ease of use also has five items. Table 5.14 shows that the KMO is 0.709, exceeding the minimum requirement and the BTS is significant (P<0.001). These imply that the five perceived ease of use items fulfill the conditions and are suitable for subsequent factor analysis.

Table 5.14: KMO and Bartlett's tests of Perceived Ease of Use

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.709
Bartlett's Test of Sphericity	Approx. Chi-Square	853.398
	df	10.000
	Sig.	0.000

When further analyzed, Table 5.15 shows that there is one factor with eigenvalue exceeding one which is supported by the screen plots in Figure 5.5. This factor was adopted using the latent root criterion which explains about 57% of the variance.

Table 5.15: Result for Extraction of Components for Perceived Ease of Use

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.825	56.509	56.509	2.825	56.509	56.509
2	0.938	18.763	75.271			
3	0.648	12.958	88.229			
4	0.438	8.767	96.996			
5	0.150	3.004	100.000			

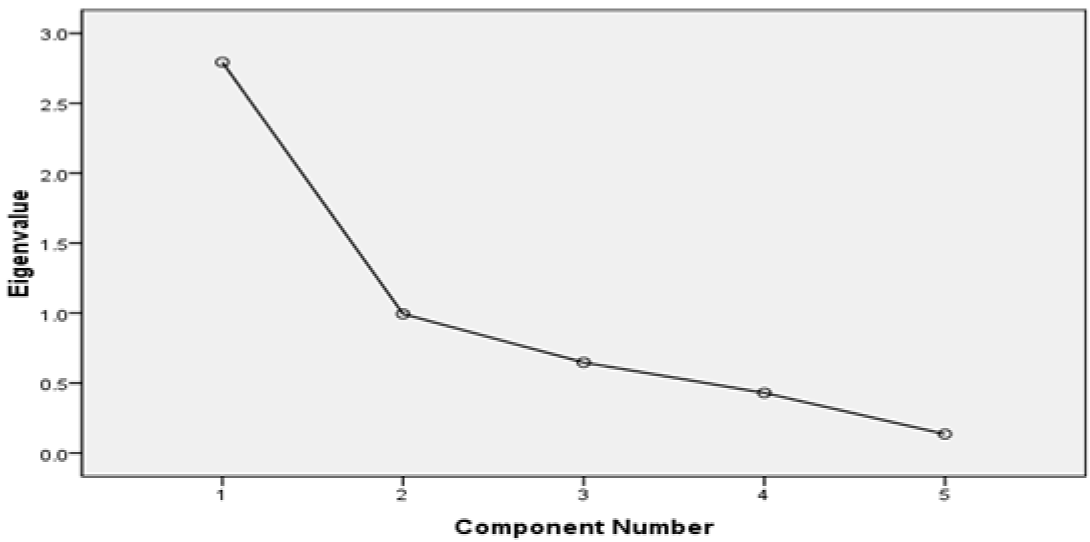

Figure 5.5: Screen plot for Perceived Ease of Use

Further, Table 5.16 exhibits the factor loadings of each item of the perceived ease of use. They range from 0.653 to 0.846 which is considered acceptable and justifiable. Thus, the perceived ease of use factor can be measured with the evaluated items.

Table 5.16: Factor analysis loadings of perceived ease of use Using Varimax Rotation

	Component
	1
PEOU1	0.846
PEOU5	0.835
PEOU2	0.725
PEOU3	0.678
PEOU4	0.653

5.3.2.6 Exploratory Factor Analysis on Attitude Toward Using Factor (ATU)

The Attitude consists of 4 items which reflects the students' attitude towards using m-learning. As portrayed in Table 5.17, the KMO is 0.709, which is considered acceptable because it is greater than 0.5, and BTS is significant (P<0.05). Hence, the items are appropriate for further analysis.

Table 5.17: KMO and Bartlett's tests of Attitude

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.709
Bartlett's Test of Sphericity	Approx. Chi-Square	288.883
	df	6.000
	Sig.	0.000

When they are analyzed, the results as exhibited in Table 5.18 show that there is only one factor has eigenvalue greater than 1. This factor was adopted using the latent root criterion which explains about 54 % of the variance. Also, the screen plots in Figure 5.6 supports the statement.

Table 5.18: Extraction of Components for Attitude

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.140	53.505	53.505	2.140	53.505	53.505
2	0.798	19.953	73.458			
3	0.583	14.585	88.043			
4	0.478	11.957	100.000			

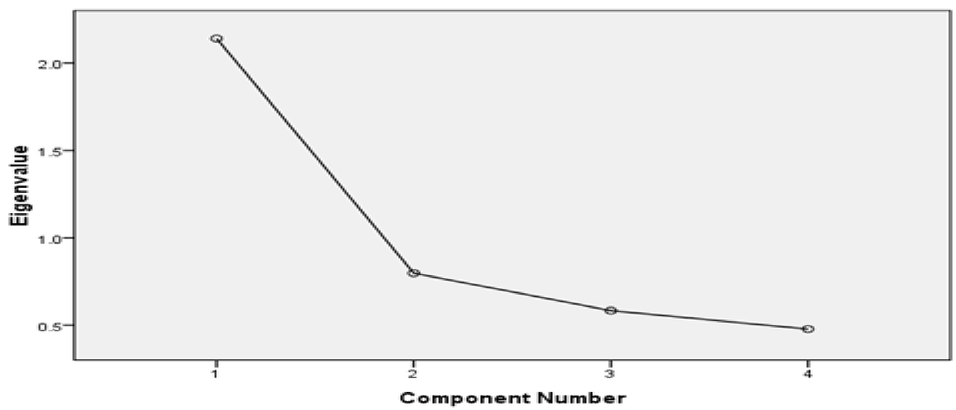

Figure 5.6: Screen plot for Attitude Toward Using

The factor loadings of each of the attitude toward using item after rotation are shown in Table 5.19. All the four rotated items are retained for future analysis, as there is no cross-loading of items of more than 0.5 observed.

Table 5.19: Factor Analysis Loadings of Attitude Toward Using Varimax Rotation

	Component
	1
Attitude2	0.761
Attitude4	0.760
Attitude1	0.721
Attitude3	0.681

5.3.2.7 Exploratory Factor Analysis on Behavioral Intention Factor (BI)

A total of four items were utilized to assess the behavioral intention the dependent variable in this study. As shown in Table 4.20, the KMO value for the behavioral intention is 0.765 and the BTS is significant ($P<0.001$). Thus, they could proceed for further analysis.

Table 5.20: KMO and Bartlett's tests of Behavioral Intention

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.765
Bartlett's Test of Sphericity	Approx. Chi-Square	419.459
	df	6.000
	Sig.	0.000

The results of extracted components are displayed in table 5.21. It is seen that there is one factor has an eigenvalue exceeding one which is supported with screen plots in Figure 5.7. Hence, this factor was adopted using the latent root criterion which explains about 60% of the variance.

Table 5.21: Extraction of Components for Behavioral Intention

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.411	60.283	60.283	2.411	60.283	60.283
2	.637	15.913	76.196			
3	.533	13.335	89.531			
4	.419	10.469	100.000			

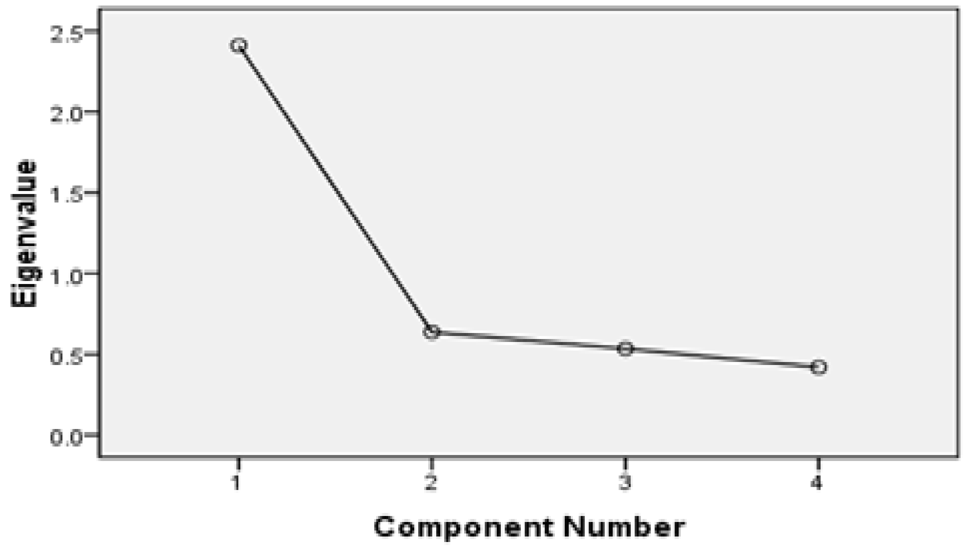

Figure 5.7: Screen plot for Behavioral Intention

As represented in Table 5.22, the factor loading for BI items range from 0.750 to 0.803 which is considered as acceptable. Overall, the results indicate a goodness of the factor measurements.

Table 5.22: Factor analysis loadings of Behavioral Intention Using Varimax Rotation

	Component
	1
Behavioral intintion4	0.803
Behavioral intintion2	0.793
Behavioral intintion3	0.759
Behavioral intintion1	0.750

5.3.3 Reliability of Scale

The results of factor analysis as described and discussed in the previous section demonstrate the construct validity of all seven factors. Each scale reliability score is then calculated and rechecked for this sample, using the test for reliability. Therefore, the next step is to test the internal consistency of each factor, utilizing Cronbach's alpha.

The reliability of the scales are determined through an iterative process: if the elimination of any items increased the reliability of the scale, the item will be eliminated and analysis will be performed again; in contrast, deletions resulting in minimal increases were not made, as recommended by Nunnally (1978). In this study, no item is eliminated because the alpha values for all variables are greater than0.7. as can be seen in Table 5.23.

Table 5.23: Cronbach Alpha Test Results of Main Study

Factor	Variables	#of Items	Cronbach's Alpha	Overall Alpha
Culture	Uncertainty Avoidance (UA)	4	0.891	0.790
	Power Distance (PD)	5	0.846	
	Masculinity/Femininity (MF)	4	0.703	
	Individualism/Collectivism(IC)	4	0.884	
	Long vs. Short term Time Orientation (LST)	3	0.756	
Trust	Trust in the University (TU)	8	0.934	0.911
	Trust in the Mobile channel (TM)	4	0.853	

Technology Service Quality	Accessibility (AC)	4	0.798	0.739
	Interface design (ID)	4	0.822	
	Reliability and response (RS)	3	0.862	
	Content quality (CQ)	3	0.832	
	Personalization (P)	4	0.813	
	Privacy/Security (PS)	2	0.872	
Perceived Usefulness	Perceived Usefulness	5	0.801	0.801
Perceived Ease of Use	Perceived Ease of Use	5	0.806	0.806
Attitude Towards Use	Attitude Towards Use	4	0.707	0.707
Behavioral Intention	Behavioral Intention	4	0.779	0.779
Total		**70**		**0.910**

The seventeen multi-variable factors used in this study have gone through several successive reliability testing treatments. The statistical information for seventeen variables shows that Cronbach's alpha score are at least 0.703 (Masculinity/Femininity) which means the entire construct are deemed to have adequate reliability.

5.4 Profile of Respondents

This section provides background information of students who participate in this study. This study analyze to their gender, age, field of study, academic year, time spent using mobile device, used mobile device for learning or education, mobile ownership, and their experience in using mobile technologies.

5.4.1 The Students' Gender

The results shown in Table 5.24 indicate that 65.3% of the respondents are male while the rest 34.7% are females.

Table 5.24: Students' Gender

Gender	Frequency	Percentage
Male	258	65.3
Female	137	34.7
Total	**395**	**100**

5.4.2 The Students' Age

Table 5.25 shows that more than three quarter of the respondents (80.5%) are between 18 and 22 years old. Among the remaining, 12.9% are between 23 and 26 years old and 6.6% are more than 26 years old.

Table 5.25: Students' Age Categories

Age	Frequency	Percentage
18-22	318	80.5
23-26	51	12.9
>26	26	6.6
Total	**395**	**100.0**

5.4.3 Field of Study

The students were requested to indicate their majors based on their field of study. As shown in Table 5.26, there are 19 fields of study the students do, in which the most students study Mathematics and Computer Science (10.4%) and Engineering (10.4%). In contrast, only 1.5% of the students do Veterinary Medicine which the lowest.

Table 5.26: Fields of Study

Field	Frequency	Percentage
Education Sc & Teacher Training	21	5.3
Humanities & Religion	34	8.6
Fine and Applied Arts	9	2.3
Service Trades	10	2.5
Law	14	3.5
Social Behavior Science	25	6.3
Commercial and Business	36	9.1
Mass communication & Documentation	8	2.0
Physical Education	18	4.6
Natural Science	29	7.3
Mathematics & Computer Science	41	10.4
Medicine	23	5.8
Dentistry	15	3.8
Pharmacy	18	4.6
Para-Medical Science	26	6.6
Engineering	41	10.4
Agriculture	10	2.5
Architecture & Town Planning	11	2.8
Veterinary Medicine	6	1.5
Total	**395**	**100.0**

5.4.4 The Students' Academic Year

Table 5.27 shows that most respondents were in their fourth year (25.1%). Also, many of them are second year (21.5%), third year (21.3%), and first year (19.7%). There are fifth year (11.4%) and sixth year (1%) students involve in this study.

Table 5.27: Academic Year

Academic year	Frequency	Percentage
First	78	19.7
Second	85	21.5
Third	84	21.3
Fourth	99	25.1
Fifth	45	11.4
Sixth	4	1.0
Total	**395**	**100.0**

5.4.5 Time Spent Using Mobile Device Daily

In this section five activities were examined based on the students' time spent in using mobile device daily. The activities are (i) conversation (ii) messaging (iii) internet (iv) games and music, and (v) learning and education.

5.4.5.1 Time Spent Using Mobile Device Daily for Conversation

Using mobile device for conversation is very common. In this study, the results are shown in Table 5.28, in which the average amount of time spent using the mobile device for conversation is higher than that for other activities, with approximately 26.9% of students spend four or more hours per day calling or receiving calls. 32.4%spend less than one hour a day, while 40.3% spend between 1 to 3 hours daily. Additionally, 17% spend 4 to 6 hours daily, and 9.9% spend either 6 hours or more daily.

Table 5.28: Time spent on using mobile device for conversation

Conversation	Frequency	Percentage
N/A	2	0.5
<1 Hour	128	32.4
1-3 Hours	159	40.3
4-6Hours	67	17.0
>6 Hours	39	9.9
Total	**395**	**100.0**

5.4.5.2 Time Spent Using Mobile Device Daily for Messaging

Table 5.29 shows the average amount of time spent by student in text messaging on a daily basis. It is seen than about 52.7%spend less than one hour a day, while 22.8% spent 1 and 3 hours. They represent a big percentage of the respondents. In contrast, only 21.5% spend more than 4 hours a day for text messaging.

Table 5.29: Time spent using mobile device for messaging

Messaging	Frequency	Percentage
N/A	12	3.0
<1 Hour	208	52.7
1-3 Hours	90	22.8
4-6 Hours	44	11.1
>6 Hours	41	10.4
Total	**395**	**100.0**

5.4.5.3 Time Spent Using Mobile Device Daily for Internet

Referring to Table 5.30 there are about 25.3% of the respondents do not use mobile devise for the Internet. Besides that, 51.6 % spend less than one hour a day, 14.9% spend between 1 and 3, and only 8.1 spend more than 4 hours.

Table 5.30: Time spent on using mobile device for Internet

Internet	Frequency	Percentage
N/A	100	25.3
<1 Hour	204	51.6
1-3 Hours	59	14.9
4-6 Hours	25	6.3
>6 Hours	7	1.8
Total	**395**	**100.0**

5.4.5.4 Time Spent Using Mobile Device Daily for Game or Music

Further, Table 5.31 explains that 34.4% of the respondents do not use mobile devices for playing games and listening to music. Another 60.2% spend less than 4 hours, while only another 5.4% spend more than 4 hours a day.

Table 5.31: Time spent on using mobile device for Game or Music

Game \Music	Frequency	Percentage
N/A	136	34.4
<1 Hour	175	44.3
1-3 Hours	63	15.9
4-6 Hours	16	4.1
>6 Hours	5	1.3
Total	**395**	**100.0**

5.4.5.5 Time Spent Using Mobile Device Daily for Learning or Education

Table 5.32 explains that only 21% of the respondents use mobile device for learning or educational purposes. From that 21%, about 15.9 % spend less than one hour using their device for learning or educational purposes and 3.5% spend between 1 and 3 hours daily on learning activities. Additionally, only 1.6% spend 4 hours or more a day.

Table 5.32: Time spent using mobile device for Learning or Education

Learning\Education	Frequency	Percentage
N/A	312	79.0
<1 Hour	63	15.9
1-3 Hours	14	3.5
4-6 Hours	5	1.3
>6 Hours	1	.3
Total	**395**	**100.0**

5.4.6 Mobile Device for Learning or Education

As can be seen in Table 5.33, which is consistence with Table 5.32, surprisingly 79% of total students do not use their mobile device for learning or educational purpose.

Table 5.33: Mobile device usage for Learning or Education

Learning\Education	Frequency	Percentage
Yes	83	21.0
No	312	79.0
Total	**395**	**100.0**

5.4.7 The Students' Mobile Ownership

In this section three mobile devices were examined based on the students' ownership namely on (i) Mobile wireless phone, (ii) PDA, and (iii) mobile wireless computer.

5.4.7.1 Mobile Wireless Phone Ownership

Table 5.34 shows that majority of the students (71.4 %) own a mobile wireless phone, while only 28.6 % do not. This explains that respondents can effort for mobile devices.

Table 5.34: Mobile wireless phone ownership

Mobile Wireless Phone	Frequency	Percentage
Yes	282	71.4
No	113	28.6
Total	**395**	**100.0**

5.4.7.2 PDA Ownership

In contrast to mobile phone ownership, Table 5.35 shows that 28.9% of the students own a PDA while 71.1% do not.

Table 5.35: PDA ownership

PDA	Frequency	Percentage
Yes	114	28.9
No	281	71.1
Total	**395**	**100.0**

5.4.7.3 Mobile Wireless Computer Ownership

Similar with the case of owning a PDA, majority of the respondents 74.4% also do not own a mobile wireless computer.

Table 5.36: Mobile wireless computer ownership

Mobile Wireless Computer	Frequency	Percentage
Yes	101	25.6
No	294	74.4
Total	**395**	**100.0**

5.4.8 Experience in Using the Mobile.

In this study, the students were asked to indicate their experience (in year) in using mobile devices. As expected and can be seen in Table 5.37, about 57.5 % of the students have had the mobile device for more than 4 years while the rest have only used for less than four years.

Table 5.37: Years experience in using the mobile

Years using the mobile	Frequency	Percentage
<1 Year	25	6.3
1-3 Years	143	36.2
4-6 Years	140	35.5
>6 Years	87	22.0
Total	**395**	**100.0**

5.5 Descriptive Analysis

For the purpose of descriptive analysis, the mean and standard deviation are computed. In general, the higher the mean value, the higher level of agreement with the statements and the smaller the standard deviation the more concentrated the data around the mean (Jennings, 2001). For ease interpretation, the range of five point likert-scale was categorized into equal sized; categorized as low, moderate, and high. Hence, scores of less than 2.33 (4/3 +lowest value 1) are considered as low; scores of higher than 3.67 (highest value (5) - 4/3) are considered as high and those in between are considered moderate.

5.5.1 Descriptive Analysis for Culture Factor (CF)

Frequency distribution and measurements in the form of means and standards deviations for the five culture variables are reflected in Table 5.38. It can be observed that the mean scores for power distance (4.66), individualism/collectivism (3.66), and long term versus short-term orientation (3.83) are very high. Meanwhile, the uncertainty avoidance (2.33) and masculinity\femininity (3.44) are moderate. Overall, the results are moderate in the whole of culture factor (CF) with mean score of 3.48. In addition, the results indicate that is Jordan culture reflects masculine, collectivism, and Long-term orientation.

Table 5.38: Descriptive Statistics for Culture Factor

N.	Statement	N	Mean	Std.Deviation
Uncertainty Avoidance				
1	It is important to have study requirements and instructions spelled out in detail so that students always know what they are expected to do.	395	2.3139	0.94113
2	It is better to study in a university with specific rules and regulations.	395	2.2557	0.97158
3	Rules and regulations are important because they inform students what the university expects of them.	395	2.3873	0.94717
4	Students should avoid making changes because things could get worse.	395	2.3696	0.88290
Overall Uncertainty Avoidance		**395**	**2.3316**	**0.92320**
Power Distance				
1	Lecturer should be careful not to ask the opinions of students too frequently, otherwise the lecturer might appear to be weak and incomplete	395	4.1013	0.86668
2	Lecturers should make most decisions without consulting students.	395	4.0937	0.86608
3	Students should not question their lecturer's decisions.	395	4.0684	0.83264
4	Students should pay high respect for their lecturers.	395	3.9544	0.93056
5	Students should not show their disagreement to their lecturers.	395	4.1215	0.88726
Overall Power Distance		**395**	**4.0678**	**0.69022**
Masculinity and Femininity				
1	It is advisable for male students to pursue their study in vocational fields while females to pursue their study in academic ones.	395	3.4937	0.93202
2	Female students do not value recognition and promotion in their learning as much as male students do.	395	3.1519	0.89738

3	It is preferable for male students to have majors different from females.	395		0.79350
4	There are some study fields that male students can always perform better than female students.	395	3.7544	0.95096
Overall Masculinity and Femininity		**395**	**3.4405**	**0.97470**
Individualism and Collectivism				
1	Individual achievement is not as important as group achievement.	395	3.7316	0.77975
2	Group success is more important than individual success.	395	3.6557	0.79844
3	Being accepted as a member of a group is more important than having autonomy and independence on learning.	395	3.6506	0.76700
4	It is more important for a lecturer to encourage loyalty and a sense of responsibility in students than it is to encourage individual initiative.	395	3.7342	0.75247
Overall Individualism and Collectivism		**395**	**3.6930**	**0.66687**
Long term versus Short-term Orientation				
1	It is important to have a conscience in learning.	395	3.7241	0.87683
2	Personal stability is not critical to success in education.	395	3.8785	0.77421
3	Respect for tradition hampers performance in the education environment.	395	3.9013	0.90001
Overall Long term versus Short-term Orientation		**395**	**3.8346**	**0.69863**
Overall culture Factor		**395**	**3.4852**	**0.47339**

5.5.2 Descriptive Analysis for Trust Factor

The means and standard deviations for the two trust variables are presented in Table 5.39. It can be observed that the mean scores of trust variables which include trust in the university (TU) and trust in the mobile channel (TM) have indicated a high level with mean score (3.78 and 3.81). In overall the trust factor (TF) of the respondents are high (mean = 3.79).

Table 5.39: Descriptive Statistics for Trust Factor

N.	Statement	N	Mean	Std.Deviation
Trust in the University				
1	The performance of mobile learning implementations makes me confident in my university.	395	3.6810	0.9240
2	My university is honest with me.	395	3.7468	0.9091
3	My university has a good reputation.	395	3.7949	0.8080
4	I feel loyal towards my university.	395	3.7494	0.9176
5	I am happy about the efforts my university is making towards a regular student like me.	395	3.7241	0.8768
6	I am satisfied with the relationship I have with my university.	395	3.8076	0.7992
7	My university is one that keeps promises and commitments.	395	3.8684	0.8835
8	Overall, I trust my university.	395	3.9038	0.9130
Overall Trust in the University		**395**	**3.7845**	**0.8735**
Trust in the Mobile Channel				
1	I expect that using the mobile to access my university will perform as well as other technologies which include as e-learning.	395	3.8430	0.8948
2	I expect that using the mobile to access my university will be available without interruption of service.	395	3.7772	0.9179
3	I think that when I use the mobile to access my university, it has the capability to provide a desired level of service in adverse or hostile conditions (e.g., natural disaster)	395	3.7975	0.9896
4	I trust the mobile to do functions such as (registration, results, assignments.....).	395	3.8557	0.9528
Overall Trust in the Mobile Channel		**395**	**3.8184**	**0.9073**
Overall Trust Factor		**395**	**3.7958**	**0.7573**

5.5.3 Descriptive Analysis for Technology Service Quality Factor

The results in Table 5.40 show that the means are high for technology accessibility (3.84), interface design (3.88), reliability/response (3.76), and personalization (3.70). In contrast, the means are moderate for while content quality (3.35) and privacy/security (3.35). Overall, the mean for technology service quality factor (TSQF) is high (mean=3.71).

Table 5.40: Descriptive Statistics for Technology Service Quality Factor

N.	Statement	N	Mean	Std.Deviation
Accessibility				
1	For m- learning to be effective it is important to accomplish my studies at a time that is convenient for me.	395	3.7316	0.8870
2	For m- learning to be effective it is important to perform my studies any place	395	3.8405	0.8185
3	For m- learning to be effective it is important to provide me with convenience in performing my studies	395	4.1215	0.8178
4	For m-learning to be effective it is important to increase access to learning and education.	395	3.6987	0.9412
Overall	Accessibility	**395**	**3.8481**	**0.8621**
Interface Design				
1	For m-learning system to be effective it is important for the interface design to provide me visually appealing features.	395	3.9443	0.8620
2	For m-learning to be effective it is important for the interface design to provide site colors, graphics, and fonts.	395	3.8759	0.9247
3	For m-learning to be effective it is important for the interface design to provide a good page layout.	395	3.8582	0.9620

4	For m-learning to be effective it is important for the interface design to provide a well designed site menus.	395	3.8481	0.8697
Overall Interface Design		**395**	**3.8816**	**0.8164**
Reliability and Response				
1	For m-learning to be effective it is important for the service to be accurate (error free).	395	3.6582	0.9359
2	For m-learning to be effective it is important for the service to be reliable.	395	3.7899	0.9893
3	For m-learning to be effective it is important for the service to be adequately fast (fast download).	395	3.8405	0.9531
Overall Reliability and Response		**395**	**3.7629**	**0.9378**
Content Quality				
1	For m-learning to be effective it is important for the content to be easy to navigate.	395	3.3418	0.9601
2	For m-learning to be effective it is important for the content to be understandable	395	3.3899	0.8494
3	For m-learning to be effective it is important for the content to be current (up to date).	395	3.8405	0.7522
Overall Content Quality		**395**	**3.5241**	**0.8347**
Personalization				
1	It is important that m-learning services are personalized to control my learning progress	395	3.7747	0.9935
2	It is important that m-learning services are personalized to choose what I want to learn.	395	3.6405	0.9755
3	It is important that m-learning services are personalized to record my learning progress and performance.	395	3.5468	0.9298
4	It is important that m-learning services are personalized to understand my needs.	395	3.8810	0.72814
Overall Personalization		**395**	**3.7063**	**0.79087**
Privacy and Security				
1	I would likely not be worried about security when using m-learning.	395	3.2861	0.9326
2	I trust the ability of the university to protect my privacy.	395	3.4304	0.9247

Overall Privacy and Security	**395**	**3.3582**	**0.9175**
Overall Technology Service Quality Factor	**395**	**3.7170**	**0.4293**

5.5.4 Descriptive Analysis for Perceive Usefulness Factor

As portrayed in Table 5.41, it can be observed that the mean scores for all items in perceive usefulness construct are high. In overall, the mean for perceive usefulness (PU) is very high (mean = 4.2).

Table 5.41: Descriptive Statistics for Perceive Usefulness Factor

N.	Statement	N	Mean	Std.Deviation
	Perceive Usefulness			
1	Using m-learning would likely be useful in my academic life.	395	4.2127	0.78069
2	Using m-learning would likely enable me to accomplish learning tasks more quickly.	395	4.2329	0.71349
3	Using m-learning in my academic life would likely increase my productivity (do more things).	395	4.1519	0.73160
4	Using m-learning would likely enhance my effectiveness in my academic life (do things better and smarter).	395	4.1494	0.70204
5	Using m-learning would likely improve my academic life performance.	395	4.2329	0.80382
Overall Perceive Usefulness		**395**	**4.1959**	**0.55790**

5.5.5 Descriptive Analysis for Perceive Ease of Use Factor

Table 5.42 shows that the mean for all items in perceive ease of use (PEOU) are high (between 4.14 and 4.24). This makes the overall mean for PEOU high (mean = 4.19).

Table 5.42: Descriptive Statistics for Perceive Ease of Use Factor

N.	Statement	N	Mean	Std.Deviation
	Perceive Ease of Use			
1	I would likely find m-learning easy to use.	395	4.1924	0.77620
2	It would likely be easy for me to become skillful at using m-learning.	395	4.2430	0.71009
3	I would likely find my interaction with m-learning to be clear and understandable.	395	4.1722	0.73404
4	I would likely find m-learning flexible to interact with.	395	4.1468	0.70438
5	I would likely find it easy to get m-learning to do what I want it to do.	395	4.2203	0.79949
Overall Perceive Ease of Use		**395**	**4.1949**	**0.55971**

5.5.6 Descriptive Analysis for Attitude toward Using

The mean scores of items in attitude range from 4.02 to 4.11 (Table 5.43) where as the standard deviation values range from 0.69 to 0.82.

Table 5.43: Descriptive Statistics for Attitude Toward Using Factor

N.	Statement	N	Mean	Std.Deviation
	Attitude Toward Use			
1	Using the mobile learning is a good idea.	393	4.1145	0.77237
2	I like the idea of using the mobile learning.	395	4.0203	0.82757
3	Using the mobile learning would be pleasant.	395	4.0506	0.75567
4	I dislike the idea of using the mobile learning.	395	4.0608	0.69176
Overall Attitude Toward Use		**393**	**4.0614**	**0.55751**

5.5.7 Descriptive Analysis for Behavioral Intention Factor

Table 5.44 displays that the mean scores in behavior intention range from 4.06 to 4.15 whilst the standard deviation values range from 0.72 to 0.82.

Table 5.44: Descriptive Statistics for Behavioral Intention Factor

N.	**Statement**	**N**	**Mean**	**Std.Deviation**
	Behavioral Intention			
1	I intend to use m-learning in my academic life.	395	4.1595	0.76893
2	I would enjoy using m-learning.	395	4.0658	0.82826
3	I intend to use m-learning frequently.	395	4.0759	0.80247
4	I would recommend that others use m-learning	395	4.0633	0.72905
Overall	**Behavioral Intention**	**395**	**4.0911**	**0.60710**

5.6 Research Model Evaluation

In this study, the model evaluation is a way to ensure a clear understanding of the determinants of the acceptance of m-learning among students in Jordanian higher education institutions. Three factors consist of thirteen variables external to the TAM model are discovered through the component factor and reliability analyses. In order to evaluate the model, two research questions were asked. For the first research question (RQ1: What are the factors that could influence acceptance of m-learning among students in the Jordanian higher education institutions?), eleven hypotheses were tested through Pearson correlation matrix and multiple regression analysis. Meanwhile, to answer the second research question (RQ2:Which variables from each external factor have the most influence on the acceptance of m-learning among student in Jordanian higher education institutions?), a stepwise regression was conducted in order to obtain the most significant predictors variables that have a strong influence on the acceptance of m-learning. These are discussed next.

5.6.1 Hypotheses Testing – Correlation

The study proposes eleven hypotheses to test the relationships between the factors in the proposed model. The mean values of variables within the constructs or factors were calculated and correlation analysis was conducted on these values. All hypotheses test indicate a positive relationship between constructs; thus a positive correlation different from zero and meeting the minimum criterion stated earlier supports the hypothesis and the relationship. Zero-order (simple) correlation hypotheses tests are presented next. The following descriptions present the detailed results of each hypothesis testing.

5.6.1.1 Culture

The first hypothesis (H1) states a positive relationship between culture and perceived usefulness of m-learning. In conjunction, Table 5.45 indicates that the correlation coefficient between the two variables is 0.536. This result suggests that a significant positive relationship exists; therefore, H1 is supported at the zero-order level.

Table 5.45: Hypothesis H1 correlation

		CF	PU
CF	Pearson Correlation	1.000	0.536**
	Sig. (2-tailed)		0.000
	N	395.000	395
PU	Pearson Correlation	.536**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

The second hypothesis (H2) states a positive relationship between culture and perceived ease of use of m-learning. Having tested the date, the results are presented in Table 5.46. The table indicates that the correlation coefficient between the two variables is 0.524. This also suggests an existence of a significant positive relationship. Therefore, H2 is supported at the zero-order level.

Table 5.46: Hypothesis H2 correlation

		CF	PEOU
CF	Pearson Correlation	1.000	0.524**
	Sig. (2-tailed)		0.000
	N	395.000	395
PEOU	Pearson Correlation	.524**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.2 Trust

In this study, the trust factor has two hypotheses related to perceived usefulness and perceived ease of use. Specifically, the third hypothesis (H3) proposes a positive relationship between trust and perceived usefulness of m-learning. In conjunction, Table 5.47 indicates that the correlation coefficient between the two variables is 0.358. This suggests an existence of a significant positive relationship. Thus, H3 is supported at the zero-order level.

Table 5.47: Hypothesis H3 correlation

		TF	PU
TF	Pearson Correlation	1.000	0.358**
	Sig. (2-tailed)		0.000
	N	395.000	395
PU	Pearson Correlation	.358**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

Meanwhile, the fourth hypothesis (H4) mentions a positive relationship between trust and perceived ease of use of m-learning. In response to that, Table 5.48 exhibits that the correlation coefficient between the trust and PEOU variables is 0.293. This result suggests that a significant positive relationship exists and H4 is supported at the zero-order level.

Table 5.48: Hypothesis H4 correlation

		TF	PEOU
TF	Pearson Correlation	1.000	0.293**
	Sig. (2-tailed)		0.000
	N	395.000	395
PEoU	Pearson Correlation	0.293**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.3 Technology Service Quality

Further, the fifth hypothesis (H5) states a positive relationship between technology service quality and perceived usefulness of m-learning. The result shows that the correlation coefficient between the two variables is 0.454 (Table 5.49). This evidences a significant positive relationship exists; therefore, H5 is supported at the zero-order level.

Table 5.49: Hypothesis H5 correlation

		TSQF	PU
TSQF	Pearson Correlation	1.000	0.454**
	Sig. (2-tailed)		0.000
	N	395.000	395
PU	Pearson Correlation	0.454**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

The sixth hypothesis (H6) stipulates a positive relationship between technology service and perceived ease of use of m-learning. The results are exhibited in Table 5.50, which demonstrates that the correlation coefficient between the two variables is 0.459. This suggests that a significant positive relationship exists and H6 is supported at the zero-order level.

Table 5.50: Hypothesis H6 correlation

		TSQ	PEOU
TSQF	Pearson Correlation	1.000	0.459**
	Sig. (2-tailed)		0.000
	N	395.000	395
PEOU	Pearson Correlation	0.459**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.4 Perceived Usefulness

The seventh hypothesis (H7) suggests a positive relationship between perceived usefulness and attitude toward using m-learning. As the finding indicates that the correlation coefficient between the two variables is 0.773 (Table 5.51), this confirms that a significant positive relationship exists. Therefore H7 is supported at the zero-order level.

Table 5.51: Hypothesis H7 correlation

		PU	Attitude
PU	Pearson Correlation	1.000	0.773**
	Sig. (2-tailed)		0.000
	N	395.000	395
Attitude	Pearson Correlation	.773**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

The eighth hypothesis (H8) proposes a positive relationship between perceived usefulness and behavioral intentions to use m-learning. The results are displayed in Table 5.52. It indicates that the correlation coefficient between the two variables is 0.629. This gives an existence of a significant positive relationship; therefore, H8 is supported at the zero-order level.

Table 5.52: Hypothesis H8 correlation

		PU	BI
PU	Pearson Correlation	1.000	.629**
	Sig. (2-tailed)		.000
	N	395.000	395
BI	Pearson Correlation	.629**	1.000
	Sig. (2-tailed)	.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.5 Perceived Ease of Use Hypotheses

The ninth hypothesis (H9) states a positive relationship between perceived ease of use and perceived usefulness of m-learning. The correlation coefficient between the two variables is 0.817 (Table 5.53). This suggests that a significant positive relationship exists; therefore, H9 is supported at the zero-order level.

Table 5.53: Hypothesis H9 correlation

		PEOU	PU
PEOU	Pearson Correlation	1.000	0.817**
	Sig. (2-tailed)		0.000
	N	395.000	395
PU	Pearson Correlation	0.817**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

Next, the tenth hypothesis (H10) states a positive relationship between perceived ease of use and attitude toward using m-learning. The results are exhibited in Table 5.54, which indicates that the correlation coefficient between the two variables is 0.737.This proves a significant positive relationship. Therefore, H10 is supported at the zero-order level.

Table 5.54: Hypothesis H10 correlation

		PEOU	Attitude
PEOU	Pearson Correlation	1.000	0.737**
	Sig. (2-tailed)		0.000
	N	395.000	395
Attitude	Pearson Correlation	0.737**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.6 Attitude Toward Using

Finally, the eleventh hypothesis (H11) states there is a positive relationship between attitude toward using and behavioral intentions to use m-learning. Table 5.55 displays the results, indicating that the correlation coefficient between the two variables is 0.714. This suggests that a significant positive relationship exists; therefore, H11 is supported at the zero-order level.

Table 5.55: Hypothesis H11correlation

		Attitude	BI
Attitude	Pearson Correlation	1.000	0.714**
	Sig. (2-tailed)		0.000
	N	395.000	395
BI	Pearson Correlation	0.714**	1.000
	Sig. (2-tailed)	0.000	
	N	395	395.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.6.1.7 Summary of Hypotheses Testing – Correlation

As a summary, all the zero-order correlation tests of the hypotheses are found to be significant and thus support the hypotheses at this level. It has been that culture, trust, and technology service quality have positive indirect relationships with the behavioral intention to use m-learning and thus the acceptance of m-learning through perceive usefulness and perceive ease of use.

Having obtained the results (previous section) the correlations among all factors in the proposed model are presented in Figure 5.8. The model depicts correlation values between the model constructs including TAM factors. Further, the next section tests the hypotheses using a predictive regression model.

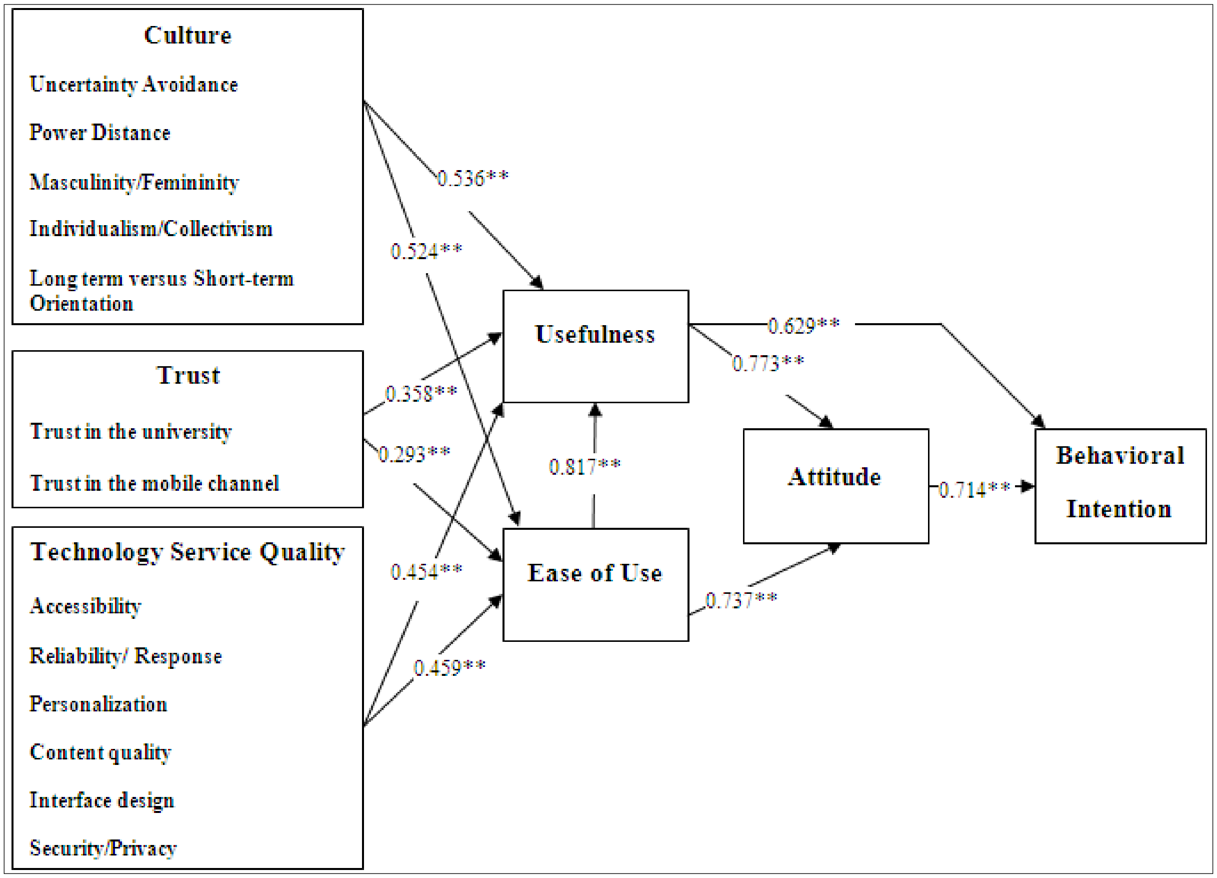

Figure 5.8: Correlational Model

5.6.2 5.6.2 Hypotheses Tests - Regression Model

A multiple regression analysis is performed in order to assess the influences between the factors in the proposed research model. All hypotheses test indicate some influences between constructs. The analysis is conducted in four regression models involving four different statistics, as shown in Table 5.56. The first model contains four hypotheses (H1, H3, H5, and H9), while, the second model contains three hypotheses (H2, H4, and H6).

In addition, the third model contains two hypotheses which are (H7 and H10), and finally the fourth model also contains two hypotheses which are (H8 and H11).

Table 5.56: Regression Model and Hypotheses

Model	Hypotheses	Independent	Dependent
1	**H1**	Culture Factor	Perceive Usefulness Factor
	H3	Trust Factor	
	H5	Technology Service Quality Factor	
	H9	Perceive Ease of Use Factor	
2	**H2**	Culture Factor	Perceive Ease of Use Factor
	H4	Trust Factor	
	H6	Technology Service Quality Factor	
3	**H7**	Perceive Usefulness Factor	Attitude Toward Using Factor
	H10	Perceive Ease of Use Factor	
	H8	Perceive Usefulness Factor	
4	**H11**	Attitude Toward Using Factor	Behavioral Intention Factor

5.6.2.1 Hypotheses test in Regression model for Perceive Usefulness (PU)

Model 1 with perceived usefulness as the dependent variable together with (culture, trust, technology service quality, and perceive ease of use) as the independent variables was tested using multiple regression analysis. The results are exhibited in Table 5.57.

The coefficient of determination (R^2) measures the proportion of the total variance of the dependent variable about its mean that is explained by the independent or predictor variables (Hair et al., 1998). The higher the value of R^2, the greater the explanatory power of the regression model. It is found that the regression model R^2 value for the dependent variable perceive usefulness is 0.854, meaning that 85.4% of the total variance in students' perceive usefulness are explained by the regression model. This value is considered high and thus the power of the regression model is good. This implies that the model is statistically significant ($F=572.307$, $p<0.001$). The values of the regression coefficients and their significance determine the factors included in the model.

In short, referring to the data in Table 5.57, the regression model supports the following hypotheses:

- H1: CF- PU: there is a positive relationship between culture and perceived usefulness of m-learning ($\beta=0.053$, $P<0.05$).
- H3: TF – PU: there is a positive relationship between trust and perceived usefulness of m-learning ($\beta=0.094$, $P<0.001$).
- H5: TSQF- PU: there is a positive relationship between technology service quality and perceived usefulness of m-learning ($\beta=0.044$, $P=0.05$).
- H9: PEOU – PU: there is a positive relationship between perceived ease of use and perceived usefulness of m-learning ($\beta=0.842$, $P<0.001$).

Table 5.57: Regression results for dependent variable Perceive Usefulness (PU)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.924(a)	0.854	0.853	0.21

ANOVA(b)

Model	Sum of Squares	df	Mean Square	F	P.
1	104.782	4	26.196	572.307	.000(a)
	17.851	390	0.046		
	122.634	394			

Coefficients(a)

Model		Unstandardized		S.zed		
		B	Std. Error	Beta	t	P.
1	(Constant)	.018	.114		-.156	0.876
	Culture	.063	.028	.053	2.280	0.023
	Trust	.069	.015	.094	4.562	0.000
	TSQ	.057	.029	.044	1.964	0.50
	PEOU	.839	.025	.842	34.092	0.000

5.6.2.2 Hypotheses test in Regression model for Perceive Ease of Use (PEOU)

The multiple regression analysis was used in testing Model 2 with perceives ease of use as the dependent variable and together with external factors (culture, trust, and technology service quality) as the independent variables. The results are exhibited in Table 5.58.

It is found in the table that the external factors explain a significant percentage of variance in perceive ease of use ($R^2 = 0.388$, F=82.714, P<0.001). Therefore, the culture, trust and technology service quality factors explain 38.8% of the total variance in students' perceive ease of use of m-learning. Additionally, all hypotheses are supported. In detail, Table 5.58 explains that the regression model supports the following:

- H2: CF – PEOU: there is a positive relationship between culture and perceived usefulness of m-learning (β=0.362, P<0.001).
- H4: TF – PEOU: there is a positive relationship between trust and perceived usefulness of m-learning (β=0.173, P<0.001).
- H6: TSQF – PEOU: there is a positive relationship between technology service quality and perceived usefulness of m-learning (β=0.322, P<0.001).

Table 5.58: Regression results for dependent variable Perceive Ease of Use (PEOU)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
2	0.623(a)	0.388	0.384	0.43

ANOVA (b)

Model	Sum of Squares	df	Mean Square	F	P.
2	47.921	3	15.974	82.714	.000(a)
	75.509	391	0.193		
	123.430	394			

Coefficients(a)

Model		Unstandardized		S.zed		
		B	Std. Error	Beta	t	P.
2	(Constant)	.647	.231		2.800	0.005
	Culture	.431	.052	.362	8.219	0.000
	Trust	.128	.030	.173	4.195	0.000
	TSQ	.420	.055	.322	7.607	0.000

5.6.2.3 Hypotheses test in Regression model for Attitude Toward Using (ATU)

Model 3 with attitude toward use as the dependent variable together with (perceive usefulness and perceive ease of use) as the independent variables was tested using multiple regression analysis. The results are presented in Table 5.59.

It can be seen in Table 5.59 that perceive usefulness and perceive ease of use explain a significant percentage of variance in attitude toward using (R^2= 0.603, F=297.257, P<0.001).Therefore, the perceive usefulness and perceive ease of use explain 60.3% of the total variance in students' attitude towards using m-learning. While, all hypotheses are supported. Table 5.59 that the regression model supports the following:

- H7: PU – ATU: there is a positive relationship between perceived usefulness and attitude toward using m-learning (β=0.612, P<0.001).
- H10: PEOU – ATU: there is a positive relationship between perceived ease of use and attitude toward using m-learning (β=0.176, P<0.05).

Table 5.59: Regression results for dependent variable Attitude Toward Using (ATU)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
3	0.776(a)	0.603	0.601	0.35

ANOVA (b)

Model	Sum of Squares	df	Mean Square	F	P.
3	73.801	2	36.900	297.257	.000(a)
	48.662	392	.124		
	122.463	394			

Coefficients(a)

		Unstandardized		S.zed		
Model		B	Std. Error	Beta	t	P.
3	(Constant)	.761	.137		5.547	0.000
	PU	.612	.080	.612	7.650	0.000
	PEOU	.175	.080	.176	2.194	0.029

5.6.2.4 Hypotheses test in Regression model for Behavioral Intention (BI)

In this section, multiple regression analysis is used to find the predictors for model 4. Particularly, Model 4has behavioral intention as dependent variables together and perceive usefulness and attitude as independent variables. Table 5.60 shows the results of model 4 testing.

The perceive usefulness and attitude toward using explain a significant percentage of variance in behavioral intention (R^2 = 0.525, F=216.499, P<0.001). Generally all hypotheses are supported. As shown in Table 5.60, the regression model supports the following:

- H8: PU–BI: there is a positive relationship between perceived usefulness and behavioral intentions to use m-learning (β=0.190, P<0.01).
- H11: ATU– BI: there is a positive relationship between attitude toward using and behavioral intentions to use m-learning (β=0.568, P<0.001).

Table 5.60: Regression results for dependent variable Behavioral Intention (BI)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
4	0.724(a)	0.525	0.522	0.42

ANOVA (b)

Model	Sum of Squares	df	Mean Square	F	P.
4	76.218	2	38.109	216.499	.000(a)
	69.001	392	.176		
	145.219	394			

Coefficients(a)

Model		Unstandardized B	Unstandardized Std. Error	S.zed Beta	t	P.
4	(Constant)	0.714	.168		4.258	0.000
	PU	0.207	.060	.190	3.457	0.001
	Attitude	0.618	.060	.568	10.341	0.000

Further, multiple regression assumptions were tested for each regression test. The full SPSS outputs of regression assumptions are provided in Appendix F. In relation the assumptions for the testing following guidelines suggested by Hair et al. (1998) are as follow:

- Normality of the error term (residuals) distribution. This test is performed by visual inspection over histograms.
- Homoscedasticity or constant variance of the error terms or residuals. This test is performed by inspecting a plot of the standardized residuals vs. predicted values. Ifthe plot presents no pattern (generally a random pattern), the residuals are homoscedastic.
- Multicollinearity or the correlation among three or more independent variables. Multicollinearity can have substantial effects on the results of the regression model. It makes determining the contribution of each independent variable difficult; thus, non collinearity is desired. Two tests are performed for multicollinearity: tolerance value and variance inflation factor (VIF). Tolerance is the amount of variability of the independent variable not explained by other independent variables. VIF is the inverse of tolerance. Very small tolerance values or large VIF values indicate high collinearity. A common cutoff threshold value for tolerance is 0.10 and for VIF is 10.
- Linearity between dependent and independent variables. This assumption is tested by the normal probability plot (P-P) of the residuals.
- Outliers are observations that have a large residual (difference between actual and estimated value) value and can only be identified with respect to a specific

regression model. Outliers do not necessarily influence the regression model and must be handled with caution. One criterion used to test for outliers includes a standard score of $\geq \pm 3.0$. The leverage statistic and Cook's distance were used to test whether an outlier was influential and needed to be deleted. Leverage statistics identify cases that influence the regression model more than others; Cook's distance measures the effect of deleting a given observation. Larger Cook's distance values indicate unusual leverage. The rule-of-thumb values are ≤ 0.20 for the leverage ≥ 1.0 for and Cook's distance.

These assumptions were tested and no gross violations were found. These tests were repeated for each regression analysis done in this study. The results of the normality, linearity, multicollinearity, and homoscedasticity were acceptable and no gross violations were found.

5.6.2.5 Summary of Hypotheses Testing – Regression

In summary, the predictive model accounts for 52.5% of the variance in behavioral intention (BI). Additionally, the model accounts for 60.3% of the variance in attitude toward using (ATU). The total variance (85.4%) explained in perceive usefulness (PU) is directly explained by culture, trust, and perceive ease of use. Perceive ease of use has only direct relationships through culture, trust, and technology service quality. The model accounts for 38.8 % of the variance in perceive ease of use (PEOU) that is explained by these factors. The predictive models with R^2 and path coefficients in the research model are presented in figure 5.9. The next section explores the most predicted or contributive variables under each factor that could significantly predict the students' m-learning acceptance.

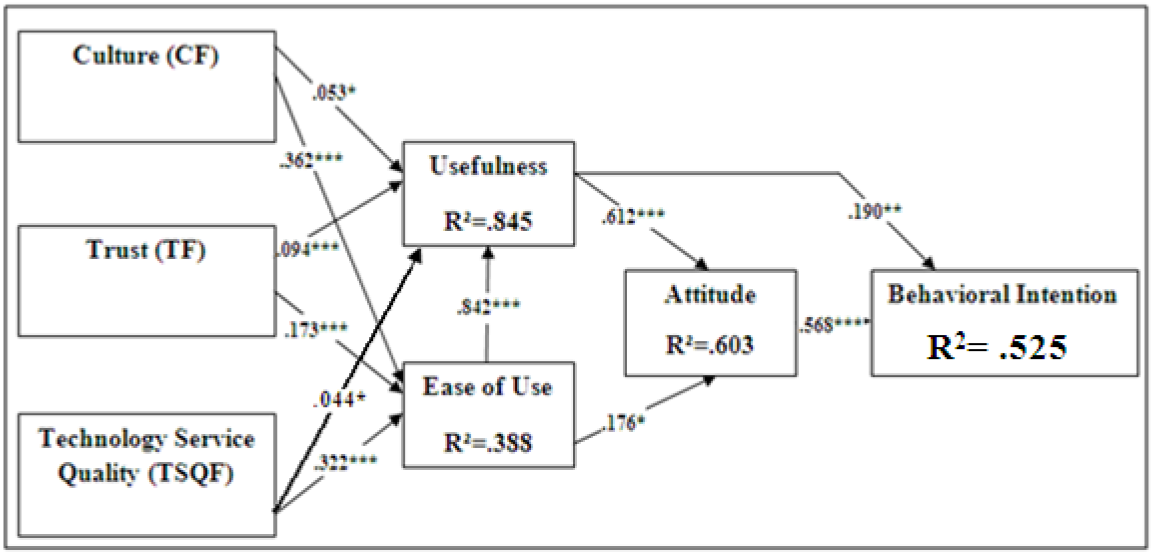

Figure 5.9: Predictive model with R² and path coefficients

5.6.3 Critical Variables

In order to answer the second research question (RQ2: Which variables from each external factor have the most influence on the acceptance of m-learning among students in Jordanian higher education institutions?), a stepwise regression analysis was performed. This helps in identifying the most influential variables under each external factor that could predict the students' acceptance of m-learning. The stepwise regression analysis would provide information on the relationship between the independent variables and the dependent variable. It can also provide the degree to which variation in the dependent variable can be explained by the dependent variables (Hair et al., 1998). The analysis was conducted in six models involving six different statistics, as simplified in Table 5.61.

Table 5.61: Stepwise regression models

Model	External factor	Independent	Dependent
1	Culture (CF)	Uncertainty Avoidance (UA) Power Distance(PD) Masculinity and Femininity (MF) Individualism and Collectivism (IC) Long term versus Short-term Orientation (LST)	Perceive Usefulness (PU)
2	Trust(TF)	Trust in the University (TU) Trust in the Mobile Channel (TM)	Perceive Usefulness (PU)
3	Technology Service Quality (TSQF)	Accessibility(AC) Interface Design(ID) Reliability and Response (RS) Content Quality (CQ) Personalization (P) Privacy and Security (PS)	Perceive Usefulness (PU)
4	Culture (CF)	Uncertainty Avoidance (UA) Power Distance(PD) Masculinity and Femininity (MF) Individualism and Collectivism (IC) Long term versus Short-term Orientation (LST)	Perceive Ease of Use (PEOU)

5	Trust (TF)	Trust in the University (TU) Trust in the Mobile Channel (TM)	Perceive Ease of Use (PEOU)
6	Technology Service Quality (TSQF)	Accessibility(AC) Interface Design(ID) Reliability and Response (RS) Content Quality (CQ) Personalization (P) Privacy and Security (PS)	Perceive Ease of Use (PEOU)

Table 5.62 represents the stepwise regression analysis for the dependent variable: perceive usefulness and culture as the independent variables namely (Uncertainty Avoidance, Power Distance, Masculinity and Femininity, Individualism and Collectivism, Long term versus Short-term Orientation). Change in R^2 that ΔR^2 is examined to identify each predictor's contribution (Hayes, 1998).For perceive usefulness, the ΔR^2 for power distance is 0.552 at $p<0.001$ significant level. Next, at similar significant level ($p<0.001$), the ΔR^2 is 0.016for uncertainty avoidance. Additionally, the ΔR^2 in individualism/collectivism is 0.007 at $p< 0.05$ significant level. Hence, it could be deduced that power distance, uncertainty avoidance, individualism/collectivism are the most important or influential variables for culture factor in predicting perceive usefulness and thus, indirectly, the acceptance of m-learning.

Table 5.62: Stepwise regression model summary: culture factor variables as predictors of perceive usefulness (PU)

Model Summary[d]

				Std. Error	Change Statistics				
Mode l	R	R Square	Adjusted R Square	of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.743[a]	0.552	0.551	.37395	0.552	483.977	1	393	0.000
2	0.754[b]	0.568	0.566	.36760	0.016	14.685	1	392	0.000
3	0.758[c]	0.575	0.572	.36511	0.007	6.358	1	391	0.012

a. Predictors: (Constant), PD

b. Predictors: (Constant), PD, UA

c. Predictors: (Constant), PD, UA, IC

d. Dependent Variable: PU

As portrayed in Table 5.63, the trust variables (Trust in the University and Trust in the Mobile Channel) were regressed in stepwise technique. The regression model is utilized to predict the perceived usefulness. Then, the ΔR^2 is examined to identify each predictor's contribution.

In this model only one variable is found predicting the perceive usefulness, which is the trust in the university (ΔR^2 is 0.152 at $p<0.001$). Hence, it is deduced that the trust in the university is the most important or influential variable for trust factor in predicting perceived usefulness and thus, indirectly, the acceptance of m-learning.

Table 5.63: Stepwise regression model summary: trust factor variables as predictors of perceive usefulness (PU)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.390[a]	0.152	0.150	0.51444	0.152	70.377	1	393	0.000

a. Predictors: (Constant), TU

b. Dependent Variable: PU

Further, Table 5.64 shows that the technology service quality variables (Accessibility, Interface Design, Reliability and Response, Content Quality, Personalization, Privacy and Security) were also regressed in stepwise technique. Similarly, the regression model was utilized to predict the perceived usefulness. It is found that the ΔR^2 for accessibility is 0.119 at $p<0.001$. At similar significant level ($p<0.001$), the ΔR^2 for interface design and personalization are 0.043 and 0.026 respectively. The content quality was tested at $p<0.01$, in which the ΔR^2 is only 0.021. Meanwhile, the privacy/security was tested at $p<0.05$. It was found that the ΔR^2 is 0.011. Hence, this study deduced that accessibility, interface design, personalization, content quality, and privacy/security are the most important or influential variables for technology service quality factor in predicting perceive usefulness and thus, indirectly, the acceptance of m-learning.

Table 5.64: Stepwise regression model summary: technology service quality factor variables as predictors of perceive usefulness (PU)

Model Summary[f]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.345[a]	0.119	0.117	0.52440	0.119	52.954	1	393	0.000
2	0.402[b]	0.162	0.157	0.51216	0.043	20.011	1	392	0.000
3	0.433[c]	0.188	0.182	0.50473	0.026	12.619	1	391	0.000
4	0.457[d]	0.209	0.201	0.49875	0.021	10.425	1	390	0.001
5	0.469[e]	0.220	0.210	0.49598	0.011	5.376	1	389	0.021

a. Predictors: (Constant), AC

b. Predictors: (Constant), AC, ID

c. Predictors: (Constant), AC, ID, P

d. Predictors: (Constant), AC, ID, P, CQ

e. Predictors: (Constant), AC, ID, P, CQ, PS

f. Dependent Variable: PU

Consequently, the results for stepwise regression analysis for perceive ease of use (as the dependent variable) and culture as independent variable (with Uncertainty Avoidance, Power Distance, Masculinity and Femininity, Individualism and Collectivism, and Long term versus Short-term Orientation) are displayed in Table 5.65. Similarly, the ΔR^2 is examined to identify the contribution of each predictor. It is found that the ΔR^2 for power distance at $p<0.001$ is 0.638 while it is 0.007 for uncertainty avoidance at $p<0.01$. Hence, it is deduced that power distance and uncertainty avoidance are the most important or influential variables for culture factor in predicting perceive ease of use and thus, indirectly, the acceptance of m-learning.

Table 5.65: Stepwise regression model summary: culture factor variables as predictors of perceive ease of use (PEOU)

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.798[a]	0.638	0.637	0.33739	0.638	691.310	1	393	0.000
2	0.803[b]	0.644	0.643	0.33461	0.007	7.552	1	392	0.006

a. Predictors: (Constant), PD
b. Predictors: (Constant), PD, UA
c. Dependent Variable: PEOU

As represented in Table 5.66, the trust variables (Trust in the University and Trust in the Mobile Channel) were regressed in stepwise technique. Then, the regression model was utilized to predict the perceived ease of use. Similarly, the ΔR^2 is examined to identify the contributions of each predictor.

In this model trust in the university is found predicting the perceived ease of use. Particularly, the ΔR^2 for trust in the university (TU) is 0.106 at $p<0.001$. Hence, the trust in the university is believed the most important or influential variable for trust factor in predicting the perceived ease of use and thus, indirectly, the acceptance of m-learning.

Table 5.66: Stepwise regression model summary: trust factor variables as predictors of perceive ease of use (PEOU)

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.326[a]	0.106	0.104	.52988	0.106	46.600	1	393	0.000

a. Predictors: (Constant), TU

b. Dependent Variable: PEOU

Next, Table 5.67 explains about the variable in technology service quality (Accessibility, Interface Design, Reliability and Response, Content Quality, Personalization, Privacy and Security). It is found that the ΔR^2 for accessibility at $p<0.001$ is 0.152at $p<0.001$. At also $p<0.001$, the interface design is 0.055. Meanwhile, the ΔR^2 for personalization at $p<0.01$ is 0.017 and ΔR^2 for at $p<0.05$ for content quality is only 0.013. Hence, this study deduced that accessibility, interface design, personalization, and content quality are the most important or influential variables under technology service quality factor for predicting the perceived ease of use and thus, indirectly, the acceptance of m-learning.

Table 5.67: Stepwise regression model summary: technology service quality factor variables as predictors of perceive ease of use (PEOU)

Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.390[a]	0.152	0.150	.51599	0.152	70.597	1	393	0.000
2	0.455[b]	0.207	0.203	.49966	0.055	27.113	1	392	0.000
3	0.473[c]	0.224	0.218	.49504	0.017	8.344	1	391	0.004
4	0.487[d]	0.237	0.229	.49147	0.013	6.699	1	390	0.010

a. Predictors: (Constant), AC
b. Predictors: (Constant), AC, ID
c. Predictors: (Constant), AC, ID, P
d. Predictors: (Constant), AC, ID, P, CQ
e. Dependent Variable: PEOU

In a nutshell, the results discussed in the previous paragraphs explain that not all predictors have significant influence over the dependent variables. In response to that, each predictor is listed in Table 5.68 with an indication whether or not it has a significant influence over the dependent variable, in which they are labeled with either significant or not significant.

Table 5.68: Summaries the results for stepwise regression analysis

External Factor	Independent	Dependent	Significant / Not Significant
Culture (CF)	Uncertainty Avoidance (UA)	Perceive	Significant
	Power Distance (PD)	Usefulness (PU)	Significant
	Masculinity and Femininity (MF)		Not Significant
	Individualism and Collectivism (IC)		Significant
	Long term versus Short-term Orientation (LST)		Not Significant

Trust (TF)	Trust in the University (TU)	Perceive Usefulness (PU)	Significant
	Trust in the Mobile Channel (TM)		Not Significant
Technology Service Quality (TSQF)	Accessibility (AC)	Perceive Usefulness (PU)	Significant
	Interface Design (ID)		Significant
	Reliability and Response (RS)		Not Significant
	Content Quality (CQ)		Significant
	Personalization (P)		Significant
	Privacy and Security (PS)		Significant
Culture (CF)	Uncertainty Avoidance (UA)	Perceive Ease of Use (PEOU)	Significant
	Power Distance (PD)		Significant
	Masculinity and Femininity (MF)		Not Significant
	Individualism and Collectivism (IC)		Not Significant
	Long term versus Short-term Orientation (LST)		Not Significant
Trust (TF)	Trust in the University (TU)	Perceive Ease of Use (PEOU)	Significant
	Trust in the Mobile Channel (TM)		Not Significant
Technology Service Quality (TSQF)	Accessibility (AC)	Perceive Ease of Use (PEOU)	Significant
	Interface Design (ID)		Significant
	Reliability and Response (RS)		Not Significant
	Content Quality (CQ)		Significant
	Personalization (P)		Significant
	Privacy and Security (PS)		Not Significant

5.7 Group Analysis

Analysis of variance tests (ANOVA) and t-test were performed in order to answer the third research question (RQ3: How do the acceptance of m-learning different across the student groups in Jordanian higher education institutions?). Specifically, to understand the acceptance of m-learning among students, this study compares different groups of students across different variables. Particularly, for acceptance behavior, perceived usefulness and perceived ease of use are compared across groups because these variables have been proven as directly affecting the behavioral intention and thus the acceptance of m-learning.

5.7.1 Mobile Learning Acceptance vs. Mobile Device Ownership

In this study, the students' were asked to indicate their type of mobile device ownership. Three types of mobile devices are investigated (i) Mobile wireless phone (ii) Mobile wireless computer, and (iii) Personal Digital Assistant (PDA). In order to achieve the third research objective, the following tests were performed to further understand the acceptance behavior. The first test investigates how the behavioral intention, perceived usefulness, and perceived ease of use are compared across the students who own mobile wireless phones with those who do not own. Three hypotheses for mobile wireless phone were tested as follows:

H_0 (1): The behavior intention to use m-learning is consistant among students who own mobile wireless phones and those who do not have.

H_A (1): The behavior intention to use m-learning is not consistant among students regardless of mobile wireless phones ownership.

H_0 (2): The perceived usefulness of m-learning is consistant among students who own mobile wireless phones and those who do not have.

H_A (2): The perceived usefulness of m-learning is not consistant among students regardless of mobile wireless phones ownership.

H_0 (3): The perceived ease of use of m-learning is consistant among students who own mobile wireless phones and those who do not have.

H_A (3): The perceived ease of use of m-learning is not consistant among students regardless of mobile wireless phones ownership.

Alternatively stated in terms of acceptance, student's acceptance of m-learning will vary significantly between students who own mobile wireless phone and those who do not own. Table 5.69 presents the ANOVA test of mobile wireless phone ownership vs. behavioral intention. Levene's test of homogeneity of variance is not significant at the 0.211 level and thus the variances are not different. $F = 6.024$. This F value is significant at the 0.015 level. Thus the null hypothesis is rejected, explain that there are significant differences between students who own and do not own mobile wireless phone regarding behavioral intentions to use m-learning.

Table 5.69: ANOVA test of Mobile wireless phone ownership vs. behavioral intention(BI)

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.570	1	393	0.211

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.192	1	2.192	6.024	0.015
Within Groups	143.027	393	.364		
Total	145.219	394			

Table 5.70 shows the ANOVA test of mobile wireless phone ownership vs. perceived usefulness, in which Levene's test of homogeneity of variance is not significant at the 0.836 level and thus the variances are not different. F = 12.617. This F value is significant at the 0.000 level. Thus the null hypothesis is rejected, which means there are significant differences between students who own and do not own mobile wireless phone. This result along with the lack of difference in perceived ease of use may indicate that students who own mobile wireless phones realize the benefits and features that the mobile wireless phones offer, which they desire, but at the same time they realize that these devices are more complicated and have a long learning curve.

Table 5.70: ANOVA test of Mobile wireless phone ownership vs. perceive usefulness (PU)

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
0.043	1	393	0.836

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.815	1	3.815	12.617	0.000
Within Groups	118.819	393	0.302		
Total	122.634	394			

Further, the ANOVA results of mobile wireless phone ownership vs. perceive ease of use exhibited in Table 5.71. It is seen that Levene's test of homogeneity of variance is significant at the 0.745 level and thus the variances are not different. F = 11.787. This F value is significant at the 0.001 level. Consequently, the null hypothesis is rejected, explaining that there are significant differences between students who own and do not own mobile wireless phone when it comes to perceive ease of use of m-learning**.**

Table 5.71: ANOVA test of Mobile wireless phone ownership vs. perceive ease of use

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
0.106	1	393	0.745

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.594	1	3.594	11.787	0.001
Within Groups	119.836	393	0.305		
Total	123.430	394			

As a summary, there is a significant difference between students who own mobile wireless phone compared to students who do not own them in terms of perceive usefulness, perceive ease of use and regarding to behavioral intention to use m-learning. In detail, Appendix G exhibits the ANOVA test of PDA ownership vs. behavior intention, perceive usefulness, and perceive ease of use and the ANOVA test of mobile wireless computer ownership vs. behavior intention, perceive usefulness, and perceive ease of use. In contrast, the results indicate that there is no significant difference between students who own PDA or mobile wireless computer and those who do not own them when it comes to the acceptance mobile learning.

5.7.2 Mobile Learning Acceptance vs. Mobile Learning Usage

In the questionnaire, the students' were asked to indicate whether they use mobile technology for learning or not. In this study, t-tests were performed in order to compare the acceptance of m-learning between two groups of students, which have used their mobile device for learning or education while the other group have not. T-tests were used to compare the two groups across the three variables (behavioral intention, perceived usefulness, and perceived ease of use). In conjunction, the results of the tests are presented in Tables 5.72, 5.73, and 5.74. Consequently, three hypotheses for mobile learning usage were tested as follows:

H_0 (1): The behavior intention to use m-learning is consistant among students who use their mobile device for learning and those who do not.

H_A (1): The behavior intention to use m-learning is not consistant among students regardless of mobile learning usage.

H_0 (2): The perceived usefulness of m-learning is consistant among students who use their mobile device for learning and those who do not.

H_A (2): The perceived usefulness of m-learning is not consistant among students regardless of mobile learning usage.

H_0 (3): The perceived ease of use of m-learning is consistant among students who use their mobile device for learning and those who do not.

H_A (3): The perceived ease of use of m-learning is not consistant among students regardless of mobile learning usage.

Levene's test of variance homogeneity for all of these tests indicate that the variances are equal (not significantly different) since the null hypotheses in Levene's test are accepted with significance levels of 0.272, 0.893, and 0.403 ($p>0.05$) respectively as seen in Tables 5.72, 5.73, and 5.74.Thus, the two-tail significance for equal variances estimates were used to determine whether any difference exist between students who have used their mobile devices for learning and those who have not. Apparently, all three t-tests reject the null hypothesis at 0.000 significance levels because all are less than the threshold 0.05 p-value. These results explain that there is a significant difference between the two groups.

In other words, the tests indicate that students with prior experience using their mobile devices for learning have higher levels of behavioral intention to use and thus the acceptance of m-learning. Also, Students with prior experience of using their mobile device for learning have higher levels of perceived ease of use and perceived usefulness of m-learning. These two factors influence the behavioral intention both directly and indirectly and thus leading to higher levels of acceptance of m-learning.

Table 5.72: T-test of device use for learning vs. behavioral intentions

Group Statistics

	Ever used mobile device for learning	N	Mean	Std. Deviation	Std. Error Mean
BI	Yes	83	4.3584	0.57672	0.06330
	No	312	4.0200	0.59591	0.03374

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BI	Equal variances assumed	1.209	0.272	4.629	393	0.000	0.33840	.07311	.19467	.48214
	Equal variances not assumed			4.718	132.378	0.000	0.33840	.07173	.19651	.48029

Table 5.73: T-test of device use for learning vs. perceive usefulness

Group Statistics

	Ever used mobile device for learning	N	Mean	Std. Deviation	Std. Error Mean
PU	Yes	83	4.4964	.52579	.05771
	No	312	4.1160	.53938	.03054

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PU	Equal variances assumed	.018	.893	5.740	393	.000	.38036	.06627	.25007	.51065
	Equal variances not assumed			5.825	131.621	.000	.38036	.06529	.25120	.50952

Table 5.74: T-test of device use for learning vs. perceive ease of use

Group Statistics

	Ever used mobile device for learning	N	Mean	Std. Deviation	Std. Error Mean
PEOU	Yes	83	4.4771	0.49665	.05451
	No	312	4.1199	0.55222	.03126

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PEOU	Equal variances assumed	0.701	0.403	5.346	393	0.000	.35724	0.06683	.22585	.48862
	Equal variances not assumed			5.685	140.79	0.000	.35724	0.06284	.23300	.48147

5.7.3 Mobile Learning Acceptance vs. Mobile Internet Usage

In this section, another aspect of prior experience was tested among students. In particular, the mobile Internet usage is compared between students who have used their mobile device for Internet/web vs. students who have not used. T-tests were used to compare the two groups across the three variables (behavioral intention, perceived usefulness, and perceived ease of use). In which the results are outlined in Tables 5.75, 5.76, and 5.77.Specifically, the hypotheses in the following were tested.

H_0 (1): The behavior intention to use m-learning is consistant among students who used their mobile device for browsing the internet and those who do not.

H_A (1): The behavior intention to use m-learning is not consistant among students regardless of mobile internet usage.

H_0 (2): The perceived usefulness of m-learning is consistant among students who used their mobile device for browsing the internet and those who do not.

H_A (2): The perceived usefulness of m-learning is not consistant among students regardless of mobile internet usage.

H_0 (3): The perceived ease of use of m-learning is consistant among students who used their mobile device for browsing the internet and those who do not.

H_A (3): The perceived ease of use of m-learning is not consistant among students regardless of mobile internet usage.

The hypotheses testing produce results as can be seen in Tables 5.75, 5.76, and 5.77, it is seen that the Levene's tests of variance homogeneity indicate that the variances are equal (not significantly different). Therefore, the null hypotheses are accepted with significance levels of 0.466, 0.051, and 0.350 ($p>0 .05$) respectively. Thus, the two-tail significance test for equal variance estimates were performed to determine whether any difference exists between students who have used their mobile devices for the Internet and the web and those who have not.

Table 5.75: T-test of time spent using device for Internet vs. behavioral intentions

Group Statistics

	Time spent using mobile device for Internet	N	Mean	Std. Deviation	Std. Error Mean
BI	>=2	100	3.9075	0.62629	0.06263
	<2	295	4.1534	0.58864	0.03427

Time spent on Internet < 2 means no Internet use

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BI	Equal variances assumed	0.531	0.466	-3.551	393	0.000	-.24589	0.06924	-.38201	-.10977
	Equal variances not assumed			-3.444	162.27	0.001	-.24589	0.07139	-.38687	-.10491

Table 5.76: T-test of time spent using mobile device for Internet vs. perceive usefulness

Group Statistics

	Time spent using mobile device for Internet	N	Mean	Std. Deviation	Std. Error Mean
PU	>=2	100	3.9660	.61303	0.06130
	<2	295	4.2739	.51623	0.03006

Time spent on Internet < 2 means no Internet use

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PU	Equal variances assumed	3.827	.051	-4.907	393	.000	-.30790	.06275	-.43126	-.18454
	Equal variances not assumed			-4.510	149.409	.000	-.30790	.06827	-.44281	-.17299

Table 5.77: T-test of time spent using mobile device for Internet vs. perceive ease of use

Group Statistics

	Time spent using mobile device for Internet daily	N	Mean	Std. Deviation	Std. Error Mean
PEoU	>=2	100	3.9840	0.62194	0.06219
	<2	295	4.2664	0.51895	0.03021

Time spent on Internet < 2 means no Internet use

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PEOU	Equal variances assumed	4.458	.35	-4.464	393	0.000	-.28244	0.06326	-.40682	-.15806
	Equal variances not assumed			-4.085	148.46	0.000	-.28244	0.06915	-.41908	-.14580

It is proven that all three t-tests reject the null hypothesis at a very high (0.000) significance levels because all less than the threshold 0.05. This suggests a highly significant difference between the two groups.

The tests indicate that students with prior experience using their mobile devices for the Internet and the web have higher levels of behavioral intention to use m-learning and thus the acceptance of m-learning. Additionally, students with prior experience in using their mobile device for the Internet and the web also have higher levels of perceived ease of use and perceived usefulness of m-learning. In short, these two factors influence behavioral intention both directly and indirectly and thus leading to higher levels of acceptance m-learning.

5.7.4 Mobile Learning Acceptance vs. Gender

In order to examine the significant differences between gender among students in terms of the acceptance factors (behavioral intention, perceive usefulness, perceive ease of use, and attitude).T-tests were deployed, in which the results are attached in Appendix G. In short, the results indicate that the four t-tests reject the null hypothesis at significance levels of 0.005, 0.000, 0.000 and 0.004 respectively. Apparently, all are less than the 0.01 ($p<0.05$). This result suggests a highly significant difference between the two groups. In short, the tests indicate that male students have high levels of behavioral intention, perceived usefulness, perceive ease of use and attitude toward using and thus the acceptance of m-learning.

5.7.5 Mobile Learning Acceptance vs. Field Enrolment

In order to determine whether there is any significant difference between the students' field enrollment or majors and the acceptance of m-learning, an ANOVA test was used to evaluate whether any difference exists between the student groups when it comes to behavioral intention to use m-learning and thus the acceptance of m-learning. Hence, it was tested using the following hypotheses.

H_0 (1): There is no significant difference between the field enrollment and students acceptance of m-learning.

H_A (1): There is an existence of significant difference between the field enrollment and students acceptance of m-learning.

As shown in Table 5.78, the results clearly indicate that there is no significant difference between the groups of students based on their field affiliation. The F value (1.370) has a significance level of 0.143 ($p > .05$) and thus the alternative hypothesis is rejected, indicating no significant differences between the groups.

Table 5.78: ANOVA test of field affiliation vs. behavioral intentions

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
0.940	18	376	0.530

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.940	18	0.497	1.370	0.143
Within Groups	136.279	376	0.362		
Total	145.219	394			

Descriptives

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min	Max
Education Sc & Teacher Training	21	4.2143	0.59312	0.12943	3.9443	4.4843	3.00	5.00
Humanities & Religion	34	4.0662	0.59451	0.10196	3.8587	4.2736	3.00	5.00
Fine and Applied Arts	9	4.0556	0.56978	0.18993	3.6176	4.4935	3.00	5.00
Service Trades	10	4.5000	0.64550	0.20412	4.0382	4.9618	3.25	5.00
Law	14	4.3393	0.47644	0.12733	4.0642	4.6144	3.50	5.00
Social Behavior Science	25	4.1300	0.38270	0.07654	3.9720	4.2880	3.25	5.00
Commercial and Business	36	4.1111	0.59295	0.09882	3.9105	4.3117	3.00	5.00
Mass communication & Documentation	8	4.3438	0.39950	0.14124	4.0098	4.6777	3.75	5.00
Physical Education	18	4.0000	0.65865	0.15525	3.6725	4.3275	2.50	5.00
Natural Science	29	4.0862	0.58354	0.10836	3.8642	4.3082	3.00	5.00
Mathematics & Computer Science	41	3.9390	0.62695	0.09791	3.7411	4.1369	2.00	5.00
Medicine	23	3.8913	0.54786	0.11424	3.6544	4.1282	3.00	4.75
Dentistry	15	4.4333	0.77613	0.20040	4.0035	4.8631	2.00	5.00
Pharmacy	18	4.0278	0.58717	0.13840	3.7358	4.3198	3.00	5.00
Para-Medical Science	26	4.0865	0.58285	0.11431	3.8511	4.3220	3.00	5.00
Engineering	41	4.1159	0.68259	0.10660	3.9004	4.3313	2.75	5.00
Agriculture	10	3.7250	0.74954	0.23702	3.1888	4.2612	2.75	5.00
Architecture & Town Planning	11	4.0909	0.53936	0.16262	3.7286	4.4533	3.00	5.00
Veterinary Medicine	6	3.8750	0.73739	0.30104	3.1012	4.6488	2.75	5.00
Total	**395**	**4.0911**	**0.60710**	**0.03055**	**4.0311**	**4.1512**	**2.00**	**5.00**

5.8 Conclusion

The findings show that culture, trust, and technology service quality factors have significant influnce on students' acceptance of m-learning as this study proposes. Additionally, the relationships among the construct in TAM are significant, in which the power distance variable is the most predictor variable among all of those in culture factor. Meanwhile, the most predictor variable under trust factor is trust in the university variable and the most predictor variable related to technology service quality factor is accessibility variable. Besides, a prior experience is found to have a positive influence on the acceptance of m-learning and that there are a significant difference between students who own mobile wireless phone and those who do not have. In addition, ownership of other devices has no significant difference between students who own PDA and those who do not have. The same trend is found in the relationship between students who own mobile wireless computer devices and those who do not have. In contrast, there are significant differences between the genders on acceptance of m-learning. Finally, there is no significant difference between the groups of students based on department affiliation.

CHAPTER SIX
CONCLUSTION

6.1 Introduction

This study starts with a description of the research problem, research questions, research objectives, and its significance. The literature reviews of literatures are discussed to support the research carried out. The research model and the hypotheses were developed based on the inputs from preliminary study, previous research, and theories. Then, the research methodology is also presented leading to the data collection and analysis. Eventually, this chapter provides a summary of the outcomes and the achievements of this study including the results of hypotheses testing and research questions. Additionally, this chapter also provides concludes the study by addressing its implications, describes limitations, and mentioning the opportunities for future research.

Briefly, this concluding chapter reflects on the findings of the following research objectives as stated in Chapter 1.

1. To identify the factors that influence the acceptance of m-learning among students' in Jordanian higher education institutions.
2. To identify the most influential variables under each external factor that would predict the students' acceptance of m-learning in Jordanian higher education institutions.

3. To investigate the students' differences in m-learning the acceptance based on mobile device ownership, mobile learning usage, mobile Internet usage, gender, and field enrollment in Jordanian higher education institutions.

6.2 Summary of Research Achievements

This section discusses the achievements of the study based on the research questions.

6.2.1 Research Question One (RQ 1)

The first research question is concerned with discovering the factor that influence of the acceptance of m-learning among the students' in higher education in Jordan. The results of this study suggest that the external factors i.e. culture, trust and technology service quality are all the determinants of the acceptance of m-learning. Additionally, the factors in TAM including perceived usefulness, perceived ease of use, and attitude that have been validated through numerous other studies, were also determined to be significant determinants of the acceptance of m-learning. Hence, this study proposes that the model examining the acceptance of m-learning in Jordan among students of higher education institutions should be as illustrated in Figure 6.1

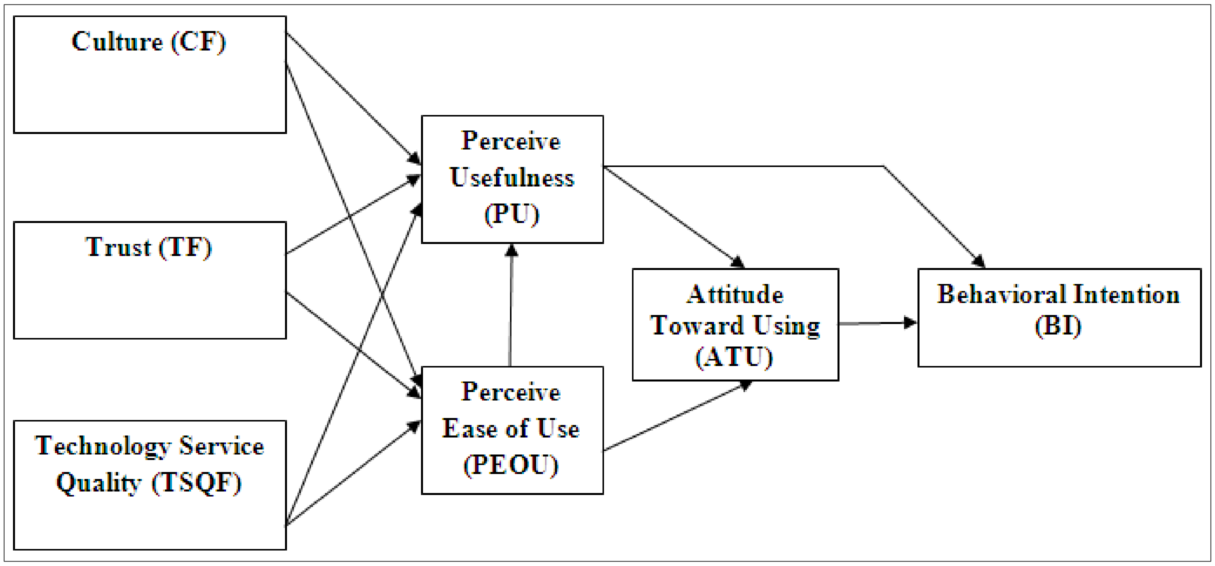

Figure 6.1: Mobile Learning Acceptance Model

Culture Factor

The findings show that cultural factor (uncertainty avoidance, power distance, masculinity/femininity, and long-term versus short-term orientation) has a significant and positive relationship with perceive usefulness and perceive ease of use. Unanimously, many researchers agreed that these variables were considered as successful key variables in the area of technology acceptance (Al-Khaldi & Wallace, 1999; Al-Sukkar, 2005; Srite, 2000, 2006). In fact, the findings were also supported by original dimensions of Hofstede (1991), and is consistent with AL-Sukkar (2005) findings, who found that cultural factor has strong and positive relationships with perceived ease of use and perceived usefulness of internet banking in Jordan. Likewise, Myers and Tan (2002) indicated that cultural dimensions have strong and positive relationships with both the web design and users' interface acceptance, and Srite (2000)found that cultural dimensions seem to be significantly positive in relation to the users' acceptance or resistance to use the proposed system in Arab world. Finally, the present research findings are also in agreement with (Kovačić, 2005) who conducted a study to investigate the impact of national culture dimensions on the web E-government's readiness. The researcher indicated that countries with strong uncertainty avoidance would have less acceptance and readiness with adopting new ICTs. However, the countries with weak uncertainty avoidance will be willing to adopt the new ICTs because of its ability to take the risk of unsuccessful implantation.

Trust Factor

The obtained findings show that the trust factors (trust in the university and trust in the mobile channel) are proven as a significant and have positive relationship with perceive usefulness and perceive ease of use. It is in line with previous studies (Al-Sukkar, 2005; Barakat & El-Sheikh, 2010; Benamati, Fuller, Serva, & Baroudi, 2010; Gefen et al., 2003b; Reid & Levy, 2008; Zhou, 2011). The findings are supported by a recent study by Barakat and El-Sheikh (2010) which indicate that the trust factor is significant and positive with TAM and need to be considered as crucial in mobile advertising. Similarly, It is also in line with Al-Sukkar (2005) who found that trust significantly influences the customer acceptance of internet banking and directly influences their perceive usefulness and perceive ease of use towards the use of online tools.

Technology Service Quality Factor

The findings also reveal that the technology service quality factor (accessibility, interface design, reliability/response, content quality, personalization, and privacy/security) has a significant influence on perceive usefulness and perceive ease of use, and thus, the acceptance of mobile learning in higher education environment, which support some previous studies (Akour, 2009; Palloff & Pratt, 1999; Pituch & Lee, 2006; Selim, 2003). This finding is also consistent with Ying and Kaewmee (2011) who found that perceived service quality in the airport ground service influence the perceived ease of use, perceived value in terms of usefulness and status, attitude toward using, and behavioral intention to use. Besides, the finding is also supported by Akour (2009) who indicate that the technology service quality factor is significant and positive with perceive usefulness and perceive ease of use, and thus, acceptance of m-learning. Therefore, the influence of technology service quality factor is expected due to its significant effects that are supported extensively in the existing literatures. Hence, it is assumed that the students who perceived the m-learning system to be functioning, interactive, and responsive, it will positively encourage them to participate effectively in their mobile device and eventually, their level of acceptance will be enhanced.

As a summary, this study deduced that culture, trust, and technology service quality factors have a significant impact on students' acceptance of m-learning. Additionally, the relationships among the constructs in TAM are significant.

6.2.2 Research Question Two (RQ 2)

This question is set out to determine the variables that are most influential to each external factor that would significantly predict the students' acceptance of m-learning through the perceive usefulness and perceived ease of use.

Culture Variables

In analyzing the culture variables, power distance, uncertainty avoidance, and individualism/collectivism are found to be significant in respect to perceived usefulness, and thus the acceptance of m-learning. In addition, power distance and uncertainty avoidance are significantly influence in close values and in respect to perceived ease of use, and thus the acceptance of m-learning. The obtained findings are consistent with Galletta and Zhang (2006) who found that power distance has been is important in determining an individual's reactions in the workplace by effecting interaction and association among the individuals. Similarly, and particularly in Jordan, Alhujran (2009) examined the e-government acceptance in Jordan culture. Their study aimed to identify the influencing factors that may affect e-government acceptance in Jordan. The researcher found that power distance and uncertainty avoidance significantly influence the perceived usefulness and perceived ease of use. Conversely, masculinity/femininity and long-term versus short-term orientation are found to be not significant to influence perceived usefulness. Furthermore, individualism/collectivism, masculinity/femininity and long-term versus short-term orientation not significantly influence the perceived ease of use. However, the obtained findings regarding individualism/collectivism and long-term versus short-term orientation were inconsistent with that of (Al-Sukkar & Hasan, 2005) who extended TAM with the culture constructs in context of internet banking acceptance. The reason could be due to the fact that the majority of Jordanian universities provide m-learning implementations equally to all students regardless of his/her college. Besides, the obtained findings regarding masculinity/femininity were inconsistent with that of (Akour et al., 2006) who extended TAM with the culture constructs. In which his findings indicated a strong relationship between masculinity/femininity with perceived usefulness and perceived ease of use. The reason might be due to the fact that Jordanian universities provide m-learning implementations equally to both female and male students. Furthermore, the female and male students have an equal opportunity to access online courses using the facilities provided by the university.

Trust Variables

In analyzing the trust variables namely trust in the university and trust in the mobile channel, trust in the university was found to be significantly influencing the perceived usefulness and perceived ease of use and thus the acceptance of m-learning. However, trust in the mobile channel did not significantly influence the acceptance of m-learning. Unanimously, many researchers agreed that this variable was considered as successful key variable in the area of technology acceptance (Lewicki & Bunker, 1996; Powell, 1996; Tyler & Degoey, 1996). However, the obtained findings regarding trust in the electronic channel such as mobile were inconsistent with that of (Al-Sukkar, 2005) who extended TAM with the trust construct in the electronic channel. In which his findings indicated a strong relationship between trust in the electronic channel with perceived usefulness and perceived ease of use. The reason could be due to the fact that Jordanian students have a good experience to use mobile device.

Technology Service Quality Variables

The last variables of technology service quality factor are accessibility, interface design, reliability/response, content quality, personalization, and privacy/security. The findings reveal that the best predictor of perceive usefulness under technology service quality is accessibility, followed by interface design, personalization, content quality and lastly by privacy/security. However, reliability and response did not significantly influence perceived usefulness. Meanwhile, the best predictor for the perceive ease of use under technology service quality is accessibility, followed by interface design, personalization, and lastly content quality. Conversely, reliability/response and privacy/security not significantly influence the perceived ease of use. The results obtained are in line with Akour (2009), who found that the personalization and content quality have a positive relationship with the TAM constructs and that it significantly influence the acceptance of m-learning. However, the obtained findings regarding reliability/response and privacy/security were inconsistent with that of (Lin & Wu, 2002) who extended the Technology Acceptance Model with the online service quality constructs. In which his findings indicated a strong relationship between reliability/response and privacy/security with perceived usefulness and perceived ease of use. The reason could be the reduced intention paid to system reliability and response problems since the recent enhanced and updated new m-learning systems that are provided by the national centre of E-learning. At the same time, the students' intention might be intended to evaluate the provided new system characteristics such as accessibility, interface design, content quality, and personalization. Having described the relationships among the constructs, they are illustrated in Figure 6.2.

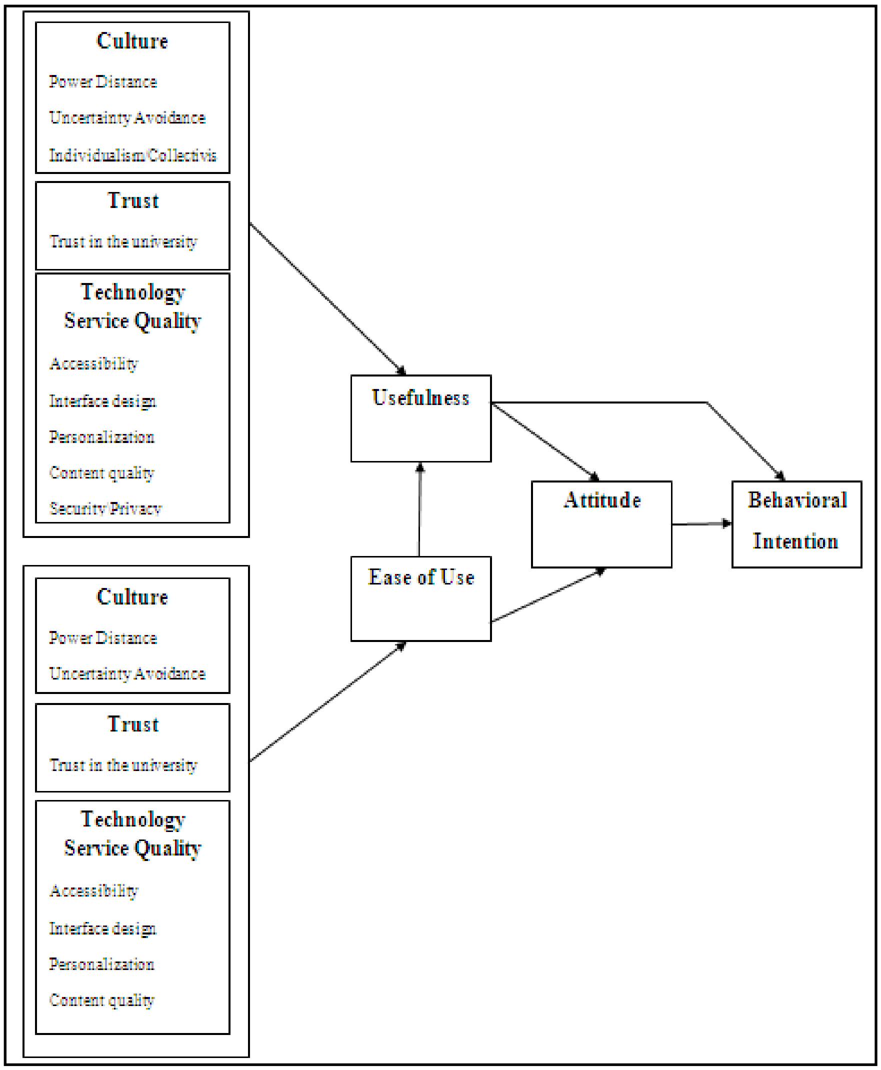

Figure 6.2: The Critical Variables Model

6.2.3 Research Question Three (RQ 3)

RQ 3 sought to investigate if there are any significant differences in students' acceptance of m-learning based on their mobile device ownership, mobile learning usage, mobile Internet usage, gender, and field enrollment in Jordanian higher education institutions. The results related to this question indicate that there is no any statistically significant difference in students' acceptance of m-learning in terms of field enrollment (majors) and the personal digital assistants (PDA) ownership as well as mobile wireless computer ownership. However, there are statistically significant differences in the students' m-learning acceptance on their level of m-learning usage, the use of mobile technologies for browsing the Internet, mobile wireless phone owner ship, and gender.

Mobile device ownership

Group tests were conducted to understand the differences between groups basedon mobile device ownership. The students' mobile device ownership was divided into three major devices: (1) mobile wireless Internet, (2) personal digital assistants (PDA) and (3) mobile wireless computer.

- **Mobile wireless Internet**

  The results indicate that there are significant differences between mobile wireless phone owners and non-owners regarding perceived usefulness, perceive ease of use and behavioral intentions to use m-learning. This indicates that students who own mobile wireless phone realize the benefits and features that the mobile wireless phone offer and understand their usefulness and ease of use, which supported by (Akour, 2009). Furthermore, the mean score for students who owned mobile wireless phone is higher than the mean score of students who do not own the mobile wireless phone.

- **Personal Digital Assistants (PDA)**

  The results indicate that there are insignificant differences between PDA owners and non-owners regarding perceived usefulness, perceive ease of use and behavioral intentions to use m-learning. This result however contradicts some previous findings such as by Chen and Huang (2010),and Park et al. (2011). However, this study reveal that there are statistically insignificant differences in the students' acceptance of m-learning between those who own personal PDA and those who do not own.

- **Mobile wireless computer.**

  The results indicate that there are insignificant differences between mobile wireless computer owners and non-owners regarding perceived usefulness, perceive ease of use and behavioral intentions to use m-learning. The results however, contradict some previous findings such as by Chen and Huang (2010), and Williams (2009). This may indicate that students who own mobile wireless computer such as laptop do not realize the benefits and features that mobile wireless computer offer and understand their usefulness and ease of use and the reason that the mobile wireless computer are heavy.

Mobile learning usage

The results also show that there are significant differences in students' acceptance of m-learning based on their experience in using the mobile device. Groups were compared based on their prior use of mobile devices for learning. The test reveal a significant difference between the two groups: in which students with prior experience in using their mobile devices for learning have higher levels of behavioral intention to use and thus, the acceptance of m-learning. Besides, students with prior experience using their mobile device for learning also have higher levels of perceived ease of use and perceived usefulness of m-learning. In contrast, it was found that the users with prior experience in using computer technology have a positive intention towards using IT more than the users who are not experienced in using mobile technology. In fact, Akour (2009), and Williams (2009) also found similar findings in which they indicate that experience directly influence the students' intention to use the courseware as well as increase the students' perceptions on the usefulness of the courseware and its ease of use.

In this study, the most probable explanation of not having significant differences in the students' acceptance of m-learning based on experience in using the mobile device is that the majority of the students had high level of experience in using the mobile device. Logically, once the students have a good experience in using mobile devices, the anxiety of using the m-learning is reduced and the students' m-learning self efficacy will be increased. Hence, the students experience in using the m-learning would significantly influence their acceptance.

Mobile Internet usage

It is evidenced that mobile Internet experience is statistically significant in influencing the students' acceptance of m-learning. The finding is supported extensively by many scholars who had tested Internet experiences as an external variable with the intention to use distance and m-learning (Fusilier& Durlabhji, 2005; Kerka, 1999; Rezaei et al,. 2008). In another study, Akour (2009) investigated the effect of student experiences on the acceptance of m-learning using the technology acceptance model as the basic framework. The results revealed that the experience on using mobile devices to browse the Internet was directly related to usefulness, ease of use and intention to use m-learning.

Gender

T-test was performed in assessing the effect of gender differences on their acceptance of m-learning. The results yield that gender gives significant differences in the acceptance of m-learning. The finding is supported by some previous findings in terms of technology acceptance (Gefen & Straub, 1997; Jackson et al,. 2001; Ong & Lai, 2006; Tolhurst & Debus, 2002; Yuen & Ma, 2002). The researchers found that gender had a significant effect on students' utilization of the learning tools. Particularly, males were found to have more knowledge than females in using the mobile activities. However, this contradicts with some of previous findings (Masrom, 2007; Milis, Wessa, Poelmans, Doom, & Bloemen, 2008). The inconclusive findings in the literature and the result obtained in this study and might be due to the fact that all students in the higher education in Jordan are significantly different in terms of acceptance of m-learning based on their gender.

Field enrollment (Major)

The results show that there is insignificant difference in students' acceptance of m-learning in terms of their majors. This may be because the university students have a good experience in using the mobile device whatever the field enrolment. In addition, all students are required to pass successfully one year of foundation in order to join their program. The foundation year is designed to provide students with essential skills in using the ICT for academic purposes. Therefore, the insignificant difference in students' acceptance of m-learning in terms of their majors could be justified.

6.3 Research implications

As a result of the obtained findings and the discussion, several implications have surfaced. These implications are divided into theoretical and practical implications.

6.3.1 Theoretical implications

This study has successfully extended and validated Technology Acceptance Model's (TAM). It is applicability to determine, predict, and understand the factors affecting students' acceptance of m-learning in the Jordanian higher education context. The suggestion of Davis et al. (1989), who stated that testing TAM with additional factors would provide richer understanding of the users' acceptance and their behaviour toward using the technology, is considered as a successful key factor of the extension and elaboration of TAM in this study. Hence, the examined factors indeed contributed, significantly to provide in-depth understanding of how these factors influence the students' acceptance, and how considering these factors could improve the students' acceptance towards using the m-learning system.

The applicability and validity of TAM and its related original constructs are confirmed in the educational context especially in the area of m-learning in Jordanian institutions of higher education as consistent with the research that examined the TAM's applicability in the area of m-learning (Akour, 2009; Liu, Li, & Carlsson, 2010; Lu & Viehland, 2008; Zhao & Zhu, 2010). Particularly, this study found that perceived ease of use influence the perceived usefulness and both constructs significantly influence the acceptance of m-learning through the effects of students' attitude. Thus, it also confirms that TAM is able to include additional factors that could influence technology acceptance besides the confirmed original directions and relationships between the constructs in TAM. In fact, the significant role of attitude in influencing the relationships between the main TAM constructs and the students' behavioural intention towards using m-learning has also been confirmed.

Even though there are many studies have investigated the issue of students' acceptance using the TAM, there is limited research addressing the influence of demographic variables. Hence, this study examines the effects of proposed demographic variables on the students' acceptance of m-learning. The suggestions of studies in investigating the influence of the demographic variables such asmobile device ownership, m-learning usage, mobile Internt usage, gender, and filed enrolment is responded in this study (Akour, 2009; Ong, Lai, & Wang, 2004).However, while many researchers investigated the role of demographic variables as moderators or antecedents, this study examines the direct effects of it on the students' acceptance of m-learning. The examined demographic variables are students' m-learning usage, mobile Internet usage, gender, filed enrolment and three different types of mobile device ownership which are the mobile wireless phone, PDA, and mobile wireless computer. As a result, the obtained demographic significant variables need to be taken into account by higher education stakeholders, system designers, and the academic staff who are interested with mobile-based teaching. Furthermore, the future researchers could test and investigate the influence of significant demographic variables as moderators in the relationship between proposed factors and the students' attitude rather than their behavioral intention towards m-learning.

The significant factors have been derived from well known theories and validated studies. Hence, it could provide richer understanding in the nature of the previous relationship between these variables and the TAM constructs whether agreeing or contradicting with previous findings. It can also give an indication in the significance of examined variables compared with previous research recommendations and suggestions. Theoretically, this study examines the indirect influence of these factors on the students' acceptance of m-learning. Therefore, examining these factors directly is indeed important.

6.3.2 Practical implications

Based on the research findings, several practical implications are discussed. The study shows that students' acceptance of m-learning is affected by the trust variables namely trust in the university and trust in the mobile channel. Therefore, the universities' management and academic staff should take into consideration the important role of these variables in enhancing the students' acceptance of using the universities available m-learning system fully. Thus, the lecturers can upload m-learning materials such as the subject's guidelines, lecture notes, subject quizzes, and case studies in enjoyable organizations and interactions in order to attract the students to accept and fully participate in the universities' mobile activities. For instance, the management and the university administrators could provide the students with appropriate technical support and training workshops in order to overcome the problems of the trust in the university. In addition, the management should provide the students with suitable facilitating conditions such as high speed and reliable networks and wireless services in order to overcome any unexpected problems that could be caused by institutional oversight.

The significant influence of the culture factor should also be taken into the educators' and administrators' consideration. Since the importance of power distance and uncertainty avoidance in influence the students' acceptance of m-learning, the lecturers can play a crucial role in positively influencing the students' acceptance. The lecturers can provide the students' with incentive such as giving 5 marks participation upon their effective participation on using m-learning implementations such as online discussion to induce them to use the m-learning system. They can also promote m-learning acceptance by highlighting the benefits and features that can be derived from using m-learning through giving live examples of these features during the lecturers' introduction of the m-learning system. On the other hand, the university management should also encourage the lecturers to use m-learning system. Since the power distance and uncertainty avoidance are significant in influencing the acceptance of m-learning, the lecturers power can be used as enforcement tools for the students to encourage them to participate efficiently in the m-learning activities.

In terms of significant technology service quality variables, the findings are likely to be relevant to learning and content management system designers. System response, accessibility and personalization were significantly influence the students' acceptance. In other words, when the students' perceived the system as easy to access, reliable and highly responsive, and keep the personalization information's, their acceptance level will be increased. Therefore, system designers must take this into consideration in achieving these significant system characteristics. Furthermore, the influence of original TAM's main constructs, namely perceived usefulness and perceived ease of use are also confirmed. Thus, the m-learning system should be perceived as both easy to use and useful to maximize the use of the system. Hence, universities' learning management system should be perceived as both useful and easy to use in order to maximize the system acceptance and ultimately increase the students' participation.

6.4 Limitations and Recommendations for Future Research

Based on the obtained findings, discussion and research implications, the following recommendations are formulated for academic staff, m-learning system designers, university' management and administrations, and IT experts to undertake in order to achieve a high level students acceptance and successful implementation of new systems.

Due to the limitation of sample size with only five public universities, it would be certainly useful for future research to implement the research examining factors and instrumentations with more universities either public or private ones, in order to obtain a better representation for the entire population and ultimately represent optimum generalization. Furthermore, thisstudy is limited only to university students. Therefore future research should consider other university members such as research assistants, lecturers and administrators in order to identify their trend to accept m-learning and determine the important factors that could affect their acceptance.

The scope of this research is limited due to the higher education environment and Jordan institutions of higher education. In accordance, future research could study different organizations such as the government and business sectors, in order to investigate the influence of examined factors on their mobile users. Also, the future research could implement this proposed research factors in other countries in order to confirm the instrumentation accuracy and assess the questionnaire validity and reliability.

The significant factors proposed in the research model can be implemented by IT experts to evaluate and develop new systems and create new prototypes which would help them to design successful mobile systems. Moreover, the demographic variables were examined directly with students' behavioural intention as external factors. Therefore, future research could possibly investigate the effects of these variables as moderators or antecedents to other factors and specifically to its related variables.

The reported R-square yield other additional variables that might be needed to add variables. Additionally, this study examined the proposed factors in light of the Technology Acceptance Model (TAM) as a theoretical basis. Hence, it is recommended that future research could examine these factors with other acceptance theories or models.

It could confirm and validate the significance of these variables in relation to other main indictors of acceptance in respected models and theories. On the other hand, this study uses quantitative methods in collecting data. Thus, it would be useful if future investigation could use qualitative or triangulation methods which can help the researcher discover additional factors that could influence the students' acceptance and also help them understand more about how the students could accept the use of new technology.

6.5 Conclusion

Researchers calling for an evolutionary change to the educational system based on mobile devices need to heed the concerns of students regarding such a system's replacing traditional learning and teaching. This study is conducted to investigate factors affecting the students' acceptance of m-learning in institutions of higher education in Jordan. The findings show that the students' acceptance can be modeled by the TAM's original constructs. Additionally, this study confirms the strength of TAM in predicting the acceptance and use of m-learning in addition to other significant variables that were derived from other related theories. The present research model was tested and validated with 395 undergraduate students at five public universities. This study on the factors affecting the students' acceptance of m-learning in Jordanian universities was deemed necessary in order to increase the students' acceptance towards using universities' m-learning systems.

In terms of culture, trust, and technology service quality factors, the results indicate that the culture factor is the most significant factor compared to other factors. It is followed by trust factor is the second influential factor and then technology service quality factor. In addition, Stepwise regressions were performed in order to determine variables that contribute the most in each factor. The results show that the three variables (power distance, uncertainty avoidance, and individualism/collectivism) related to culture factor are significantly influencing to the students' acceptance of m-learning. Furthermore, the regressed variables of the trust factor reveal that the most influential variable is trust in the university while trusts in the mobile channel insignificantly influence the students' acceptance. Meanwhile, variables that contribute the most in the technology service quality are accessibility, interface design, personalization, content quality, and privacy/security while reliability and response did not contributed significantly.

Finally, in terms of demographic variables, it was found that gender, mobile wireless phone ownership, and their m-learning experience and mobile internet experience significantly influence the students' acceptance while other related examined variables do not indicate statistically any significant differences. The results also indicate that attitude significantly influence the relationship between the TAM main constructs and the students' behavioral intention to use m-learning. In addition, the perceived ease of use and perceived usefulness are found significant with the students' acceptance. Meanwhile, perceived ease of use is found to influence perceived usefulness significantly, which indicates that all of the obtained results regarding the relationships between the TAM's original variables are consistent with the findings of Davis (1989) and Davis et al. (1989).

Universities and system architects can focus their attention on making the system useful while making it easy to use. The usefulness of m-learning is very important. Power distance and trust in the university variables must be fostered and nourished for students. In fact, encouragement and providing support through peers, faculty, and the university is also very important. Thus, the social variables (Power distance and trust in the university) are very important to the acceptance and success of m-learning.

Universities can use mobile learning acceptance model as a foundation on which to build their IT decision making and strategic planning. In fact, universities can use the model components to understand what factors need attention. When a new m-learning initiative is in its infancy stages of planning and design, this model can give guidelines for where resources should be applied. It is appropriate because proper planning can ensure proper distribution of fiscal and human resources.

Although research in the area of m-learning is rapidly growing, little attention has been paid to investigating students' acceptance of m-learning. Hence, this study contributes to the body of knowledge in the areas of technology acceptance and mobile learning and provides a foundation for future research in this area.

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APPENDIX A

Original Questionnaires (English Version)

SURVEY QUESTIONNAIRE

MOBILE LEARNING ACCEPTANCE IN JORDANIAN HIGHER EDUCATION INSTITUTIONS

Thank you for showing an interest in this research project. Please read this information sheet carefully before deciding whether or not you wish to participate. Participation in the study is entirely up to you.

Purpose: I am conducting a survey as partial fulfillment of the requirements for the degree of Doctor of Philosophy in Information Technology at the University Utara Malaysia. The website is "www.uum.edu.my".

Definition**:** Mobile Learning (m-learning), for this research project, refers to anywhere, anytime access to educational and university services such as course registration, result, time table and my courses through the use of mobile technology, whether connected or disconnected from the network.

Instructions**:**
Please read the information sheet before completing survey.
Select the answer that best reflects your views. Answer all questions as honestly as possible. There are no correct or best answers.
For all questions please mark (X) in the appropriate box unless instructed to do otherwise. Please indicate the degree to which you agree or disagree with statement base on 5-point Likert scale (1=Strongly Disagree (SD), 2= Disagree (D), 3= Neutral (N), 4= Disagree (D) 5= Strongly Agree (SA)

Section 1: Student Demographics

1.1 Your Gender (sex): **Female** ☐ **Male** ☐

1.2 What age group are you in?

18-22 years ☐

23-26 years ☐

Over 26 years ☐

1.3 In what colleges are you enrolled?

☐ Education Sc & Teacher Training

☐ Humanities & Religion

☐ Fine and Applied Arts

☐ Service Trades

☐ Law

☐ Social Behavior Science

☐ Commercial and Business

☐ Mass communication & Documentation

☐ Physical Education

☐ Natural Science

☐ Mathematics & Computer Science

☐ Medicine

☐ Dentistry

☐ Pharmacy

☐ Para-Medical Science

☐ Engineering

☐ Agriculture

☐ Architecture & Town Planning

☐ Veterinary Medicine

1.4 In which academic year are you now?

☐ First year
☐ Second year
☐ Third year
☐ Fourth year
☐ Fifth year
☐ Sixth year
☐ Seventh year
☐ Eighth year
☐ More than

1.5 Have you used mobile device(s) for learning or educational purposes?

Yes ☐ **No** ☐

1.6 What type of mobile device(s) you own?

☐ Mobile wireless computer (laptop).
☐ Personal Digital Assistants (PDAs).
☐ Mobile wireless phones.
☐ Other, please state_______________

1.7 Experience using mobile devices?

☐ N/A
☐ Less than 1 year
☐ 1-3 years
☐ 4-6 years
☐ More than 6 years

1.8 Average amount of time spent on your mobile device(s) on a daily basis?

Conversation	Messaging	Internet (Web/Email)	Games/Music	Learning/Education	
☐	☐	☐	☐	☐	N/A
☐	☐	☐	☐	☐	Less than 1 hour
☐	☐	☐	☐	☐	1-3 hours
☐	☐	☐	☐	☐	4-6 hours
☐	☐	☐	☐	☐	More than 6 houre

Section 2

The statements below represent the dimensions of culture. Please, state how much you agree with each of the statements listed below on the attached scale (Circle one option):

	SD	D	N	A	SA
It is important to have study requirements and instructions spelled out in detail so that students always know what they are expected to do.	1	2	3	4	5
It is better to study in a university with specific rules and regulations.	1	2	3	4	5
Rules and regulations are important because they inform students what the university expects of them.	1	2	3	4	5
Students should avoid making changes because things could get worse.	1	2	3	4	5
Lecturer should be careful not to ask the opinions of students too frequently, otherwise the lecturer might appear to be weak and incomplete	1	2	3	4	5
Lecturers should make most decisions without consulting students.	1	2	3	4	5
Students should not question their lecturer's decisions.	1	2	3	4	5
Students should pay high respect for their lecturers.	1	2	3	4	5
Students should not show their disagreement to their lecturers.	1	2	3	4	5
It is advisable for male students to pursue their study in vocational fields while females to pursue their study in academic ones.	1	2	3	4	5
Female students do not value recognition and promotion in their learning as much as male students do.	1	2	3	4	5
It is preferable for male students to have majors different from females.	1	2	3	4	5
There are some study fields that male students can always perform better than female students.	1	2	3	4	5
Individual achievement is not as important as group achievement.	1	2	3	4	5
Group success is more important than individual success.	1	2	3	4	5
Being accepted as a member of a group is more important than having autonomy and independence on learning.	1	2	3	4	5
It is more important for a lecturer to encourage loyalty and a sense of responsibility in students than it is to encourage individual initiative.	1	2	3	4	5
It is important to have a conscience in learning.	1	2	3	4	5
Personal stability is not critical to success in education.	1	2	3	4	5
Respect for tradition hampers performancein the education environment.	1	2	3	4	5
Upholding one's personal image makes little difference in goal achievement.	1	2	3	4	5

Section 3

The statements below represent the dimensions of trust in university and mobile wireless university service channels, Please circle around the number which represents your appropriate answer at best on the attached scale.

	SD	D	N	A	SA
The performance of mobile learning implementations makes me confident in my university.	1	2	3	4	5
My university is honest with me.	1	2	3	4	5
My university has a good reputation.	1	2	3	4	5
I feel loyal towards my university.	1	2	3	4	5
I am happy about the efforts my university is making towards a regular student like me.	1	2	3	4	5
I am satisfied with the relationship I have with my university.	1	2	3	4	5
My university is one that keeps promises and commitments.	1	2	3	4	5
Overall, I trust my university.	1	2	3	4	5
I expect that using the mobile to access my university will perform as well as other technologies which include as e-learning.	1	2	3	4	5
I expect that using the mobile to access my university will be available without interruption of service.	1	2	3	4	5
I am very confident that when I use the mobile to access my university, it will perform as reliably as I expected it to perform.	1	2	3	4	5
I think that when I use the mobile to access my university, it has the capability to provide a desired level of service in adverse or hostile conditions (e.g., natural disaster)	1	2	3	4	5
I trust the mobile to do functions such as (registration, results, assignments.....).	1	2	3	4	5

Section 4

The statements below represent the dimensions of Technology service quality. Please, state how much you agree with each of the statements listed below on the attached scale (Circle one option):

	SD	D	N	A	SA
For m- learning to be effective it is important to accomplish my studies at a time that is convenient for me	**1**	**2**	**3**	**4**	**5**
For m- learning to be effective it is important to perform my studies any place	**1**	**2**	**3**	**4**	**5**
For m- learning to be effective it is important to provide me with convenience in performing my studies	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important to increase access to learning and education.	**1**	**2**	**3**	**4**	**5**
For m-learning system to be effective it is important for the interface design to provide me visually appealing features.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the interface design to provide site colors, graphics, and fonts.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the interface design to provide a good page layout.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the interface design to provide a well designed site menus.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the service to be accurate (error free).	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the service to be reliable.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the service to be adequately fast (fast download).	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the content to be easy to navigate.	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the content to be understandable	**1**	**2**	**3**	**4**	**5**
For m-learning to be effective it is important for the content to be current (up to date).	**1**	**2**	**3**	**4**	**5**
It is important that m-learning services are personalized to control my learning progress	**1**	**2**	**3**	**4**	**5**
It is important that m-learning services are personalized to choose what I want to learn.	**1**	**2**	**3**	**4**	**5**
It is important that m-learning services are personalized to record my learning progress and performance.	**1**	**2**	**3**	**4**	**5**
It is important that m-learning services are personalized to provide learning support.	**1**	**2**	**3**	**4**	**5**
It is important that m-learning services are personalized to understand my needs.	**1**	**2**	**3**	**4**	**5**
I would likely not be worried about security when using m-learning.	**1**	**2**	**3**	**4**	**5**
I trust the ability of the university to protect my privacy.	**1**	**2**	**3**	**4**	**5**

Section 5

Please, circle the degree to which you believe that using the mobile learning would be free of effort (perceive ease of use).

	SD	D	N	A	SA
I would likely find m-learning easy to use.	**1**	**2**	**3**	**4**	**5**
It would likely be easy for me to become skillful at using m-learning.	**1**	**2**	**3**	**4**	**5**
I would likely find my interaction with m-learning to be clear and understandable.	**1**	**2**	**3**	**4**	**5**
I would likely find m-learning flexible to interact with.	**1**	**2**	**3**	**4**	**5**
I would likely find it easy to get m-learning to do what I want it to do.	**1**	**2**	**3**	**4**	**5**

Section 6

Please, circle the degree to which your believe that individuals will accept mobile learning if they perceive the mobile would help them to achieve the desired performance (perceive usefulness).

	SD	D	N	A	SA
Using m-learning would likely be useful in my academic life.	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely enable me to accomplish learning tasks more quickly.	**1**	**2**	**3**	**4**	**5**
Using m-learning in my academic life would likely increase my productivity (do more things).	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely enhance my effectiveness in my academic life (do things better and smarter).	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely improve my academic life performance.	**1**	**2**	**3**	**4**	**5**

Section 7

Please, circle around the number which expresses the degree of your favorableness or unfavorableness towards using mobile learning.

	SD	D	N	A	SA
Using the mobile learning is a good idea.	**1**	**2**	**3**	**4**	**5**
I like the idea of using the mobile learning.	**1**	**2**	**3**	**4**	**5**
Using the mobile learning would be pleasant.	**1**	**2**	**3**	**4**	**5**
I dislike the idea of using the mobile learning.	**1**	**2**	**3**	**4**	**5**
Using the mobile learning would be unpleasant.	**1**	**2**	**3**	**4**	**5**

Section 8

Please, state how strong your intention to use the mobile to access university services such as course registration, result, time table and my courses.

	SD	D	N	A	SA
I intend to use m-learning in my academic life.	**1**	**2**	**3**	**4**	**5**
I would enjoy using m-learning.	**1**	**2**	**3**	**4**	**5**
I intend to use m-learning frequently.	**1**	**2**	**3**	**4**	**5**
I would recommend that others use m-learning	**1**	**2**	**3**	**4**	**5**

Section 9

We will appreciate any comments you can give about this study below.

Thank you for your time, feedback and effort in completing this questionnaire

APPENDIX B

Original Questionnaires (Arabic Version)

نموذج معلومات للمشاركين بالبحث

تقبل التعلم النقال في مؤسسات التعليم العالي الأردنيه

شكرا لاهتمامك بهذا البحث، الرجاء قراءة هذه الورقة بتمعن قبل التفكير في المشاركة أو عدم المشاركة، علما ان حرية المشاركة في الدراسة تعودبشكل تام لك .

هدف الدراسة: اقوم بهذه الدراسة الميدانية كجزء من متطلبات الحصول على درجة الدكتوراه في تكنولوجيا المعلومات من جامعه اوتارا الماليزيه

التعريف : التعلم المتنقل (م- التعلم)، لهذا البحث،يشير إلى أي مكان و في أي وقت يمكن الوصول إلى الخدمات التعليمية والجامعيه مثل التسجيل ، النتائج ، الجدول الزمني والمواد الدراسيه من خلال استخدام تكنولوجيا الاتصالات المتنقلة، سواء كانت متصلة أو منفصلة عن الشبكة.

التعليمات :يرجى قراءة ورقة المعلومات قبل استكمال الدراسة .اختر الإجابة التي تعكس أفضل وجهات نظرك. أجب على جميع الأسئلة بكل صراحة ممكنه. لا توجد إجابات صحيحة أو أفضل. لجميع الأسئله يرجى وضع علامه (×) في الخانه المناسبه مالم تصدر تعليمات بخلاف ذلك.

القسم الأول: معلومات عن الطالب

1.1 الجنس

ذكر ☐ **أنثى** ☐

1.2 الفئه العمريه بالسنوات

☐ 22-18 سنه

☐ 26-23 سنه

☐ فوق 26 سنه

1.3 في أي كليه تدرس؟

☐ علوم التربيه وأعداد المعلمين

☐ العلوم الأنسانيه والدينيه

☐ الفنون الجميله والتطبيقيه

☐ مهن الخدمات

☐ الحقوق

☐ العلوم الأجتماعيه والسلوكيه

☐ التجاره واداره الأعمال

☐ الاتصال الجماهيري والتوثيق

☐ التربيه الرياضيه

☐ العلوم الطبيعيه

☐ الرياضيات والحاسوب

☐ الطب

☐ طب الأسنان

☐ صيدله

☐ العلوم الطبيه المساعده

☐ الهندسه

☐ الهندسه المعماريه وتخطيط المدن

☐ الزراعه

☐ الطب البيطري

1.4 في اي سنه دراسيه انت الأن

- ☐ سنه اولى
- ☐ سنه ثانيه
- ☐ سنه ثالثه
- ☐ سنه رابعه
- ☐ سنه خامسه
- ☐ سنه سادسه
- ☐ سنه سابع
- ☐ سنه ثامنه
- ☐ اكثرمن ذلك

1.5 هل استخدت النقال لاسباب اكاديميه او تعليميه

☐ **نعم** ☐ **لا**

1.6 مانوع جهاز النقال الذي تملكه؟

- ☐ **الحاسب النقال (لابتوب)**
- ☐ **المساعد الرقمي الشخصي**
- ☐ **الهواتف النقاله الاسلكيه**
- ☐ **غير ذلك,الرجاء كتابته________________________________**

1.7 مده خبرتك باستخدام النقال ؟

- ☐ **لايوجد**
- ☐ **اقل من سنه**
- ☐ **1-3 سنوات**
- ☐ **4-6 سنوات**
- ☐ **اكثر من 6 سنوات**

1.3 معدل الوقت في استخدامك للنقال في اليوم ؟

	التعلم/التعليم	العاب/موسيقى	(بريد الكتروني /مواقع) الانترنت	الرسائل	المحادثه
لا يوجد	☐	☐	☐	☐	☐
اقل من ساعه واحده	☐	☐	☐	☐	☐
1-3 ساعه	☐	☐	☐	☐	☐
4-6 ساعه	☐	☐	☐	☐	☐
اكثر من 6 ساعا ت	☐	☐	☐	☐	☐

القسم الثاني:

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
من الضروري ان تكون متطلبات وتعليمات الدراسه موضحه بشكل دقيق, وبذلك يعرف الطلاب ما هو متوقع منهم.	1	2	3	4	5
من الأفضل الدراسه في الجامعه ذات المعايير والأنظمه المحدده.	1	2	3	4	5
الأنظمه والقوانين مهمه لانها تبين للطلاب ماذا تتوقع الجامعه منهم.	1	2	3	4	5
على الطلاب تجنب اجراء تغييرات لان الأمور يمكن تزداد سوءا	1	2	3	4	5
على المحاضر ان يكون حذر بحيث لا يسأل طلابه عن ارائهم بشكل مستمر, لان ذلك ربما يظهر ضعفه و عدم جدارته.	1	2	3	4	5
على المحاضرين اتخاذ القرارات دون الرجوع الى طلابهم.	1	2	3	4	5
على الطلاب عدم مناقشه قرارات محاضريهم.	1	2	3	4	5
على الطلاب احترام محاضيرهم.	1	2	3	4	5
على الطلاب عدم اظهار اختلاف الراي مع محاضريهم.	1	2	3	4	5
من المستحسن ان يسلك الطلاب التخصصات المهنيه بينما تسلك الطالبات التخصصات الاكاديميه.	1	2	3	4	5
الطلاب الاناث لا يعطون قيمة للتعزيز و التميز مثل نظائرهم من الذكور.	1	2	3	4	5
من المفضل ان تكون تخصصات الطلاب الذكور مختلفة عن الاناث.	1	2	3	4	5
بعض المجالات الدراسية يكون فيها اداء الذكور افضل من الاناث.	1	2	3	4	5
الانجاز على مستوى الفرد ليس مهما مثل الانجاز على مستوى الجماعة.	1	2	3	4	5
النجاح الجماعي اهم من النجاح الفردي.	1	2	3	4	5
قبولك كعضو في المجموعة يعتبر اكثر اهمية من الحصول على الاستقلالية في التعلم.	1	2	3	4	5
تعزيز الولاء و الشعور بالمسؤلية لدى الطلاب من قبل الماحاضر يعتبر اكثر اهمية من تعزيز المبادرة الفردية.	1	2	3	4	5
من المهم وجود احساس في التعلم.	1	2	3	4	5
الاستقرار الشخصي لا يشكل خطرا على النجاح في التعلم.	1	2	3	4	5
احترام الاعراف يعيق الاداء.	1	2	3	4	5
دعم الصورة الشخصية للفرد يحدث فرقا ضئيلا في تحقيق الاهداف.	1	2	3	4	5

القسم الثالث

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
تطبيق التعلم عن طريق النقال يجعلني واثقا من جامعتي.	1	2	3	4	5
جامعتي صادقة معي.	1	2	3	4	5
جامعتي تتمتع بسمعة طيبة.	1	2	3	4	5
اشعر بالولاء لجامعتي.	1	2	3	4	5
تسعدني الجهود التي تبذلها جامعتي تجاه الطلاب المنتظمين مثلي	1	2	3	4	5
انا راضٍ عن علاقتي بجامعتي.	1	2	3	4	5
جامعتي تلتزم بالعهود و المواثيق .	1	2	3	4	5
بشكل عام, انا اثق بجامعتي.	1	2	3	4	5
اتوقع ان استخدم النقال للوصول الى جامعتي سيكون له نفس اداءاستخدام التكنولوجيا الأخرى مثل التعلم الألكتروني .	1	2	3	4	5
اتوقع استخدام الهاتف النقال في جامعتي سوف يكون متوفر للاستخدام دون توقف لخدمة.	1	2	3	4	5
انني واثق ان استخدام النقال للوصول لجامعتي سوف يكون جدير بالثقه مثلما اتوقع.	1	2	3	4	5
اعتقد ان استخدام النقال للوصول لجامعتي لديه القدرة لتقديم مستوى مرغوب به من الخدمات في اوقات الشدة مثل الكوارث الطبيعية.	1	2	3	4	5
انني واثق من ان النقال سوف يقوم بتأدية المهام مثل التسجيل والأطلاغ على النتائج و كذلك معرفة التعينات.	1	2	3	4	5

القسم الرابع

	لا اوافق بشد	لا اوافق	محايد	موافق	موافق بشده
كي يكون التعلم عن طريق النقال فعالاً, من المهم ان أنجز دراستي في وقت ملائم بالنسبة لي.	1	2	3	4	5
كي يكون التعلم عن طريق النقال فعالاً, من المهم ان أنجز دراستي في اي مكان.	1	2	3	4	5
كي يكون التعلم عن طريق النقال فعالاً, من المهم ان تزودني بشئ مفيد في تأديه دراستي.	1	2	3	4	5
كي يكون نظام التعلم عن طريق النقال فعالاً , من المهم ان تكون الشاشات جذابة.	1	2	3	4	5
كي يكون التعلم عن طريق النقال فعالاً, يجب على الشاشات ان تكون ملونة ويوجد فيها صور و كذلك تنوع في الخطوط.	1	2	3	4	5
كي يكون التعلم عن طريق النقال فعالاً , يجب ان توفرالشاشات تصميما رائعاً.	1	2	3	4	5
كي يكون التعلم عن طريق النقال فعالاً, يجب على الشاشات ان توفر قائمة للموقع بتصميم جيد.	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً, يجب ان تكون الخدمات دقيقة (لايوجد أخطاء).	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً, يجب ان تكون الخدمة المقدمة موثوق بها.	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً, يجب على الخدمات ان تكون سريعة بشكل مرضي (تحميل سريع) .	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً , يجب ان يكون المحتوى سهل النقل.	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً, يجب ان يكون المحتوى مفهوما وواضحا.	1	2	3	4	5
كي يكون التعلم بواسطة الهاتف النقال فعالاً, يجب على المحتوى ان يكون جديداً(التجديد).	1	2	3	4	5
يجب ان تكون خدمات التعلم عن طريق النقال مخصصة كي اتحكم في مواصلتي للتعلم.	1	2	3	4	5
يجب ان تكون خدمات التعلم عن طريق النقال مخصصة كي اختار ما اريد ان اتعلمه.	1	2	3	4	5
يجب ان تكون خدمات التعلم عن طريق النقال مخصصة كي الاحظ ادائي و تقدمي في التعلم.	1	2	3	4	5
يجب ان تكون خدمات التعلم عن طريق النقال مخصصة كي تقدم دعما للتعلم.	1	2	3	4	5
يجب ان تكون خدمات التعلم عن طريق النقال مخصصة كي تلبي احتياجاتي.	1	2	3	4	5
أود ان لا اكون قلقا بخصوص الأمان عند استخدام النقال للتعلم.	1	2	3	4	5
أود ان لا اكون قلقا بخصوص حمايه خصوصيتي عند استخدام النقال للتعلم.	1	2	3	4	5

القسم الخامس:

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
من المرجح ان اجد التعلم النقال سهل الاستخدام.	1	2	3	4	5
من المرجح ان الامر سيكون سهلا لي حتى اصبح محترفاً في استخدام التعلم النقال.	1	2	3	4	5
من المرجح ان اجد تفاعلي مع التعلم بواسطة النقال واضحا و مفهوما.	1	2	3	4	5
من المرجح ان اجد التعلم النقال مرنا كي اتفاعل معه.	1	2	3	4	5
من المرجح ان اجد الامر سهلا عبرالتعلم النقال لاجد ما اريد تؤديته.	1	2	3	4	5

القسم السادس:

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
عند استخدام التعلم النقال من المرجح انه سيكون مفيدا لي في حياتي الاكاديمية.	1	2	3	4	5
عند استخدام التعلم النقال من المرجح انه سيمكنني من المهام التعلمية بسرعة.	1	2	3	4	5
عند استخدام التعلم النقال في حياتي الأكاديميه من المرجح انه سوف يزيد عميلة الانتاج لدي(القيام بعده اعمال).	1	2	3	4	5
عند استخدام التعلم النقال من المرجح انه سيعزز الفاعلية في حيلتي الاكاديميه (تأدية المهام بشكل افضل).	1	2	3	4	5
عند استخدام التعلم النقال من المرجح	1	2	3	4	5

القسم السا بع:

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
استخدام التعلم النقال يعتبر فكرة جيدة.	1	2	3	4	5
احب فكره استخدام التعلم النقال	1	2	3	4	5
استخدام التعلم النقال سيكون ممتعا.	1	2	3	4	5
لا احب فكره استخدام التعلم النقال	1	2	3	4	5
استخدام التعلم النقال سيكون غير ممتعا.	1	2	3	4	5

القسم الثامن:

	لا اوافق بشده	لا اوافق	محايد	موافق	موافق بشده
انوي استخدام التعلم النقال في حياتي الاكاديمية.	1	2	3	4	5
ساكون سعيدا عند استخدام التعلم النقال.	1	2	3	4	5
انوي استخدام التعلم النقال كثيراً.	1	2	3	4	5
سأوصي الاخرين باستخدام التعلم النقال.	1	2	3	4	5

القسم التاسع:

اذا كان لديك اي تعليق اخر نرجو منك كتابته هنا

شكراً لك على الوقت الذي بذلته لأتمام هذا الأستبيان

Appendix C

Final Questionnaire

SURVEY QUESTIONNAIRE

MOBILE LEARNING ACCEPTANCE IN JORDANIAN HIGHER EDUCATION INSTITUTIONS

Thank you for showing an interest in this research project. Please read this information sheet carefully before deciding whether or not you wish to participate. Participation in the study is entirely up to you.

Purpose: I am conducting a survey as partial fulfillment of the requirements for the degree of Doctor of Philosophy in Information Technology at the University Utara Malaysia. The website is "www.uum.edu.my".

Definition**:** Mobile Learning (m-learning), for this research project, refers to anywhere, anytime access to educational and university services such as course registration, result, time table and my courses through the use of mobile technology, whether connected or disconnected from the network.

Instructions**:**
Please read the information sheet before completing survey.
Select the answer that best reflects your views. Answer all questions as honestly as possible. There are no correct or best answers.
For all questions please mark (X) in the appropriate box unless instructed to do otherwise. Please indicate the degree to which you agree or disagree with statement base on 5-point Likert scale (1=Strongly Disagree (SD), 2= Disagree (D), 3= Neutral (N), 4= Disagree (D) 5= Strongly Agree (SA)

Section 1: Student Demographics

1.1 Your Gender (sex): **Female** ☐ **Male** ☐

1.2 What age group are you in?

18-22 years ☐

23-26 years ☐

Over 26 years ☐

1.3 In what colleges are you enrolled?

☐ Education Sc & Teacher Training
☐ Humanities & Religion
☐ Fine and Applied Arts
☐ Service Trades
☐ Law
☐ Social Behavior Science
☐ Commercial and Business
☐ Mass communication & Documentation
☐ Physical Education
☐ Natural Science
☐ Mathematics & Computer Science
☐ Medicine
☐ Dentistry
☐ Pharmacy
☐ Para-Medical Science
☐ Engineering
☐ Agriculture
☐ Architecture & Town Planning
☐ Veterinary Medicine

1.4 In which academic year are you now?

- ☐ First year
- ☐ Second year
- ☐ Third year
- ☐ Fourth year
- ☐ Fifth year
- ☐ Sixth year
- ☐ Seventh year
- ☐ Eighth year
- ☐ More than

1.5 Have you used mobile device(s) for learning or educational purposes?

Yes ☐ **No** ☐

1.6 What type of mobile device(s) you own?

- ☐ Mobile wireless computer (laptop).
- ☐ Personal Digital Assistants (PDAs).
- ☐ Mobile wireless phones.
- ☐ Other, please state_______________

1.7 Experience using mobile devices?

- ☐ N/A
- ☐ Less than 1 year
- ☐ 1-3 years
- ☐ 4-6 years
- ☐ More than 6 years

1.8 Average amount of time spent on your mobile device(s) on a daily basis?

Conversation	Messaging	Internet (Web/Email)	Games/Music	Learning/Education	
☐	☐	☐	☐	☐	N/A
☐	☐	☐	☐	☐	Less than 1 hour
☐	☐	☐	☐	☐	1-3 hours
☐	☐	☐	☐	☐	4-6 hours
☐	☐	☐	☐	☐	More than 6

Section 2

	SD	D	N	A	SA
It is important to have study requirements and instructions spelled out in detail so that students always know what they are expected to do.	1	2	3	4	5
It is better to study in a university with specific rules and regulations.	1	2	3	4	5
Rules and regulations are important because they inform students what the university expects of them.	1	2	3	4	5
Students should avoid making changes because things could get worse.	1	2	3	4	5
Lecturer should be careful not to ask the opinions of students too frequently, otherwise the lecturer might appear to be weak and incomplete	1	2	3	4	5
Lecturers should make most decisions without consulting students.	1	2	3	4	5
Students should not question their lecturer's decisions.	1	2	3	4	5
Students should pay high respect for their lecturers.	1	2	3	4	5
Students should not show their disagreement to their lecturers.	1	2	3	4	5
It is advisable for male students to pursue their study in vocational fields while females to pursue their study in academic ones.	1	2	3	4	5
Female students do not value recognition and promotion in their learning as much as male students do.	1	2	3	4	5
It is preferable for male students to have majors different from females.	1	2	3	4	5
There are some study fields that male students can always perform better than female students.	1	2	3	4	5
Individual achievement is not as important as group achievement.	1	2	3	4	5
Group success is more important than individual success.	1	2	3	4	5
Being accepted as a member of a group is more important than having autonomy and independence on learning.	1	2	3	4	5
It is more important for a lecturer to encourage loyalty and a sense of responsibility in students than it is to encourage individual initiative.	1	2	3	4	5
It is important to have a conscience in learning.	1	2	3	4	5
Personal stability is not critical to success in education.	1	2	3	4	5
Respect for tradition hampers performance in the education environment.	1	2	3	4	5

Section 3

	SD	D	N	A	SA
The performance of mobile learning implementations makes me confident in my university.	**1**	**2**	**3**	**4**	**5**
My university is honest with me.	**1**	**2**	**3**	**4**	**5**
My university has a good reputation.	**1**	**2**	**3**	**4**	**5**
I feel loyal towards my university.	**1**	**2**	**3**	**4**	**5**
I am happy about the efforts my university is making towards a regular student like me.	**1**	**2**	**3**	**4**	**5**
I am satisfied with the relationship I have with my university.	**1**	**2**	**3**	**4**	**5**
My university is one that keeps promises and commitments.	**1**	**2**	**3**	**4**	**5**
Overall, I trust my university.	**1**	**2**	**3**	**4**	**5**
I expect that using the mobile to access my university will perform as well as other technologies which include as e-learning.	**1**	**2**	**3**	**4**	**5**
I expect that using the mobile to access my university will be available without interruption of service.	**1**	**2**	**3**	**4**	**5**
I think that when I use the mobile to access my university, it has the capability to provide a desired level of service in adverse or hostile conditions (e.g., natural disaster)	**1**	**2**	**3**	**4**	**5**
I trust the mobile to do functions such as (registration, results, assignments.....).	**1**	**2**	**3**	**4**	**5**

Section 4

	SD	D	N	A	SA
For m- learning to be effective it is important to accomplish my studies at a time that is convenient for me	1	2	3	4	5
For m- learning to be effective it is important to perform my studies any place	1	2	3	4	5
For m- learning to be effective it is important to provide me with convenience in performing my studies	1	2	3	4	5
For m-learning to be effective it is important to increase access to learning and education.	1	2	3	4	5
For m-learning system to be effective it is important for the interface design to provide me visually appealing features.	1	2	3	4	5
For m-learning to be effective it is important for the interface design to provide site colors, graphics, and fonts.	1	2	3	4	5
For m-learning to be effective it is important for the interface design to provide a good page layout.	1	2	3	4	5
For m-learning to be effective it is important for the interface design to provide a well designed site menus.	1	2	3	4	5
For m-learning to be effective it is important for the service to be accurate (error free).	1	2	3	4	5
For m-learning to be effective it is important for the service to be reliable.	1	2	3	4	5
For m-learning to be effective it is important for the service to be adequately fast (fast download).	1	2	3	4	5
For m-learning to be effective it is important for the content to be easy to navigate.	1	2	3	4	5
For m-learning to be effective it is important for the content to be understandable	1	2	3	4	5
For m-learning to be effective it is important for the content to be current (up to date).	1	2	3	4	5
It is important that m-learning services are personalized to control my learning progress	1	2	3	4	5
It is important that m-learning services are personalized to choose what I want to learn.	1	2	3	4	5
It is important that m-learning services are personalized to record my learning progress and performance.	1	2	3	4	5
It is important that m-learning services are personalized to understand my needs.	1	2	3	4	5
I would likely not be worried about security when using m-learning.	1	2	3	4	5
I trust the ability of the university to protect my privacy.	1	2	3	4	5

Section 5

	SD	D	N	A	SA
I would likely find m-learning easy to use.	**1**	**2**	**3**	**4**	**5**
It would likely be easy for me to become skillful at using m-learning.	**1**	**2**	**3**	**4**	**5**
I would likely find my interaction with m-learning to be clear and understandable.	**1**	**2**	**3**	**4**	**5**
I would likely find m-learning flexible to interact with.	**1**	**2**	**3**	**4**	**5**
I would likely find it easy to get m-learning to do what I want it to do.	**1**	**2**	**3**	**4**	**5**

Section 6

	SD	D	N	A	SA
Using m-learning would likely be useful in my academic life.	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely enable me to accomplish learning tasks more quickly.	**1**	**2**	**3**	**4**	**5**
Using m-learning in my academic life would likely increase my productivity (do more things).	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely enhance my effectiveness in my academic life (do things better and smarter).	**1**	**2**	**3**	**4**	**5**
Using m-learning would likely improve my academic life performance.	**1**	**2**	**3**	**4**	**5**

Section 7

	SD	D	N	A	SA
Using the mobile learning is a good idea.	**1**	**2**	**3**	**4**	**5**
I like the idea of using the mobile learning.	**1**	**2**	**3**	**4**	**5**
Using the mobile learning would be pleasant.	**1**	**2**	**3**	**4**	**5**
I dislike the idea of using the mobile learning.	**1**	**2**	**3**	**4**	**5**

Section 8

	SD	D	N	A	SA
I intend to use m-learning in my academic life.	**1**	**2**	**3**	**4**	**5**
I would enjoy using m-learning.	**1**	**2**	**3**	**4**	**5**
I intend to use m-learning frequently.	**1**	**2**	**3**	**4**	**5**
I would recommend that others use m-learning	**1**	**2**	**3**	**4**	**5**

Section 9

We will appreciate any comments you can give about this study below.

Thank you for your time, feedback and effort in completing this questionnaire

APPENDIX D

The number of original adapted items, Reliability coefficients and its sources

Construct	Sources	No. of Item Befor Realiabilty	No. of Item After Realiabilty	Final Reliability
Culture Factor (CF)	Hofstede, G. (1991) Linjun, H.(2003)	21	20	0.838
Trust Factor (TF)	Al-Sukkar (2005)	13	12	0.906
Technology Service Quality (TSQ)	Al-Mushasha (2008) Akour (2009)	21	20	0.718
Perceive Usefulness (PU)	Davis (1989) Venkatesh & Davis (1996) Akour (2009)	5	5	0.812
Perceive Ease of Use (EoU)	Davis (1989) Venkatesh & Davis (1996) Akour (2009)	5	5	0.844
Attitude Toward Using (ATU)	Davis et al. (1989) Bagozzi et al. (1992) Al-Sukkar (2005)	5	4	0.861
Behavioral Intention (BI)	Venkatesh & Davis (1996) Bagozzi et al. ,1992 Akour (2009)	4	4	0.914

APPENDIX E

Descriptive Statistics (Skewness and Kurtosis)

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
UA1	395	.496	.123	-.299	.245
UA2	395	.550	.123	-.117	.245
UA3	395	.652	.123	-.140	.245
UA4	395	.526	.123	-.222	.245
PD1	395	-.644	.123	-.062	.245
PD2	395	-.912	.123	1.037	.245
PD3	395	-.606	.123	.156	.245
PD4	395	-1.087	.123	1.634	.245
PD5	395	-.635	.123	-.275	.245
MF1	395	-.571	.123	-.722	.245
MF2	395	-.073	.123	-1.146	.245
MF3	395	-.611	.123	-.800	.245
MF4	395	-1.223	.123	1.044	.245
IC1	395	.121	.123	-.384	.245
IC2	395	.128	.123	-.328	.245
IC3	395	.485	.123	-.817	.245
IC4	395	.158	.123	-.303	.245
LST1	395	-.136	.123	-.422	.245
LST2	395	-.051	.123	-.781	.245
LST3	395	-.497	.123	-.022	.245
TU1	395	-.727	.123	-.154	.245
TU2	395	-.743	.123	-.136	.245
TU4	395	-.626	.123	-.175	.245
TU5	395	-1.072	.123	.554	.245
TU3	395	-.793	.123	.018	.245
TU6	395	-.634	.123	-.114	.245
TU7	395	-.924	.123	.807	.245
TU8	395	-1.028	.123	.844	.245
TM1	395	-.747	.123	-.155	.245
TM2	395	-.636	.123	-.578	.245
TM3	395	-.644	.123	-.486	.245
TM4	395	-.981	.123	.549	.245
AC1	395	-.583	.123	-.476	.245
AC2	395	-.743	.123	-.317	.245
AC3	395	-1.276	.123	1.295	.245
AC4	395	-.698	.123	-.318	.245
ID1	395	-1.231	.123	2.259	.245
ID2	395	-1.125	.123	1.483	.245
ID3	395	-.863	.123	-.249	.245
ID4	395	-.907	.123	.190	.245
RS1	395	-.380	.123	-.686	.245
RS2	395	-.759	.123	-.408	.245

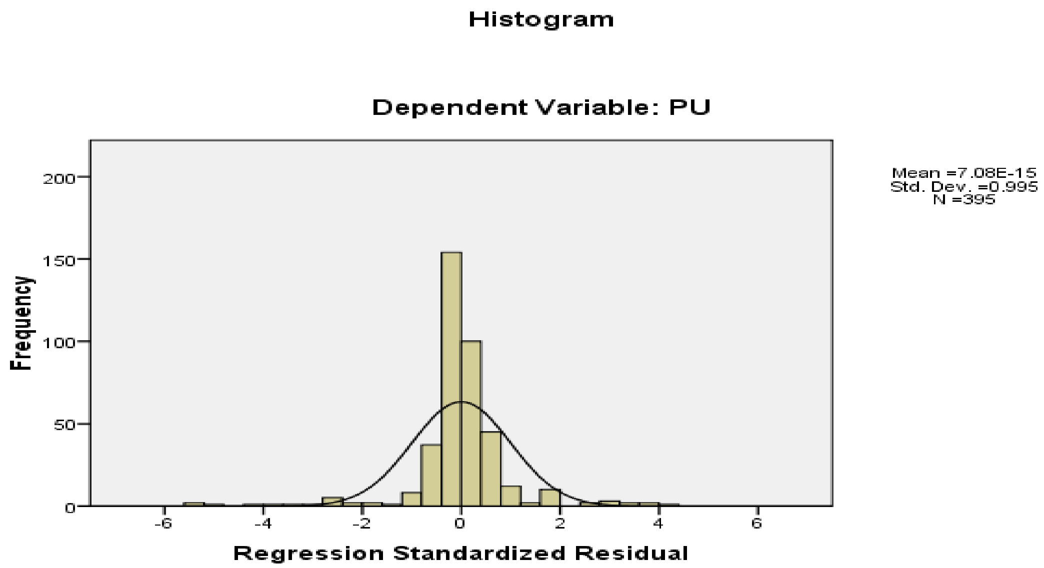
RS3	395	-.870	.123	-.069	.245
CQ1	395	.028	.123	-.552	.245
CQ2	395	.108	.123	-.778	.245
CQ3	395	-.951	.123	1.431	.245
P1	395	-.410	.123	-.602	.245
P2	395	-.284	.123	-.484	.245
P3	395	-.449	.123	-.239	.245
P4	395	-.374	.123	-.619	.245
PS1	395	-.518	.123	-.892	.245
PS2	395	-.543	.123	-.767	.245
PU1	395	-.391	.123	-1.260	.245
PU2	395	-.373	.123	-.984	.245
PU3	395	-.244	.123	-1.104	.245
PU4	395	-.216	.123	-.961	.245
PU5	395	-.446	.123	-1.315	.245
PEOU1	395	-.348	.123	-1.263	.245
PEOU2	395	-.388	.123	-.963	.245
PEOU3	395	-.282	.123	-1.106	.245
PEOU4	395	-.214	.123	-.973	.245
PEOU5	395	-.417	.123	-1.317	.245
Attitude1	393	-.434	.123	-.547	.246
Attitude2	395	-.632	.123	.102	.245
Attitude3	395	-.474	.123	-.093	.245
Attitude4	395	-.127	.123	-.752	.245
Behavioral intintion1	395	-.483	.123	-.560	.245
Behavioral intintion2	395	-.662	.123	.086	.245
Behavioral intintion3	395	-.582	.123	-.145	.245
Behavioral intintion4	395	-.335	.123	-.370	.245
Valid N (listwise)	393				

APPENDIX F

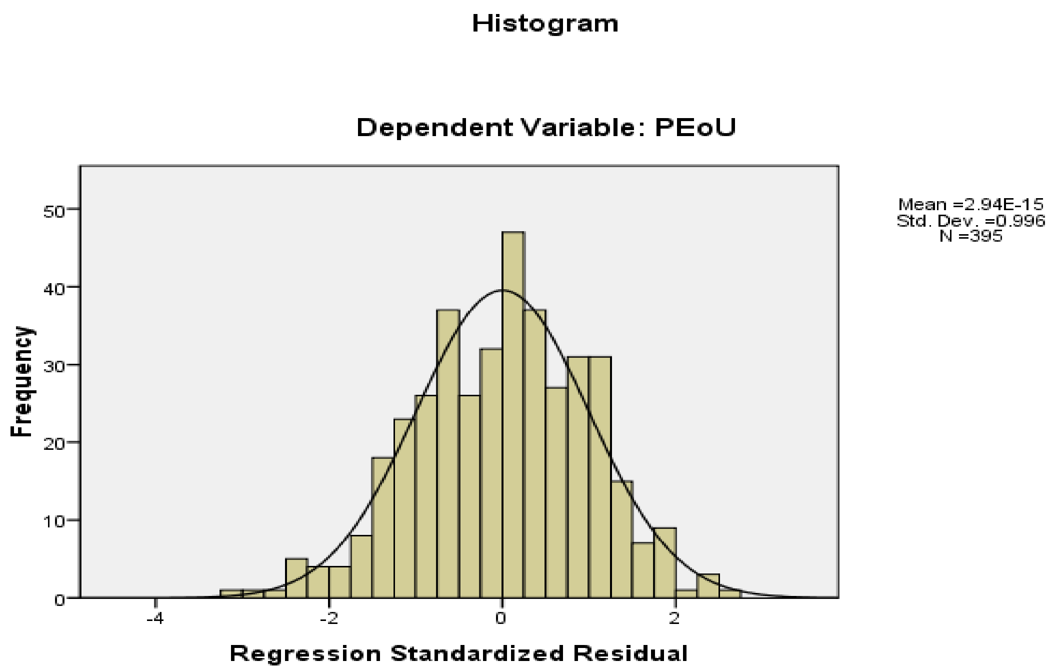
Regression Analysis Assumption Tests

Appendix F.1: Normality assumption

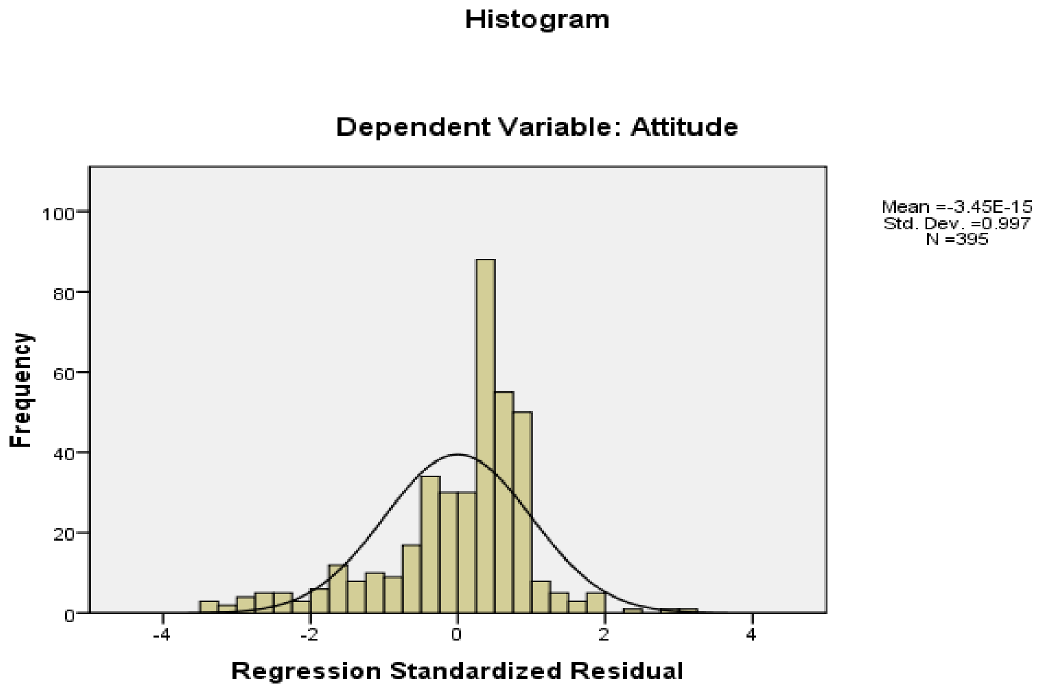
Dependent Variable Perceive Usefulness (PU)



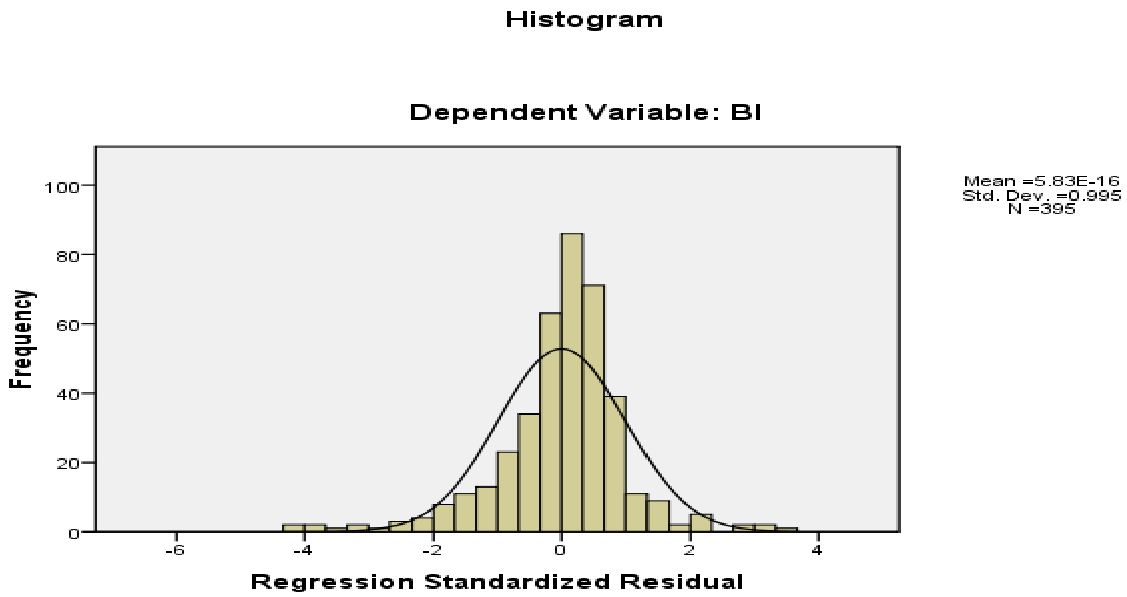
Dependent Variable Perceive Ease of Use (PEoU)



Dependent Variable Attitude Toward Use (ATU)



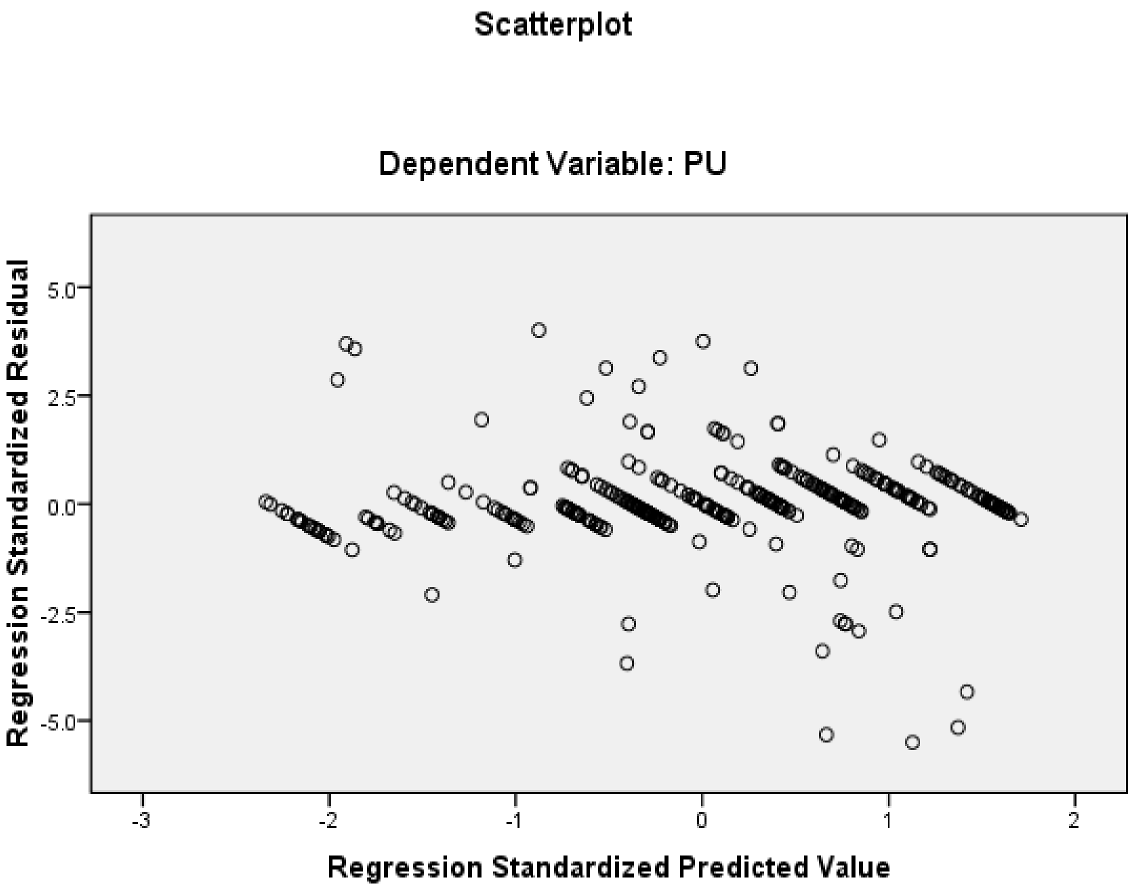
Dependent Variable Behavior al Intention (BI)



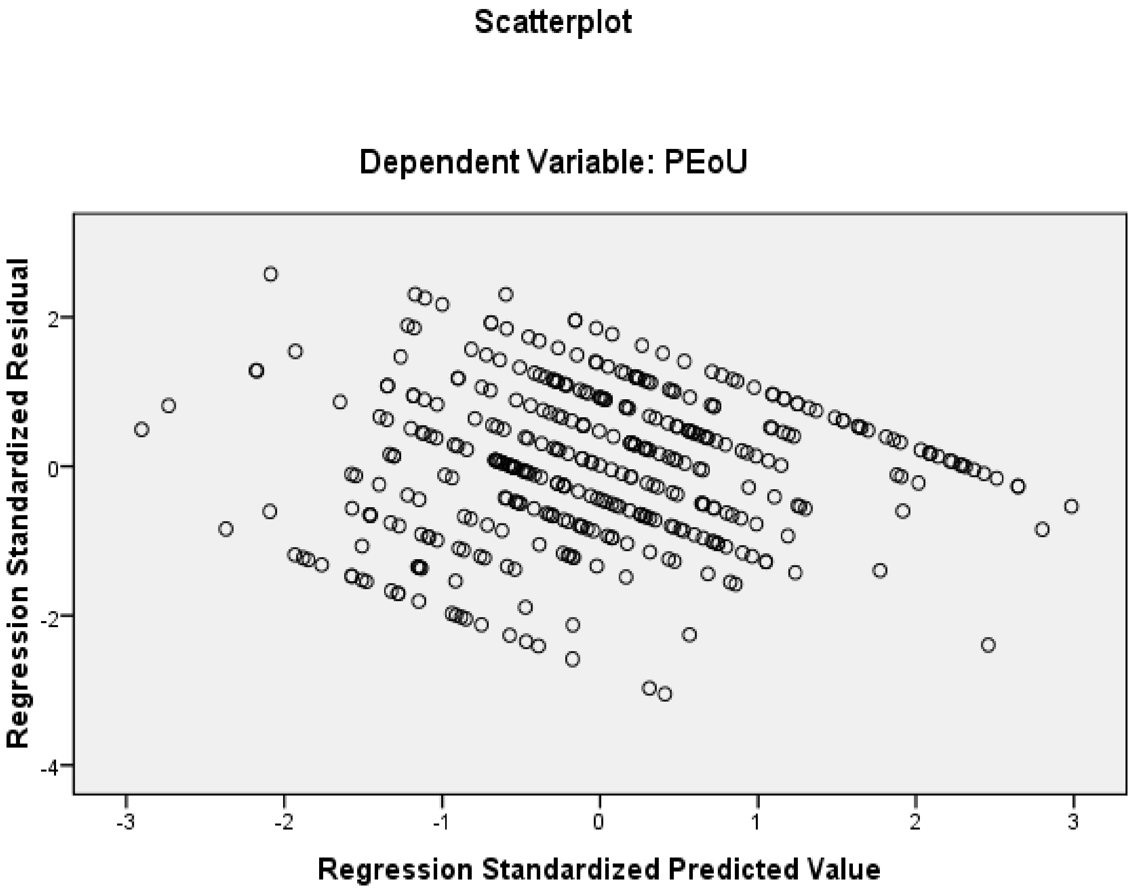
Appendix F.2

Homoscadasticity Assumption

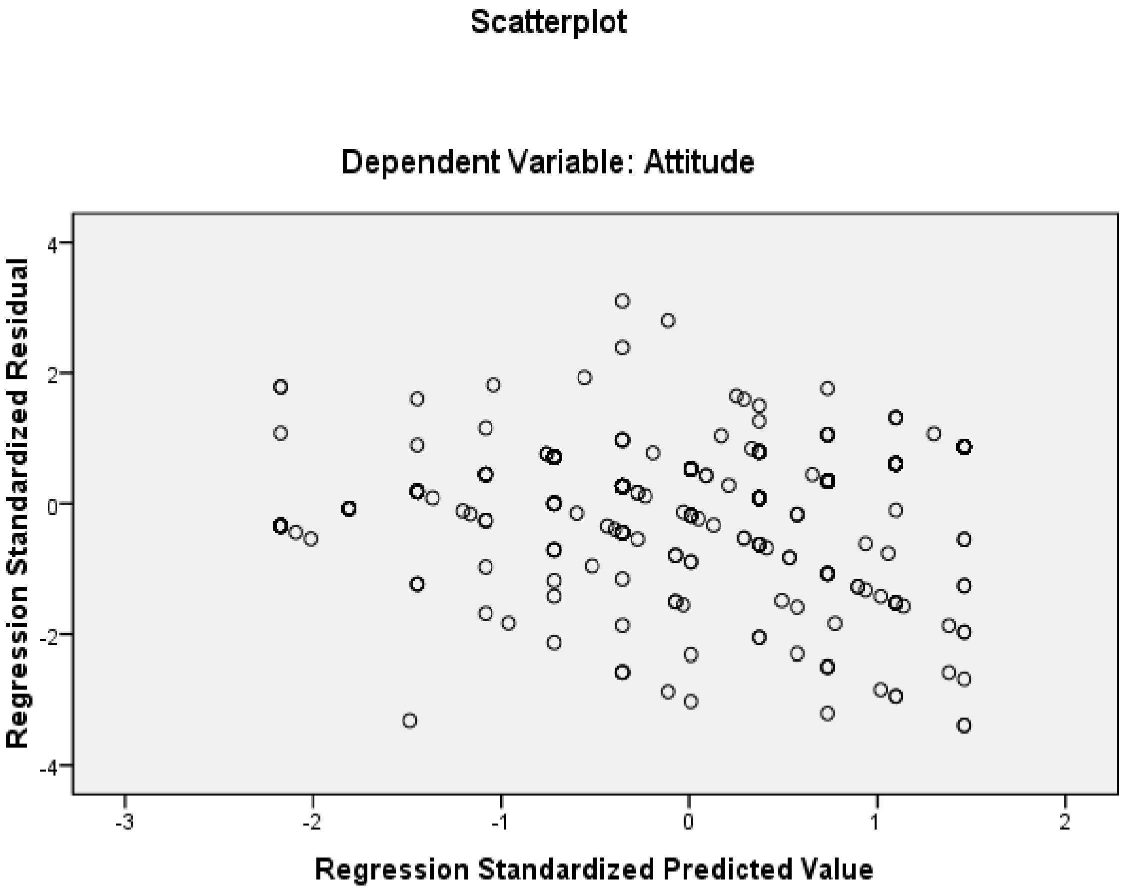
Dependent Variable Perceive Usefulness (PU)



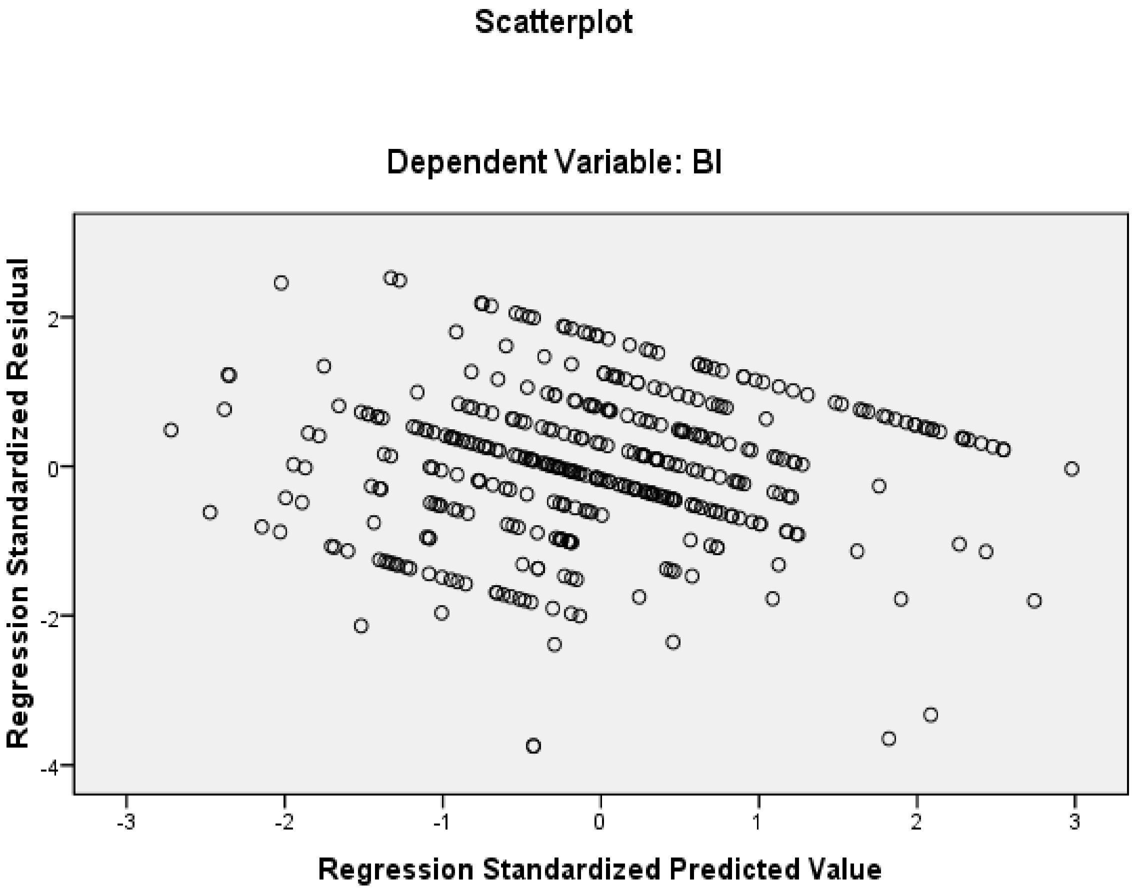
Dependent Variable Perceive Ease of Use (PEoU)



Dependent Variable Attitude Toward Use (ATU)



Dependent Variable Behavior al Intention (BI)



Appendix F.3: Multicollinearity tests

Dependent Variable Perceive Usefulness (PU)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.018	.114		-.156	.876					
	Culture	.063	.028	.053	2.280	.023	.536	.115	.044	.688	1.453
	Trust	.069	.015	.094	4.562	.000	.358	.225	.088	.879	1.138
	TSQ	.057	.029	.044	1.964	.050	.454	.099	.038	.761	1.314
	PEoU	.839	.025	.842	34.092	.000	.917	.865	.659	.612	1.635

a. Dependent Variable: PU

Tolerance and VIF values are within the specified limits. No collinearity exits.

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Culture	Trust	TSQ	PEoU
1	1	4.946	1.000	.00	.00	.00	.00	.00
	2	.029	12.978	.01	.01	.89	.04	.01
	3	.011	21.554	.15	.58	.02	.22	.08
	4	.008	24.237	.14	.36	.00	.00	.78
	5	.006	28.963	.70	.06	.08	.73	.13

a. Dependent Variable: PU

Dependent Variable Perceive Ease of Use (PEoU)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.647	.231		2.800	.005	.193	1.102					
	Culture	.431	.052	.362	8.219	.000	.328	.534	.524	.384	.325	.807	1.239
	Trust	.128	.030	.173	4.195	.000	.068	.188	.293	.208	.166	.919	1.089
	TSQ	.420	.055	.322	7.607	.000	.311	.528	.459	.359	.301	.874	1.145

a. Dependent Variable: PEoU

Tolerance and VIF values are within the specified limits. No collinearity exits.

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Variance Proportions Culture	Variance Proportions Trust	Variance Proportions TSQ
1	1	3.955	1.000	.00	.00	.00	.00
	2	.028	11.782	.02	.02	.90	.07
	3	.010	19.501	.08	.97	.03	.21
	4	.006	25.389	.90	.01	.07	.72

a. Dependent Variable: PEoU

Dependent Variable Attitude Toward Use (ATU)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.761	.137		5.547	.000	.491	1.031					
	PU	.612	.080	.612	7.650	.000	.455	.769	.773	.360	.244	.158	6.316
	PEoU	.175	.080	.176	2.194	.029	.018	.332	.737	.110	.070	.158	6.316

a. Dependent Variable: Attitude

Tolerance and VIF values are within the specified limits. No collinearity exits

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	PU	PEoU
1	1	2.987	1.000	.00	.00	.00
	2	.011	16.361	1.00	.04	.04
	3	.001	45.615	.00	.96	.96

a. Dependent Variable: Attitude

Dependent Variable Behavior al Intention (BI)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.714	.168		4.258	.000	.384	1.044					
	PU	.207	.060	.190	3.457	.001	.089	.324	.629	.172	.120	.402	2.486
	Attitude	.618	.060	.568	10.341	.000	.501	.736	.714	.463	.360	.402	2.486

a. Dependent Variable: BI

Tolerance and VIF values are within the specified limits. No collinearity exits

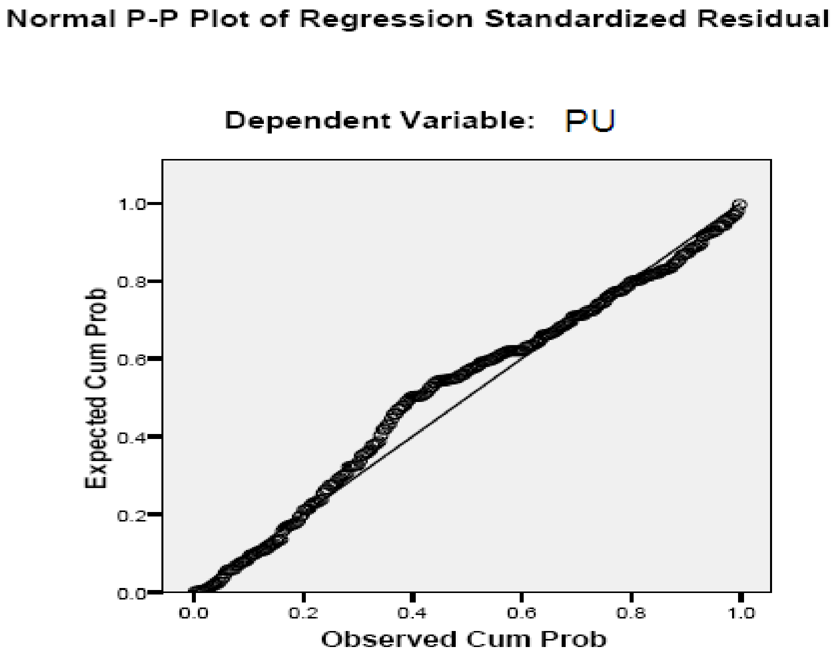
Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Variance Proportions PU	Variance Proportions Attitude
1	1	2.985	1.000	.00	.00	.00
	2	.011	16.751	.99	.09	.14
	3	.004	27.154	.01	.91	.86

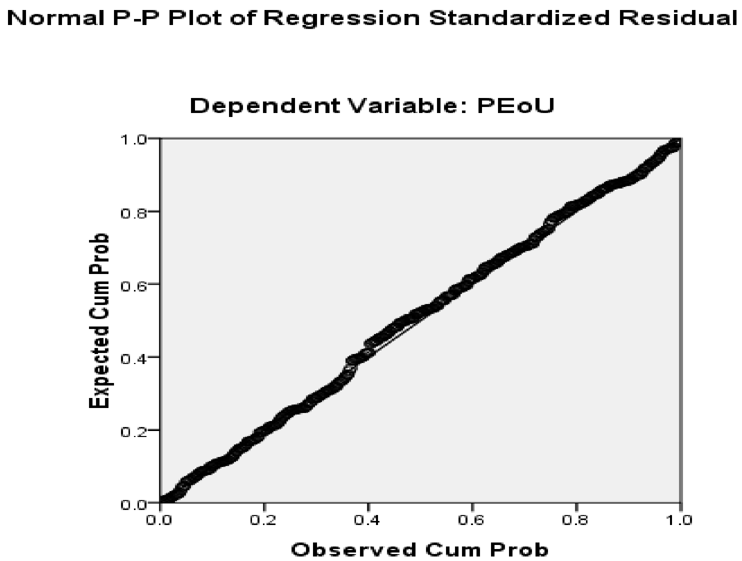
a. Dependent Variable: BI

Appendix F.4: Linearity Tests

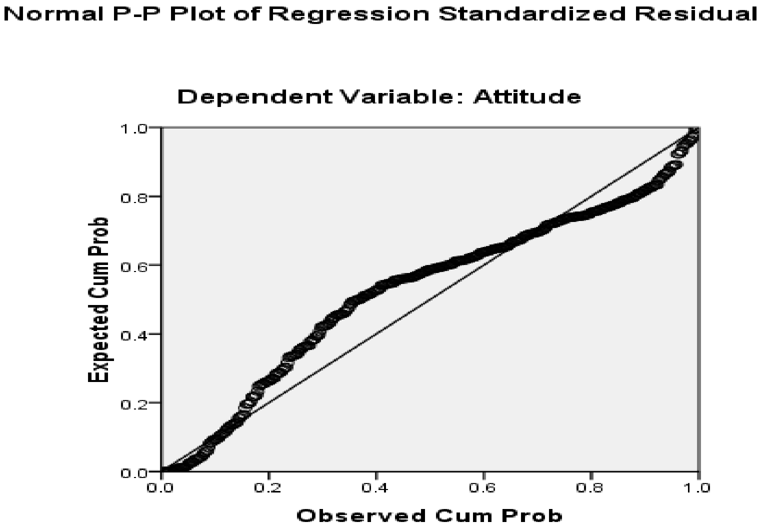
Dependent Variable Perceive Usefulness (PU)



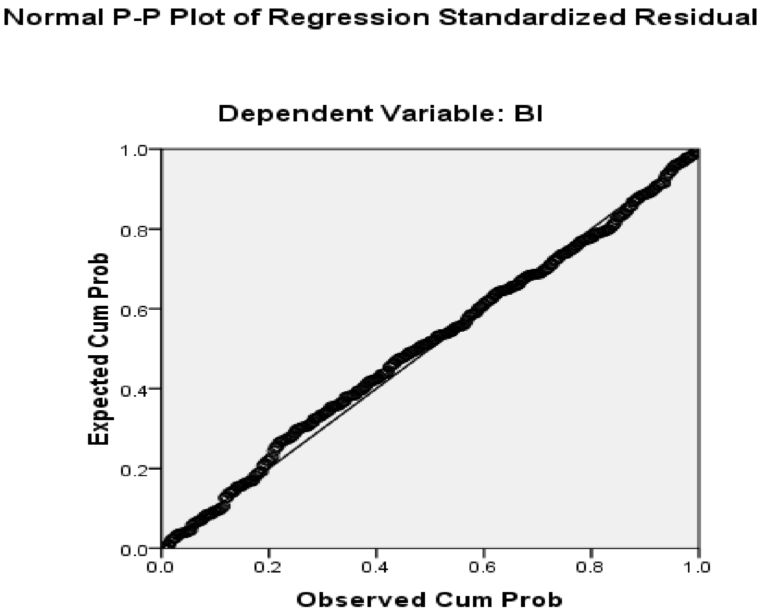
Dependent Variable Perceive Ease of Use (PEoU)



Dependent Variable Attitude Toward Use (ATU)



Dependent Variable Behavior al Intention (BI)



APPENDIX G

Group Analysis

ANOVA test of PDA ownership vs. behavioral intention(BI)

Test of Homogeneity of Variances

BI

Levene Statistic	df1	df2	Sig.
.095	1	393	.758

ANOVA

BI

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.262	1	.262	.711	.400
Within Groups	144.957	393	.369		
Total	145.219	394			

ANOVA test of PDA ownership vs. perceive usefulness (PU)

Test of Homogeneity of Variances

PU

Levene Statistic	df1	df2	Sig.
1.506	1	393	.221

ANOVA

PU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.020	1	.020	.063	.802
Within Groups	122.614	393	.312		
Total	122.634	394			

ANOVA test of PDA ownership vs. perceive ease of use (PEOU)

Test of Homogeneity of Variances

PEOU

Levene Statistic	df1	df2	Sig.
.951	1	393	.330

ANOVA

PEOU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.141	1	.141	.448	.504
Within Groups	123.289	393	.314		
Total	123.430	394			

ANOVA test of mobile wireless computer ownership vs. behavioral intention(BI)

Test of Homogeneity of Variances

BI

Levene Statistic	df1	df2	Sig.
.023	1	393	.880

ANOVA

BI

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.067	1	1.067	2.908	.089
Within Groups	144.152	393	.367		
Total	145.219	394			

ANOVA test of mobile wireless computer ownership vs. perceive usefulness (PU)

Test of Homogeneity of Variances

PU

Levene Statistic	df1	df2	Sig.
.363	1	393	.547

ANOVA

PU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.002	1	.002	.007	.936
Within Groups	122.631	393	.312		
Total	122.634	394			

ANOVA test of mobile wireless computer ownership vs. perceive ease of use (PEOU)

Test of Homogeneity of Variances

PEOU

Levene Statistic	df1	df2	Sig.
.177	1	393	.675

ANOVA

PEOU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.022	1	.022	.070	.791
Within Groups	123.408	393	.314		
Total	123.430	394			

Gender Differences

Group Statistics					
	Student Gender	N	Mean	Std. Deviation	Std. Error Mean
BI	Male	258	4.1541	.61059	.03801
	Female	137	3.9726	.58448	.04994

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
BI	Equal variances assumed	.227	.634	2.853	393	.005	.18144	.06361	.05639	.30649
	Equal variances not assumed			2.891	288.098	.004	.18144	.06276	.05792	.30496

Group Statistics					
	Student Gender	N	Mean	Std. Deviation	Std. Error Mean
PU	Male	258	4.2744	.54441	.03389
	Female	137	4.0482	.55494	.04741

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PU	Equal variances assumed	.467	.495	3.905	393	.000	.22624	.05794	.11233	.34015
	Equal variances not assumed			3.882	272.821	.000	.22624	.05828	.11151	.34098

Group Statistics					
	Student Gender	N	Mean	Std. Deviation	Std. Error Mean
PEOU	Male	258	4.2814	.53431	.03326
	Female	137	4.0321	.57201	.04887

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
PEOU	Equal variances assumed	.000	1.000	4.306	393	.000	.24928	.05789	.13546	.36310
	Equal variances not assumed			4.217	261.511	.000	.24928	.05912	.13287	.36568

Group Statistics					
	Student Gender	N	Mean	Std. Deviation	Std. Error Mean
Attitude	Male	258	4.1202	.55719	.03469
	Female	137	3.9507	.54304	.04639

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Attitude	Equal variances assumed	.635	.426	2.902	393	.004	.16943	.05839	.05463	.28422
	Equal variances not assumed			2.925	283.654	.004	.16943	.05793	.05540	.28345

APPENDIX H

Preliminary Study

Interview Results

Participants	Age\Gender	M-learning user	Results of conversations
Participant1	19\Female	No	Ia m unwilling to use m-learning, I don't trust Mobile technology as a tool in education. (Trust issues)
Participant2	20\Male	Yes	The quality of services has not satisfied my Needs. (content quality and security issues)
Participant3	23\Male	No	I am not aware of m-learning as it is not interesting. I would prefere bad situation that I know about uncertain situation which might be better such as m-learning.(culture issues)
Participant 4	22\Male	No	I heard about it but never tried it, (family, Friends influences), and I don't know about it is benefits.
Participant 5	19\ Female	No	I am not aware of m-learning, I would like to try It soon. Social influences by the lecturers (culture issues)
Participant 6	22\Male	No	I am unwilling to use m-learning. My university is not honest with me. (Trust)
Participant 7	24\ Female	Yes	The quality of services has not satisfied my desires (Accessibility, Privacy and Security issues)
Participant 8	21\Male	No	I heard about it but never tried it. My university doesn't adopt mobile learning.
Participant 9	20\Male	No	I am not aware of m-learning. Friend's opinions are important when doing something; using mobile phones for fun.
Participant 10	24\Male	Yes	I am unwilling to use m-learning again. My university does not keep it is promises and commitments.(Trust)
Participant 11	19\Male	Yes	The quality of services has not satisfied my Needs (content quality, Personalization and privacy)

Participant 12	19\Female	No	I am not aware of m-learning, I cannot use it. Social influences. (Culture issues).
Participant 13	22\Female	No	I am not aware of m-learning, I hope to try it social influences (Family, Community). (Culture issues).
Participant 14	23\ Female	No	I did not use it. My university neither adopts mobile learning nor keeps promises and commitments to provide this facility.
Participant 15	19\Male	Yes	The quality of services does not satisfy my Needs such as (Interface design, Personalization , privacy, Reliability and Response)
Participant 16	20\Male	No	I heard about it but never used it. I think that any error could mean loss of marks and money. (Trust).
Participant 17	21\Male	No	I did not use mobile learning. My university did Not adopt it. I would like to try it soon.
Participant 18	22\Female	No	I heard about mobile learning but never try it .I Respect traditional learning and I believe it is better. (Culture issues).
Participant 19	22\Female	No	I heard about mobile learning but never try it. My university doesn’t adopt mobile learning.
Participant 20	25\Male	Yes	I will not use mobile learning again because the Download is not fast and I don’t trust university.

APPENDIX I

Profile of the Experts Involved in Content Validity

Expert ID	Status	Area of Specializations	University
Expert 1	Assoc. Professor	Applied Linguistics	Universiti Utara Malaysia
Expert 2	Assoc. Professor	Information Technology	Universiti Sains Malaysia
Expert 3	Senior Lecturer	Management Science (Statistics)	Universiti Utara Malaysia
Expert 4	Senior Lecturer	Management Information System	Universiti Utara Malaysia
Expert 5	Senior Lecturer	Technology Acceptance	Aljouf University