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Research Article

M-Learning As A Blood Line For Higher Educational Institutions. A Review From Saudi Perspective

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Abstract: Psychology, information sciences, and sociology, numerous theoretical models have been developed to predict and explain user acceptance of information technology or information systems. M-learning is one of the most pivotal domain of information system technology but it is still in its initial stage in the development of e-learning and distance learning. To deeply understand, the current study aimed to review it from both theoretical and practical point of view to understand the factors inhabiting m-learning in Saudi educational institutions. Various databases such as Elsevier, Springer, Pearson Wiley, Taylor & Francis, Mc Graw- HillYell University, Oxford University, Harvard University were explored to assess the published work of previous studies. In addition, to relate the review with the context of Saudi Arabia, reports from the official institutions were also examined to collect information. The review summarizes the definition, advantages, disadvantages, barriers and current implementations strategies of m-learning in Saudi Arabia. The current study contributes to the body of knowledge by providing the review of the factors that may influence the implementation of m-learning in Saudi Arabia. To the best of current study's author knowledge, no such research has been conducted before.

Keywords: M-learning, M-learning Resistance, Benefits of M-learning, Implementation, Saudi Arabia

1. Introduction

Considering the rapid and advanced development in the field of mobile technology in the past decade, a new dimension in the education sector, popularly known as mobile learning (m-learning) has been formed with more value-added advantages. M-learning is still in its initial stage in the development of e-learning and distance learning. Currently, due to the increase of pervasiveness of mobile devices, many mobile applications have been developed to support teaching and learning programs (Chen, et al., 2008; Islam, Karia, Soliman, Fouji, Khalid & Khaleel, 2017). According to El-Hussein and Cronje (2010), the mobile application programs which aim to aid the process of teaching and learning will become effective methods of delivering higher education materials. As highlighted by Bidin et al. (2013), m-learning should be described as application and implementation of mobile technologies in order to facilitate education and the learning process. The most popular systems of m-learning applied in the education sector using the applications and popularly known as apps, which run on different mobile operating system platforms, are online or offline in nature, with easily downloadable features, are considered to be the vector of m-learning (Al-Razgan and Alotaibi, 2019). The applications offer the students with a significant scope to invest their time in different interesting educational activities like communications, quizzes, interactive educational games and more, has let them to develop their mental and psychological efficiency (Momani et al., 2017).

One must importantly mention that the advanced technologies with respect to m-learning has been effectively incorporated in technologically developed countries like the United States, China, Japan and South Korea. The models used in these countries act as measuring scales in worldwide research and development. However, these do not necessarily reflect the hindrances regarding advanced mobile technology in Middle East countries. Specifically, there is no guarantee that the influential issues and difficulties in adaptation and implementation of m-learning process in developing countries like Saudi Arabia would be the same (Masarweh, 2018; Alqahtani, 2016). As opined by Briz-Ponce et al. (2017), the implementation of most western technology is thwarted by environmental, cultural and economic differences in developing countries like Saudi Arabia. As a result, the required technological operations as well as their critical success factors are essentially different in such countries. Hence, it is safe to say that understanding the influencing factors that affect students' behavioral intention to use m-learning is essential in order to develop a proper m-learning context which matches students' interests and needs.

In recent decades in the domains of psychology, information sciences, and sociology, numerous theoretical models have been developed to predict and explain user acceptance of information technology or information systems. To deeply understand, a review is required from both theoretical and practical point of view to understand the factors inhabiting m-learning in Saudi educational institutions. Therefore, it is necessary to review and

understand the important factors that influence students' resistance and intention to use m-learning so that an m-learning context which specifically tailors to the students' needs, interests and expectations can be developed. To that end, the main objective of this research is to review the important factors that can have an impact on the behavior intentions of the students to accept m-learning in the context of Saudi Arabian Higher Education.

2. Defining M-Learning

The phrase "mobile learning" (m-learning) has become increasingly familiar because it has been used in various ways with regards to modern teaching techniques and in meeting the changing needs of educational institutions and communities for the past two decades (Behera, 2013). However, the definition of m-learning is still not clearly defined. Initial attempts at defining m-learning emphasized on technology, for example, it was "any educational provision where the sole or dominant technologies are handheld or palmtop devices" (Traxler, 2005). The concepts in defining m-learning suggest that m-learning refers to the access of students to educational materials at anytime and anywhere through the use of mobile technologies and internet wireless devices, including smart phones, mobile phones, and digital audio players (Wang et al., 2009). According to Hidayat and Utomo (2014) m- learning can be defined as a service that provides information electronically to the learners. Based on existing literature, this research defines m-learning as "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 to enhance the learning process". In other words, m-learning can take place at any time no matter where the location is due to portable devices. Portable computing devices, such as smartphones, media players, personal digital assistants (PDAs), tablets, e-readers, and wireless laptop computers, to name a few, are considered examples of mobile technologies. According to UNESCO (2013), the tools that enable m-learning and teaching includes 'mobile phones, tablet computers, e-readers, portable audio players, handheld gaming consoles, notebooks and laptops.

M-learning is considered to be an extension in the development of e-learning and distance learning. According to Abu Al-Aish and Love (2013), the relationship between e-learning and m-learning was suggested by Peters (2007) in his model of flexible learning called 'just enough, just in time, just for me' model (figure 2.1). This model denotes e-learning and m-learning as subcategories of flexible learning. Although there is an interconnection between e-learning and m-learning, the latter is not fully a subset of the former as there is an m-learning area located beyond the boundary of e-learning. This goes to show that e-learning does not always include m-learning aspects. According to Peters (2007), a close connection exists between e-learning and m-learning whereby m-learning is actually a subset of e-learning. Figure 1 shows the model of flexible learning.:

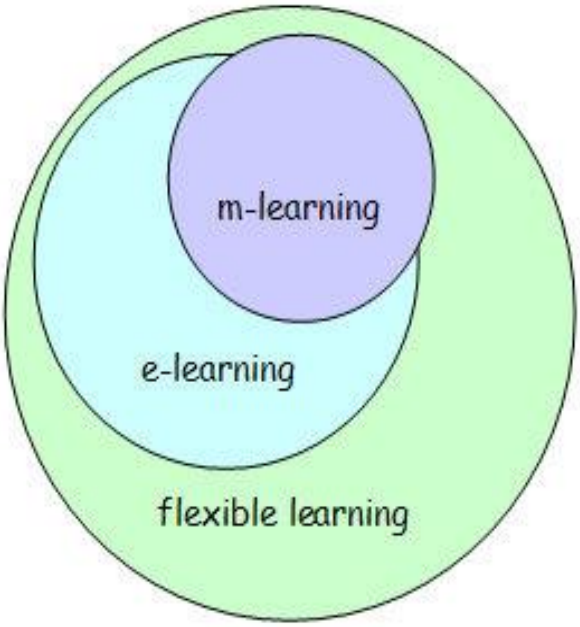

Figure 1: The model of flexible learning (Peters, 2007).

M-learning emphasizes on the mobility of the learner; the process suggests, the magnitude to which they interact with portable technologies. Information regarding mobile devices and wireless networks spread fast within university campuses which makes the higher education sector to be suitable to integrate student-centered m-learning (Cheon et al., 2012). Besides, it is expected to become one of the most effective ways of delivering higher

education materials in the future (El-Hussein & Cronje, 2010). Cheon et al. (2012) stated that students' perceptions of m-learning must be first and foremost investigated before m-learning is implemented in the higher education sector.

3. M-Learning in Saudi Arabia

The Ministry of Higher Education of Saudi Arabia (2015) has reported that Saudi Arabia has shifted from traditional learning to distance learning since 2006. The National Center for e-Learning and Distance Education (NCeDE) was established in 2006 to be the center of distance education for Saudi's higher educational institutions to assist the institutions in matters regarding to learning opportunities, and help the institutions to overcome any insufficiencies that may arise. However, m-learning as a new stage of e-learning is still in its development stage in Saudi Arabia. Recently, many universities in Saudi Arabia have started to use distance learning technology. Some universities have already adopted the short message service (SMS) for teaching and learning (Altameem, 2011). According Drew & Bahaddad (2016), a number of universities have received investments and funding for m-learning projects including King Abdul-Aziz University, the Imam Muhammad Ibn Saud Islamic University, and Saudi Electronic University. The m-learning projects were solely focused on fully implementing online learning in the universities (Garg, 2013). Accordingly, some related infrastructure sub-projects have been recognized, such as the NCeDE, the Learning Management System (LMS), the National System for the Management of e-learning (JUSUR), the Saudi Digital Library (SDL), and the Medicine program at Qassim University, which is the first m-learning program in Saudi Arabian universities (Adkins, 2011).

The LMS system incorporates tools for managing and facilitating the activities of learning and teaching. Aljuhney and Murray (2015), indicated that because of the various advantages of e-learning, the majority of higher educational institutions in Saudi Arabia (87%) have adopted LMSs. With LMS, the management of e-learning becomes a convenient process as it does not discriminate between student and administrator, allowing both of them have easy access on courses and reports. JUSUR is an LMS designed by NCeDE in order to manage the e-Learning process in the kingdom of Saudi Arabia. The JUSUR system allows the users to log on and access the training courses, registration and progress reports easily. In addition, the JUSUR System enables students to log in for registration, planning the courses and the way of teaching, delivery courses, tracking progress as well as issuing reports of students' performance, communication, evaluation through quizzes, examinations and grading (Majmaah University, 2018).

According to the Saudi Digital Library, (2015), the Saudi Digital Library Project (SDLP) is one of the most prominent forms in supporting these scientific groupings at the national level, where it provides sophisticated information services, as well as digital information resources in various forms, and making it available to everybody including the faculty staff, researchers and postgraduate students. SDLP is the largest corpus of e-books in the whole of Arab where it has more than 310000 e-books in various specializations and genre by more than 300 global publishers such as Elsevier, Springer, Pearson Wiley, Taylor & Francis, Mc Graw- HillYell University, Oxford University, Harvard University.

In this topic of discussion, an assessment of these sub-projects has been made with the help of information about Saudi Arabia's establishment and implementation of m-learning methods. However, the concept of m-learning has not been implemented in a scale that is large enough to influence the masses (Nassuora, 2013; Alqahtani, 2016; Momani et al., 2017). E-books are available for higher learning purpose throughout Saudi Arabia. The Saudi Digital Learning Project that was initiated by the government in the year 2015 has had a significant response among the higher education community of students in Saudi Arabia. The implementation and development of mobile based learning with the help of smart devices and some particular applications are still on its initial stages (Nassuora, 2013; Momani et al., 2017), and may take specific advancements to establish proper hold within the educational community. According to De Abreu and Tom (2017), a proper implementation of smart device-based application software is needed for a possible revamp in the education sector through mobile devices with the click of a button. The aforementioned literature has been observed and reviewed for assessment of the current situation.

4. The Significance of m-learning for higher education in Saudi Arabia

Nowadays, many countries are investing efforts in adopting m-learning in order to create a knowledge-based economy and improve their education system (Garg, 2013). Significantly, the Saudi government seeks to provide students with the facilities bestowed on their students by the western countries. Although there has been a significant cultural difference, the Saudi government tried to modify the m-learning strategy in accordance with its necessities (Niblock, 2015). There is no point of contradiction that application of effective m-learning strategy

would be efficiently helpful for the students, investing their time in higher studies and the students who come to this country every year to study in any of the best colleges and universities of the Gulf region. High-end introduction of m-learning in the academic structure would undoubtedly help the Saudi government to provide effective learning atmosphere to the students, both domestic and international. One can evidently observe the rapid rate with which the population of Saudi Arabia is increasing every year; a 32% population jump has been noticed between 2010 and 2018. Hence, it is evident that the majority of the population are youths and would become the strength of the country in future. Therefore, the introduction of innovative academic strategies would invariably help the country to emerge out successful and maintain pace with the growing world.

However, there are significant challenges that the government may have to face. The major challenge is the absence of extensive number of academic institutions in the country (Alrashidi & Phan, 2015). The other one being that the majority of the institutions still follow the old and conventional structure of teaching and the Saudi culture on account of being low individualistic in nature, is barely interested about the advent of the newer form of academic processes (Sandekian et al., 2015). It is very important for any country to have an appropriate alternative method of learning for students in the time of war, natural and man-made disaster and epidemics. Learning should not be stopped for technological and social disruptions. High-end technology can be used to make learning possible even in unexpected events and situations (Ting et al., 2020). The current situation with Covid-19 is a good example of these kinds of unexpected situations. During this time, when most countries are locked down all educational institutions are closed. Due to this education system is getting hampered and the students cannot cope up with their education life. Many institutes are switching to electronic methods to educate the students online by using efficient and fast technologies. The electronic methods are gradually developing even during the pandemics. Technology cannot be stopped from getting more innovated. This advantage can be considered into use to make an alternative learning method (Ting et al., 2020). However, considering the current surging demand, it is quite evident that the transformation strategies undertaken by the Saudi government are evidently required.

Vision 2030, a conspicuous visionary strategy developed and designed by the Saudi government aims at increasing excellence within the country by providing the best quality educational facilities to the students. Evidently, 35% of the total population of Saudi Arabia is within the age of requiring general and higher education (Seliaman & Al-Turki, 2012). Hence, a project like Vision 2030 can prove to be literally effective in order to ensure the overall growth of the educational sector within the country. The mission evidently targets at formulation of a teaching technique that would particularly focus on the learners more than the teachers, and would also focus on inculcating expertise, developing personality, cultivating the range of confidence, and endorsing the spirit of innovation and creativeness (Alwagait, Shahzad & Alim, 2015). The mission also concentrates on churning out the best skills and abilities of the long deprived and socially alienated differently-abled people.

Reformation of the education system, restructuring the tools and techniques highly used in the education sector, focusing on the development of students' personal and professional growth and making them competent to fight against all sorts of challenges are essentially fascinating (Al-shafei et al 2015). By attempting to make Vision 2013 a reality, one can hope to see the new face of Saudi Arabia within the next two decades. In general, this particular growth would evidently help the country to develop a parallel structure of education which would encourage students to be a part of it and in return, remain productive to meet the growing demands. Hence, the particular educational growth strategies taken by the government would help it to develop a creative and skillful workforce for the country that would in the process of development in the future.

Barriers to M-Learning Implementation

Application of m-learning, although, may seem to be an effective choice for an institution to give the students more scope and easy accessibility to the lessons and other aspects whenever or wherever they expect it for, is still confronted with some significant challenges in its implementation process. The followings are some of the critical constraints to implement the m-learning approach:

Technical and Educational Barriers

A- Content security: Although the technology is expanding its perimeter and becoming more secured in nature, however there are still significantly lagging areas that need close attention. Security vulnerability is the biggest threat in this process. Since the institutions' websites and databases are fitted with plethora of information, they become more prone to be hacked or phished (Al-Asmari & Rabb Khan, 2014). A student accessing the server, database or website can easily be the target of hackers. Although the technical experts are working at their best to tackle this issue, they are yet to resolve the problem completely. This particular challenge seems to be really critical which forces an institution to think twice before switching to m-learning (Mehdipour and Zerehkafi, 2013).

B- Connectivity and battery life: It is evident that by using a mobile phone, a student can easily log in to his or her account with the institution, access the library, participate in online examinations, as well as discuss issues

and challenges with the coordinators and friends. However, what is essential is the Internet connectivity which might not be available everywhere or every time (Al-Fahad, 2009), especially in developing countries (Masters, 2008). A study by Al-shafei et al. (2015) highlighted that in the UK, nearly 28.47% students missed their online examination because of the unsolvable Internet issues. Additionally, breathing of a technical gadget like smartphone runs on battery life. However, a student being not attentive to take care of this issue, may be abstained from taking the vital examination or participate in the group discussion process, which might cause significant damage to their career. Students have been seen to be suffering from all these fears and engage themselves to avail different support systems and back up plans which wastes their time and money.

C- Screen size and key size: The largest screen of a mobile phone available in the market and is affordable to a student is around 9 inches while the screen of a tablet that is affordable is 15 inches. However, none of them are effective for the students to read or write easily, whereby it is time consuming to zoom in and zoom out (Maniar et al., 2008). Although most of the institutions today are concentrating on developing student friendly mobile applications that are easily accessible by Android or the IOS platforms, they are still far away from attaining the best results (Aljabre, 2012). Researchers like Al-Qahtani and Higgins (2013) have pointed out that surprisingly, institutions nowadays are influencing their students to get savvy with the mobile based applications, promoting them to alienate themselves from the traditional reading practices.

D- Number of file/asset formats supported by a specific device: It is quite well-known that most of the smartphones and tablets of today support almost all types of files and formats. However, there is no assurance that all the students would be using their phone or tablet with modern facilities only. The smartphone technology of a few years back was not fitted with the qualities that are available currently (Alwagait et al., 2015; Mehdipour & Zerehkafi, 2013). Therefore, a student will have to buy a new set of phones which requires significant investment. Evidently, the institutions hinder the students and leave them with no option but to fend for themselves (Niblock, 2015).

E- Limited memory: Although most of the smartphones and tablets of today are fitted with enough memory, however, in some cases they seem to be insufficient to open a website or to read a file, which naturally denounces the operational capabilities of the device (Borg & Alshumaimeri, 2012). Researchers like Seliaman and Al-Turki (2012), and Mehdipour and Zerehkafi (2013) have witnessed that in order to get rid of this challenge, students often purchase back up memory storage and external memory devices which need them to invest significantly, imposing financial burden on them.

F- Risk of sudden obsolescence: Since technical glitches are common with a device, challenges like getting hanged, stop performing, necessary memory format, easily getting defunct, excessive heating problems and other issues are quite common which may cause a student to lose his or her important information and documents saved within the device (Mehdipour & Zerehkafi, 2013). A research conducted by Sandekian et al. (2015) showed that in 2015, 8.29% students of different universities in the US failed to submit their project or assignment on time because they often meet with serious technical glitches with their devices, which in turn caused them to acquire poor marks which impacted their overall course study. This notion also supported the findings by Crescente and Lee (2011).

G- Web contents: The quality of the web content cannot be compromised with. It is supposed to be always good, effective, catchy and efficient so that it can easily lure the students to the extent that they are convinced to deploy m-learning without any qualms. Researchers like Borg and Alshumaimeri (2012) have seen that most of the institutions try to maintain efficiency of their web content so that it can be easily read while messages can be conveyed clearly. Kutluk et al., (2015) asserted that among the attractive features of m-learning include well organized and easy to navigate content. Besides, the quality of service delivery has an impact on an individual's level of acceptance for new technology. Lee and Teo (2010) indicated that students' perception of online support service quality is considered as a key factor that affects their behavioral intention towards the acceptance of e-learning. However, providing quality online support service will require considerable investment on the part of the institution which is likely to be economically burdensome.

H- Technical training challenges: Training challenge refers to the training requirement that will allow academicians to learn the m-learning features and functions correctly and to use them effectively. In order to ensure that the technicality is maintained properly and students are provided with proper facilities and services within an institution, the faculty, academic staff and non-academic staff are required to provide the necessary training on a regular basis. Moreover, it would include maintaining a dedicated staff training department. The immense financial burden that the process will incur will be extracted from the students in return (Alrashidi & Phan, 2015). Salmon (2000) suggested that at often times, the instructors of m-learning receive inadequate training which then would

hinder them from providing proper guidance to online learners. Similarly, Gerrard (2002) states the need of academics is understood as technological skill improvement such as how to create a better presentation and how to upload it on e-learning systems rather than learning new e-teaching skills to improve and aid student learning.

I- Design training materials: Apart from the theoretical subjects, students are required to participate in lab works, technical training, workshops and other physical works which cannot be done using the m-learning platforms. Materials required for these programs need efficient hands and brains to be invested in (Al-Qahtani & Higgins, 2013). Videos developed by the proficient lecturers and teachers influence the students to work more efficiently to mitigate the challenges and score good values. However, the materials and videos developed poorly may lead them to suffer from the significant challenges. The materials and videos developed are required to be uploaded in the online portal and should be directly accessed by the students (Alebaikan & Troudi, 2010). However, the reputation of the institution would suffer a blow when the students find it difficult to access the materials and the contents online (Alebaikan & Troudi, 2010). Dai et al. (2017) suggested that content quality is one of the significant determinants of perceived usefulness of online social information services.

J- Developing an appropriate theory of learning for the mobile age: The education system of today has become faster and unique in this Internet era and extensive technological advancement. Students prefer investing their time on learning from the gadgets rather than stepping out and going to the library. Hence, a radical shift in the demand is noticeable. However, it is leading them to become more mechanical in nature. The more they are dependent on technology, the more is the loss of their creative instincts and faculties (Borg & Alshumaimeri, 2012). Evidently, learning with technology has become more incongruous in nature. This is the reason why a number of research works have suggested that it would be late if the monstrous saga of technology and Internet is not disbanded immediately in the near future. Niblock (2015) has pointed out that becoming more dependent on technology would alienate the students from psychological calmness which would further hinder their overall social growth and development.

5. Personal and Social Barriers

A- Self-management of learning: Classroom learning and self-management learning are both regarded as a type of learning that is important for a student's success (Almatari, et al., 2013). The learning process will be more successful if the learner is able to control his or her own activities (Sharples and Beale, 2003). In the context of m-learning students must be the managers of their own learning because they are away from their faculty, peers, and the institutional support. High-level self-management is important in self-directed learning, and learners need to adopt various strategies in dealing with numerous problems (Lee & Teo, 2010).

B- Personal confidence: Since an institution is populated by students of different communities, it encapsulates within itself a pool of talents and competencies (Parasuraman & Colby, 2001). Researchers like Alebaikan and Troudi (2010) have pointed out that most of the universities across the globe are seeded by a high number of international students; evidently students of different capacity and capabilities throng to the academic places to secure their degrees. There is no assurance that everyone would be proficient in handling the mobile technology effectively. Students with least confidence in handling the mobile gadgets may face serious challenges with the academic curriculum and might need help from others (Parasuraman & Colby, 2001; Borrero et al., 2014).

C- Low esteem of web-based learning: Web-based learning is a comparatively new form of education, which did not exist a few years back. A large number of countries are yet to transfer their academic structure in this format (Alrashidi & Phan, 2015). Students who have completed their previous degrees in the conventional mode may find it difficult to get acclimatized in the m-learning format and this may also impact their performance. The study conducted by Mirza and Al-Abdulkareem in Saudi Arabia (2011) revealed that low self-esteem is one of the important challenges for e-learning.

D- Fear of technology: A study of Jdaitawi (2015) has shown that despite living in a world dominated by modern technology, a large number of people, that is nearly 33% within the age group of 18 to 40, prefer to keep themselves aloof from technology since they are of the belief that it harms their originality, creativity and diverts attention. Forcing them to accept technology in all its technicalities and intricacies can prove to be a significant challenge. However, Twatti (2006) asserted that a learner can only master e-learning if he or she has enough experience and exposure with e-learning methods and strategies.

E- Technological confident: Even though a number of students make use of m-learning, yet they are not completely aware of the nuances of smartphone-based technology. Hence, in case of any unwanted technical

challenge, they would seek the help of their seniors or fellow students which might be challenging to them because this will possibly tarnish their confidence level (Jdaitawi, 2015).

F- Culture factors: Beyond the conventional learning process that helps in social, psychophysical and mental development of a student, engrossed to a mobile or tablet screen makes a student gourd in nature. The more a student allows himself or herself in this process, the more he or she remains alienated from the societal or cultural connectivity (Borg & Alshumaimeri, 2012). Considering this situation, one can widely imagine how the next generation would lose their creativity and decision-making power. A number of research works have identified that culture always play a crucial role in order to accept technology and get revolutionized. Researchers like Nassuora (2012) and Seliaman and Al-Turki (2012) have noted that "the culture of a society determines the nature of technological development and the evolution of technological culture". Unlike the collectivist culture where modernization, self-control is given the most preference, a culture with low individualism (like Saudi Arabia) is donned by low power distance and low communication style (Al-Gahtani et al., 2007). Fundamentally, the conflict strategies of their culture are also developed poorly because of the high orthodoxy, making them not always ready to accept technology or innovation. Naturally, a culture like this would always try to defer itself from accepting m-learning even after knowing that it would be highly beneficial for the individual development process (Al-Gahtani, 2007; Nassuora, 2012; Seliaman & Al-Turki, 2012).

6. Influential Factors to m-learning Implementation

The success of using new technology depends on factors such as skills, attitudes and culture (Kukulska-Hulme & Traxler 2007). In the context of m-learning, numerous factors have been identified as predictors of intention to use m-learning including perceived ease of use, perceived usefulness, alignment value, intrinsic value, utility value, self-management of learning, comfort with mobile learning, perceived trust, performance expectancy, effort expectancy, social influence, perceived playfulness, relative advantage, facilitating condition, previous experience, resistance, the importance of the course, integration of the technology into course assessment, lecturer modeling of the course, available tools, lecturer's feedback, mobile device and software, perceived innovativeness, perceived ICT anxiety, perceived self-efficacy, compatibility, complexity, trialability, observability, image, voluntariness, cost and perceived credibility (Masrom & Hussein, 2008). However, the most frequently examined factors are the following:

- **Performance Expectancy:** UTAUT suggests that performance expectancy is the strongest predictor of an individual's behavioral intention to use the information system/technology (Venkatesh, 2003), and is significant at all points of measurement for mandatory and voluntary settings (Almatari et al., 2013).
- **Effort Expectancy:** The notion that effort expectancy being a strong determinant of individual intention to use technology has been supported by many researchers from previous studies (Venkatesh & Morris, 2000; Venkatesh et al., 2000; Vankatesh et al., 2003; Almatari et al., 2013).
- **Social Influence:** Researchers have come to the conclusion that social factors exercise a robust influence on students' intention to use m-learning in the pedagogical environment including Venkatesh et al. (2003), Almatari et al. (2013).
- **Facilitating Conditions:** Facilitating conditions have been found to be the main predictor of actual use of technology (Venkatesh et al., 2003; Al-Gahtani et al., 2007; Im et al., 2011; Nassuora, 2012; Wang & Shih 2009). Meanwhile Jairak et al. (2009) stated that facilitating conditions have a significant positive relationship with behavioral intention.
- **Self-Management of Learning:** Self-management of learning has been found to play a vital role in predicting m-learning (Wang & Shih, 2009; Almatari et al., 2013; Prajapati & Patel, 2014). Research conducted by Wang and Shih (2009) reported that self-management of learning is a stronger determinant for women as compared to men.
- **Perceived Playfulness:** Research has shown that perceived playfulness is a significant positive predictor in mobile research (Almatari et al., 2013). Moreover, Wang and Shih (2009) found it to be a significant determinant of behavioral intention to use m-learning.
- **Cost:** Past researches have revealed a negative relationship between cost and adoption of technology (Seyal & Rahim, 2006; Momani et al., 2017).
- **Voluntaries of Use:** Voluntaries of use has been used as moderated variables where the systems are operating as both mandatory and volunteers (Almatari et al., 2013). This construct has been used to mediate the impact of the four key determinants of intention. However, in some m-learning acceptance studies, it has been used as a predictor for behavioral intention (Donaldson, 2011).
- **Personal Innovativeness:** Researches have shown that those who portray high level of innovativeness are more prepared to adopt positive ideas, accommodate to changes and deal better with uncertainties as opposed to those with a lower level of innovativeness (Lu et al., 2005; Abu Alish & Love 2014). Several studies investigated

the effect that personal innovativeness has on a new IT behavioral intention (Hung & Chang, 2005; Lu, Yao &Yu, 2005).

- **Lecturers' Influence:** Lecturers' influence can be gauged from social influence. Social influence is divided into two dimensions namely; superior influence (lecturers and supervisors) and peer influence (Igbaria, Schiffma & Wieckowski, 1994). According to Abu Alish and Love (2014), several studies have reported that supervisors have the ability to influence the level of acceptance of an individual (Igbaria, Schiffman & Wieckowski, 1994; Karahanna & Straub, 1999) and in terms of communication (Leonard-Barton & Deschamps, 1988).
- **Quality of Service:** Most definitions of quality of service have concentrated on reliability of the service, content quality, and security. The excellence of services provided to users can affect the level of acceptance of new technology (Xin, 2004). Findings from past studies have shown that quality of service is positively linked to students' behavioral intention to adopt m-learning because they would perceive the quality of services to be beneficial to them (Al-Alish & Love, 2014; Agarwal et al., 2007).
- **Attitude:** Past studies conducted have revealed that a positive relationship exists between social factors and attitude (Jairak et al., 2009; Nassuora, 2012; Thomas et al., (2013). However, Jairak et al. (2009) found that performance expectancy and effort expectancy posed positive effects on attitude. Meanwhile, Nassuora (2012) and Thomas et al. (2013) reported a positive impact of facilitating conditions on attitude.

Unlike the developed countries who are using m-learning practices in the academic sector, the reasons for using the same process for the developing countries varies. The developed countries can potentially afford m-learning method as they do not face such issues in managing and maintaining the cost of the technology. On the other hand, the developing countries are still fighting for their basic needs. Using these technologies does not fall under their basic needs. Only the privileged one in these countries is well-to-do with m-learning technologies. Along with the developed countries, most of the developing countries are focusing on using m-Learning technologies to achieve maximum result. During the covid-19 epidemic in year of 2020, the use of m-learning technologies came into greater use in the developing countries. The developing countries are eventually concentrating on taking up the technology the supports hassle-free learning. However, since most developing countries have not developed due to their social-cultural norms, it is becoming a significant challenge for them to convert themselves to technologically-advanced completely. These countries will develop social and cultural norms where technology will be an essential part of learning. For the developed countries, the main focus is to develop the awareness and make the students attracted to studying (Al-Azawei et al., 2016). Table 2.2 highlights some of the primary influencing factors to use m-learning in developing countries, as suggested by different researchers in different times.

7. Benefits of M-Learning

Application of m-learning tools and approaches essentially helps in the development of the overall education system whose impact can be evaluated on the students as they give better results, thereby solidifying the efficacy of m-learning. Hence, it is quite certain that m-learning has a substantial contribution in psychosocial development process. The possible advantages of m-learning process are highlighted in the following sub-section:

- **Quick Access and Convenience:** M-learning allows the users to learn at their own convenient time (Wang, 2009; Chen, et al., 2008; Negas & Ramos 2011; Crescente and Lee, 2011). One can access the necessary information related to one's study and institution quickly by making some gesture of finger in the smartphone at any time of the day. Along with the coursework and learning materials, one can conveniently access the e-library from the smartphone. Clearly, the concept of m-learning has completely alienated itself from the physical study, attendance, physical library works and others. The more the flexibility in academic structure is provided, the more students can perform effectively. Naturally, easy availability of the required elements also saves time for the students, allowing them to be invested for some better work.
- **Higher Engagement:** M-learning can provide wireless communication between lecturers and students and between the students themselves (Motiwalla, 2007; Mehdipour and Zerehkafi, 2013). M-learning has effectively proven to be a significant element that drives the common and poor performing students to remain engaged in their studies and perform effectively. Attending all the classes can become almost impossible for a large number of people due to various factors. Conventionally, missing a class means missing it forever. However, students have the convenience of attending recorded classes, visit the lectures, access the assessment tests and assignments provided by the teachers anytime and anywhere through the principles of m-learning. Needless to say, this easy accessibility provides an important facility to the students to remain engaged to their task. It also helps to cultivate a close relationship between the teacher and the student by way of regular conversations, and thereby helps in bridging communication gaps.
- **Learning Support:** M-learning helps in maintaining a satisfied students forum with active learning engagement for an academic institution (Joosten, 2010). Motiwalla (2007) hence has wisely observed that "m-learning can work as additional support to complement and add value to the existing learning models". In many

cases of the conventional learning process students seem to face challenges while clearing their doubts before the examination or before submission of assignments since most of the teachers and lecturers are physically inaccessible to the students beyond their academic institution. With m-learning approach, the students can easily connect with their tutors by mail or chat and clear their doubts. Apart from it, another provision of m-learning is to also help the students in developing study groups with their batchmates and seniors, discussing the issues and problems, and getting immediate help (Motiwalla, 2007; Mehdipour and Zerehkafi, 2013).

- **Cost Effective and Portability:** Researchers have pointed out that mobile phones are not as weighty and heavy to carry like books (Mohamad et al 2010; Nassuora 2012). At the same time, the price of the books increases almost every day. But a student can easily access e-books, journals and articles from their smartphone or tablets at a relatively lower cost. A number of free books, journals and articles can also be googled. Naturally, it saves a large amount of money for the students. Savill (2010) has found that carrying the bulkier books is a matter of menace for the students, however, carrying a tab or a smartphone with similar or more books stored in them is easier to the students. A number of gadgets offer stylus pens or touch pens. These allow the students to focus on specific areas and enjoy the parts of a book that they like.
- **- Monitoring e-learning:** It is noteworthy that monitoring e-learning is one of the important concerns of m-learning. According to Grace-Anne Jackman (2014), universities must provide students with Internet and Intranet access so that they always have the accessibility to m-learning anytime. Regular evaluations and appraisals of e-service provided by universities are required to monitor e-learning performance (Kim-Soon et al., 2015). Hence, m-learning among students should be a compulsory parameter in the consistent monitoring of e-learning performance at universities (Kim-Soon et al. 2015).
- **Advantages Beyond e-learning:** Often the concept of e-learning is misinterpreted and conflated with m-learning. Although the concepts and advantages are the same, however, in majority of the cases, they are different from each other. The concept of e-learning is limited to learners with their personal computers, but the concept of m-learning extends its perimeter and introduced portability, mobility and remote access. E-learning is fundamentally structured, formal and time bound in nature while m-learning is faster and smarter. E-learning basically tethers the learners to their desktop, but m-learning is wider in range and scope as students can use laptops, tablets and smartphones as the primary devices to access the necessary elements. Simple and smart navigation system in m-learning process is more sophisticated in comparison to that of complex but informative approaches of e-learning.

M-learning is considered to be an extension of e-learning. With the potential to guide and govern student learning, its main benefit manifests in the many possibilities that are given to students to make learning and knowledge more accessible and exciting. The traditional limitations of place and time are smashed into smithereens. There are many differences found between e-learning and m-learning. For instance, mobile technologies support learning and makes it more accessible than e-learning constructs. M-learning corroborates performance which is defined by an easy access to information, which has an immediate effect of students' performance in a learning environment, thereby positively impacting their education (Sarrab and Aldabbas, 2012). Abu-Al-Aish (2014) compared aspects of e-learning and m-learning in Table 2.1 basing his analysis on the literature review of m-learning (Attewell, 2005; Laouris and Eteokleous, 2005; Traxler, 2007):

Table 2.1: Comparison between e-learning and m-learning

Feature	E-learning	M-learning
Network	Wired	Wireless
Devices	Computer, Laptop	Mobile phone, smart phone, PDA and Tablet PC
Accessibility	Anytime	Anywhere
Connectivity	Internet and Intranet Networks	Mobile Networks
Learning	Collaborative Distance Learning Formal Multimedia	Networked-personal and private Situated Learning Informal Objects
	Time delayed-Asynchronous	Instant delivery-Synchronous

Instructor-Student Communication	Late communication Scheduled	Immediate communication Unprompted
Student-Student Communication	Face-to-face Limit by location and time Late Communication Poor due to group consciousness	Flexible Anytime, anywhere Immediate communication Rich due to one-to-one communication

Source: Abu-AL-Aish 2014.

8. Disadvantages of m-learning

Although m-learning seems to be a beneficial and convenient tool for learners and teachers, it is open to criticism. Learners have been helped to a great extent by m-learning as it helps them grow effectively and efficiently, but the challenges it poses are rife. The followings are some of the disadvantages of m-learning:

- **Easy Distraction:** M-learning increases the total amount of screen time that a student spends in a day. Researchers like Venkatesh, Davis and Morris (2007) have seen that the more time one spends behind the screen, the more a person alienates himself or herself from the daily chores. A study of Cheon et al (2012) have shown that easy distractions available with the Internet in one's smartphone let a student lose 30% of the overall study time in a year. Screen time can also eventually turn into a habit, and in some scenarios, to some individuals, addictive. Significantly, wasting more time with mobile phones can prove to be dangerous.
- **Excessive Dependency on Technology:** When accepting mobile as a form of learning, students normally become technology dependent (Gautam, 2018). The flavor and grandeur of reading a book is somewhat lost in the m-learning process. A serious loss of skills that one can learn and exercise by studying from books only is evident (Gautam, 2018). With increasing dependency on technology, a student is also required to be cautious of device failure, possible crash of the gadget, battery life, software upgrade and other factors that might act as impediments in the proper functioning of m-learning.
- **Losing Social and Cultural Connectivity:** The more the students get addicted to the mobile screens, they would experience more loss in their social and cultural skills (Gautam, 2018). Moreover, the students are often seen to be reluctant to participate in events like group discussions, debate and others which might have acted as an influence to their study and mental relaxation. The degree of student participation in cultural interaction is inversely proportional to the chances of depression (Al-kharang, 2014).
- **Impact of Multitasking:** Mohamad et. al. (2010) have pointed out that a mobile phone or tablet provides more opportunity to a student to do a number of tasks and at the same time, reduces their enthusiasm and efforts required for a particular task. Research works have shown that taking notes with pen and paper paves way for better recall while m-learning is not much contusive in comparison to the conventional format of studying (Mehdipour and Zerehkafi, 2013).
- **Increase in Health Problems:** Students in m-learning structure are forced to read the texts on relatively small screens of their smartphones or tablets. In most of the cases, students seem to become easy prey to the locomotor, visionary or auditory problems.
- **Lack of Necessary Required Skills:** Although a majority of the mobile or tablet manufacturers of today concentrate on easy customization and high efficiency of the devices, there are students who are not ready in using mobile phones effectively, especially in developing countries (Al-Azawei et. al., 2016). In some cases, absence of browser, incapability of the mobile phones to access a high-end websites and other issues make it difficult for the students to avail this particular facility.

9. Conclusion

This research reviewed the past literature to identify the role of m-learning in Saudi Arabia. M-learning is providing the bloodline to the higher education institutions across the globe. This review shows that there are several disadvantages of m-learning but its advantages cover all the disadvantages. To date, researchers focused on the implementation of m-learning in the developed nation context and developed the models based on the user adoption strategies and neglected its implementation strategies from the developing countries context. The current review encompasses the Saudi regions and highlighted the barriers that can be empirically investigated from the regional context by integrating these factors in to existing models.

References

1. Abu-Al-Aish, A. and Love, S. (2013) Factors Influencing Students' Acceptance of M-Learning: An Investigation in Higher Education. The International Review of Research in Open and Distance Learning, 14, 82-107.
2. Adkins, S. (2011). The US Market for Mobile Learning Products and Services: 2010-2015 Forecast and Analysis. Retrieved June, 10, 2016 from http://www.ambientinsight.com/Resources/Documents/Ambient-Insight-2010-2015-US-Mobile-Learning-Market-Executive-Overview.pdf.
3. Al-Asmari, A. M., & Rabb Khan, M. S. (2014). E-learning in Saudi Arabia: Past, present and future. *Near and Middle Eastern Journal of Research in Education*, 2.
4. Al-Azawei, A., Parslow, P., & Lundqvist, K. (2016). Barriers and Opportunities of E-Learning Implementation in Iraq: A Case of Public Universities. *The International Review of Research in Open and Distributed Learning*, *17*(5). https://doi.org/10.19173/irrodl.v17i5.2501.
5. Al-Fahad, F. N. (2009). Students' attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia. *Online Submission*, *8*(2).
6. Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. Information & Management, 44(4), 681-691
7. AL-RAZGAN, Muna; ALOTAIBI, Hind. Personalized Mobile Learning System to Enhance Language Learning Outcomes. Indian Journal of Science and Technology, [S.l.], jan. 2019. ISSN 0974-5645. Available at: <http://www.indjst.org/index.php/indjst/article/view/139871>. Date accessed: 22 Nov. 2019. doi:10.17485/ijst/2019/v12i1/139871.
8. Al-Shafei, A. I., Bin Abdulrahman, K., Al-Qumaizi, K. I., & El-Mardi, A. S. (2015). Developing a generic model for total quality management in higher education in Saudi Arabia. *Medical teacher*, *37*(sup1), S1-S4.
9. Al-Qahtani, A. A., & Higgins, S. E. (2013). Effects of traditional, blended and e-learning on students' achievement in higher education. *Journal of computer assisted learning*, *29*(3), 220-234.
10. Alebaikan, R., & Troudi, S. (2010). Blended learning in Saudi universities: challenges and perspectives. *ALT-J*, *18*(1), 49-59.
11. Aljabre, A. (2012). An exploration of distance learning in Saudi Arabian universities: Current practices and future possibilities. *International Journal of Instructional Technology and Distance Learning*, *9*(2), 21-28.
12. Aljuhney Y. and Murray L., (2015). "A Comparison of the Utilization of E-learning Management Systems in the Republic of Ireland and Kingdom of Saudi Arabia: A Case Study" International Journal on Recent and Innovation Trends in Computing and Communication (IJRITCC), vol. 4, no. 2, pp. 1-12, 2016.
13. Alkharang, M. (2014). Factors that influence the adoption of e-learning: an empirical study in Kuwait. Doctoral Research, School of Information Systems. Brunel University.
14. Almatari A. Y., A.Iahad N., and Balaid A. S., (2013). Factors Influencing Students' Intention to Use M-learning. Journal of Information System Research and Innovation. https://pdfs.semanticscholar.org/d0d1/c82844308d22f67ac8fae2cb0449725aac8b.pdf
15. Alqahtani, Maha & Mohammad, Heba. (2015). Mobile Applications' Impact on Student Performance and Satisfaction. *Turkish Online Journal of Educational Technology - TOJET*, v14 n4 p102-112 Oct 2015.
16. Alrashidi, O., & Phan, H. (2015). Education Context and English Teaching and Learning in the Kingdom of Saudi Arabia: An Overview. *English Language Teaching*, *8*(5), 33-44.
17. Altameem, T. (2011). Contextual mobile learning system for Saudi Arabian oniversities. International Journal of Computer Applications, 21(4), 21=26.
18. Alwagait, E., Shahzad, B., & Alim, S. (2015). Impact of social media usage on students' academic performance in Saudi Arabia. *Computers in Human Behavior*, *51*, 1092-1097.
19. Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411
20. Attewell, J. (2005), "Mobile technologies and learning: A technology update and m-learning project summary", London: Learning and Skills Development Agency. Available at www.LSDA.org.uk. (Accessed 30th May 2006).
21. Behera, A. P. D. S. K. (2013). E-and M-Learning: A comparative study. *International Journal on New Trends in Education and Their Implications*, *4*(3).
22. Bidin, S., & Ziden, A. (2013). Adoption and application of mobile learning in the education industry. Procedia-Social and Behavioral Science, 90, 720–729.

23. Borg, S., & Alshumaimeri, Y. (2012). University teacher educators' research engagement: Perspectives from Saudi Arabia. *Teaching and Teacher Education*, *28*(3), 347-356.
24. Borrero J. D, Yousafzai S., Javed U., Kelly L., (2014): Testing the moderating effect of technology readiness and sex on student SNS use. journal homepage: www.elsevier.com/locate/comphumbeh.
25. Briz-Ponce, L., Pereira, A., Carvalho, L., Juanes-Méndez, J. A., & García-Peñalvo, F. J. (2017). Learning with mobile technologies–Students' behavior. *Computers in Human Behavior*, *72*, 612-620.
26. Chen, G. D., Chang, C. K. et al., (2008a). Ubiquitous learning website: Scaffold learners by mobile devices with information-aware techniques. Computers &Education, 50(1), 77e90.
27. Cheon, Jongpil & Lee, Sangno & Crooks, Steven & Song, Jaeki. (2012). An Investigation of Mobile Learning Readiness in Higher Education Based on the Theory of Planned Behavior. Computers & Education. 59. 1054–1064. 10.1016/j.compedu.2012.04.015.
28. Crescente, Mary Louise and Lee, Doris (2011). "Critical issues of M-Learning: design models, adoption processes, and future trends". Journal of the Chinese Institute of Industrial Engineers 28 (2): 111–123.
29. Dai Y., Zhao X., Fei M., and Gan W., (2017). Exploring an on-line course applicability assessment to assist learners in course selection and learning effectiveness improving in e-learning. Volume 60, Pages 56-62.
30. De Abreu, B. S., & Tom, V. (2017). Mobile Learning Through Digital Media Literacy. Peter Lang International Academic Publishers.
31. Donaldson, R. L., (2011). Student Acceptance of Mobile Learning. Published 2011. Computer Science.
32. Drew S. and Bahaddad A., 2016. Towards Acceptance M-Learning Approach in Higher Education in Saudi Arabia. International Journal of Business and Management; Vol. 11, No. 8; 2016, ISSN 1833-3850 E-ISSN 1833-8119.
33. El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining mobile learning in higher education landscape. Educational Technology & Society, 13(3), 12-21.
34. Garg, V. (2013). The Emergence of Mobile Learning for Higher Education in Kingdom of Saudi Arabia. Retrieved May 2016 from http://www.upsidelearning.com/blog/index.php/2013/01/15/emergence-of-mobile-learning-for-higher-education-in-kingdom-of-saudi-arabia/Documents/PR_REP_009A.pdf
35. Gautam A (2015) Mobile learning: An effective way of teaching and learning English language. International Journal on Studies in English Language and Literature (IJSELL) 3(2): 50–52.
36. Gerrard C (2002) 'Promoting Best Practice for E-tutoring through Staff Development', *In Proceedings of Networked Learning 2002: Third International Conference, Lancaster University and University of Sheffield* 26th March - 28th March 2002. Also available online at http://www.shef.ac.uk/nlc2002/proceedings/papers/15.htm. Last accessed 10/03/2003.
37. Grace-Anne Jackman, (2016), Investigating the Factors Influencing Students' Acceptance of Mobile Learning: The Cave Hill Campus Experience, Caribbean Educational Research Journal**,** Vol. 2, No. 2, September 2014, 14-32.
38. Hidayat, A. and Utomo, V. G., (2014). Open Source Based M-Learning Application for Supporting Distance Learning. Vol.12, No.3, September 2014, pp. 657~664.
39. Igbaria M., Schiffman S. J., Wieckowski T. J., (1994): The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology. Behav. Inf. Technol. 13(6): 349-361 (1994).
40. Islam, M. S., Karia, N., Soliman, M. S. M., Fouji, M. H., Khalid, J., & Khaleel, M. (2017). Adoption of mobile banking in Bangladesh: a conceptual framework. Review of Social Sciences, 2(8), 01-08
41. Jairak, K., Praneetpolgrang, P., & Mekhabunchakij, K. (2009). "An Acceptance of Mobile Learning for Higher Education Students in Thailand". Special Issue of the International Journal of the Computer, the Internet and Management, vol.17(SP3), pp.36.1–36.8.
42. Jdaitawi, M. (2015). Social Connectedness, Academic, Non-Academic Behaviors Related to Self-Regulation among University Students in Saudi Arabia. *International Education Studies*, *8*(2), 84-100.
43. Joosten, T. (2010). Mobile learning and social media: Increasing engagement and interactivity. Paper presented at the New Media Consortium Conference, June 9-12, 2010, Anaheim, CA. *Journal of Computer Assisted Learning, 19,* 392–395.
44. Karahanna, E. and Straub, D.W. (1999) The Psychological Origins of Perceived Usefulness and Ease-of-Use. Information & Management, 35, 237-250. http://dx.doi.org/10.1016/S0378-7206(98)00096-2

45. Khan, Md., Hossain S., Mahbub H., and Kum C. C., (2012). Barriers to the Introduction of ICT into Education in Developing Countries: The Example of Bangladesh. International Journal of Instruction v5 n2 p61-80.
46. Kim-Soon, Ng & Gaani, Mohamud & Ahmed, Abd Rahman & Sinisa, Ng Mei Xin (2015). Factors influencing intention to use Mobile technology for learning among technical universities students.
47. Kukulska-Hulme, A., & Traxler, J. (2007). *Learning Design with Mobile and Wireless Technologies.* In H. Beetham, & R. Sharpe (Eds.), Rethinking Pedagogy for the Digital Age: Designing and Delivering E-learning, Routledge, London.
48. Kutluk F., Donmez A., Gulmez M., and Terzioglu M., (2015). "A Re-Research about Usage of Mobile Devices in Accounting Lessons" Procedia - Social and Behavioral Sciences, vol. 197, 2015. doi:10.1016/j.sbspro.2015.07.047
49. Laouris,Y, Eteokleous, N., (2005), We Need an Educationally Relevant Definition of Mobile Learning, www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf, 20.08.2010.
50. Lee, C. B., & Teo, T. (2010). Fostering self-directed learning with ICT. In C. S. Chai, & Q. Wang (Eds.), ICT for self-directed and collaborative learning, (pp. 39–51). Singapore: Pearson.
51. Leonard D. A. & Deschamps I., (1988). Managerial Influence in the Implementation of New Technology. Management Science, page 1252.
52. Lu, J., Yao, J. E., & Yu, C. S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. Journal of Strategic Information Systems, 14(3), 245–268.
53. Majmaah University (2018). Website, https://www.mu.edu.sa/en/deanships/deanship-e-learning-and-distance-learning/jusur-system.
54. Maniar N. & Bennet E. & Steve H. & Allan G. (2008). The Effect of Mobile Phone Screen Size on Video Based Learning. Journal of Software. 3. 10.4304/jsw.3.4.51-61.
55. Masarweh, Mohammed. (2018). Evaluating M-Learning in Saudi Arabia Universities using Concerns-Based Adoption Model Level of use Framework. International Journal of Advanced Computer Science and Applications. 9. 10.14569/IJACSA.2018.090609.
56. Masrom, M. & Hussein, R (2008). User acceptance of information technology: Understanding theories and model. Published by Venton.
57. Mehdipour Y., Zerehkafi H. (2013), Mobile Learning for Education: Benefits and Challenges. International Journal of Computational Engineering Research Vol 03, Issue 6, P95.
58. Ministry of Higher Education, Saudi Arabia (2015). https://www.moe.gov.sa/en/HigherEducation.
59. Mirza, A. a., & Al-Abdulkareem, M. (2011). Models of e-learning adopted in the Middle East. *Applied Computing and Informatics*, *9*(2), 83–93. doi:10.1016/j.aci.2011.05.001.
60. Mohammad Shorfuzzaman and Musaed Alhussein (2010), "Modeling Learners' Readiness to Adopt Mobile Learning: A Perspective from a GCC Higher Education Institution," Mobile Information Systems, vol. 2016, Article ID 6982824, 10 pages, 2016. https://doi.org/10.1155/2016/6982824.
61. Momani, F. & Hussein W. & Abdulwahhab Z. T., (2017). DETERMINING FACTORS THAT INFLUENCE STUDENTS' INTENTION TO ADOPT MOBILE BLACKBOARD: A CASE STUDY AT PETRA UNIVERSITY, JORDAN. The International Journal of Multimedia & Its Applications (IJMA) Vol.9, No.4/5/6.
62. Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. Computer & Education, 49(3), 581-596.
63. Nassuora, A. B. (2012). Students acceptance of mobile learning for higher education in Saudi Arabia. *American Academic & Scholarly Research Journal*, *4*(2), 24-30.
64. Negas, M.C., & Ramos, P. 2011, "Critical Factors in the Use of Mobile Learning by "Digital Natives" on Portuguese Teaching." *Proceeding of the European Conference on Information Management & Evaluation*, pp. 333-340.
65. Neuman, W., & Robson, K. (2012). Qualitative Interviewing. In Basics of Social Research: Qualitative and quantitative approaches (2nd Canadian ed.), pp. 251-267. Toronto: Pearson Canada.
66. Niblock, T. (2015). *Social and economic development in the Arab Gulf (RLE economy of Middle East)*. Routledge.
67. Parasuraman, A., & Colby, C. (2001). Techno-ready marketing: How and why your costumers adopt technology. New York: The Free Press.
68. Peters, K. (2007). M-learning: Positioning educators for a mobile, connected future. The International Review of Research in Open and Distance Learning, 8(2), 1-17.
69. Prajapati M., Patel J. M., (2014), The Factors Influencing in Mobile Learning Adoption: A Literature Review, *International Journal of Application or Innovation in Engineering & Management*, Volume 3, Issue 9.

70. Sandekian, R. E., Weddington, M., Birnbaum, M., & Keen, J. K. (2015). A narrative inquiry into academic experiences of female Saudi graduate students at a comprehensive doctoral university. *Journal of Studies in International Education*, *19*(4), 360-378.
71. Sarrab, Mohamed & Elgamel, Liali & Aldabbas, Hamza (2012). Mobile Learning and Educational Environments. International Journal of Distributed & Parallel Systems, 3.31-38.
72. Saudi Digital Library (2015). The Saudi Digital Library Project, available at: https://portal.sdl.edu.sa/english/aboutus/
73. Savill (2010), Mobile learning in practice: Piloting a mobile learning teachers' toolkit in further education colleges. C. Savill etc. p8.
74. Seliaman, M. E., & Al-Turki, M. S. (2012). Mobile learning adoption in Saudi Arabia. *World Academy of Science, Engineering and Technology*, *69*(9), 391-293.
75. Seyal, Afzaal & Rahim, Md. (2006). A Preliminary Investigation of Electronic Data Interchange Adoption in Bruneian Small Business Organizations. EJIDC The Electronic Journal on Information System in Developing Countries, 24.1-21.
76. Sharples, M., & Beale, R. (2003). A technical review of mobile computational devices.
77. Ting, D. S. W., Carin, L., Dzau, V., & Wong, T. Y. (2020). Digital technology and COVID-19. *Nature medicine*, *26*(4), 459-461. (https://www.nature.com/articles/s41591-020-0824-5).
78. Traxler, J. (2005). Defining M-learning, IADIS International conference M-learning (261-266). Wolverhampton: University of Wolverhampton.
79. Twatti, J.M., (2006) "The impact of organizational culture innovation on the adoption of IS/IT: the case of Libya". Journal of Enterprise Information Management. Vol. 19, No.2, PP. 175-191
80. UNESCO (2013), Digital Library. UNESCO Policy Guidelines for Mobile Learning. Available at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/UNESCO_Policy_Guidelines_on_Mobile_Learning_DRAFT_v2_1_FINAL__2_.pdf
81. Venkatesh, V., and Morris, M., (2000). WHY DON'T MEN EVER STOP TO ASK FOR DIRECTIONS? GENDER, SOCIAL INFLUENCE, AND THEIR ROLE IN TECHNOLOGY ACCEPTANCE AND USAGE BEHAVIOR. Management Information Systems Quarterly, *27*(3), 425–478. *Vol. 24 No. 1, pp. 115-139/2000.*
82. Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead or alive? The development, trajectory and future of technology adoption research. Journal of the Association for Information Systems, 8(4), 268-286.
83. Venkatesh, V., Morris, M., Davis, G., and Davis, F. (2003). User acceptance of information technology: Toward a unified view. Management Information Systems Quarterly, *27*(3), 425–478.
84. Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. British Journal of Educational Technology, 40(1), 92e118.