Mobile Learning Utilization: A Proposed Model to Investigate an Important Predictors of Mobile Learning Utilization and Measure The Role of Behavioral Intention As A Mediator Variable

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ABSTRACT

Mobile learning is the extension of e-learning. Mobile learning becomes an important tool for successful learning, since an opportunity to learn anywhere and at any time. The research objective is to examine the possibility of utilizing mobile learning and study important factors that influence using mobile learning with focus on higher education students in Oman. The effectiveness of using mobile learning needs to achieve a positive behavioral intention to use it. However, much of the researches regarding using mobile learning seem to suffer from several shortcomings. On top of that, there is no common theoretical foundation on special model for using mobile learning. This study was based on a quantitative descriptive design with a sample size of 380 undergraduate students in the third-fourth years at Sultan Qaboos University (SQU). The sample was selected based on the proportional stratified and cluster sampling technique. The main instrument used was a questionnaire which was adapted from previous studies and whose content validity was checked by a panel of experts. A pilot study was conducted on 40 students to assist the reliability of the instrument which ranged in value from 0.822 to 0.949 on Cronbach's alpha. The modified utilization framework is a combination between the Unified Theory of Acceptance and Use of Technology (UTAUT), Mobile Learning acceptance Model (MLAM), and Liew’s Model. Further, this study introduces behavioral intention as a mediator variable that is believed to mediate the relationship between the selected factors and mobile learning utilization. The results from AMOS statistical analysis revealed a model that predicts the utilization of mobile learning among the undergraduates and which explained 50% of perceived mobile learning utilization and 26% of behavioral intention towards mobile learning utilization. Several implications were also drawn from the findings of this research. Finally, The proposed model is a definitive model that synthesizes what is known, and is likely to be a useful model that provides knowledge to guide future research in related fields.

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INTRODUCTION

Mobile learning is defined as the use of portable mobile devices such as smart phones, laptops, tablets and mobile phones equipped with the internet in the learning process [1][2][3]. Many higher educational institutions implement mobile learning to meet student’s needs especially those students who as a new generation [4]. According to Villiers and Harpur [5], mobile learning is an alternative to traditional education because this kind of learning can be done by anyone at any time and in any location, since mobile devices are connected using the internet and the world wide spread of mobile application. Kurkovsky [6] stated that, the learning environment may become an attractive option for many students who have increasing commitments to technology. Mobile learning is able to support a variety of learning activities [3] as well as give an enjoyable learning [7]. Using modern methods and techniques that is integrated in mobile learning assist to make learning more interesting, widely available, more interactive and flexible [8]. For instance, a student equipped with a mobile device can connect to any other devices, and access the network by using wireless communication technologies [2].

The system of Oman higher education has always revolutionized traditional concepts of teaching and learning. According to Al-Kanjari et al. [9], most of educational organizations in Oman do not provide a clear mobile learning application that supports different organizational services, so providing an educational mobile learning system is the intention of almost the developers. In fact, utilizing such mobile learning in Oman in order to support the educational fields can be beneficial [9]. Also, it is expected that the growth rate for mobile learning will be significantly higher than those for e-learning in Oman by the end of 2017, building on the popularity of mobile devices among the younger generations especially undergraduate students in colleges and universities. These solutions will go a long way in significantly improving the teaching and learning outcomes across all educational institutions. However, mobile learning can offer different benefits and enhance the overall learning experience of Omani students through providing various learning activities or utilizing the advantage of wireless technologies in the learning process of Omani education [2]. Hosni [10] concluded that, mobile learning provides uniquely actionable insights into both students’ current academic performance as well as their understanding. So, the students demands for customized mobile learning systems are increasing, because they need a proper system to interact activates and facilitate their learning [11].

Studies conducted in Oman related to mobile learning among higher education showed that, some students have started to use mobile learning outside the classroom for doing their work, such as look up words in bilingual dictionaries [12], others using mobile cameras to photograph whiteboards, power point, or any other important documents [10]. Sarrab et al. [2] conducted a study in Oman on the effectiveness and challenges of mobile technologies in learning setting, the study revealed that mobile learning is beneficial for students to complete certain tasks due to its clear features and learning becomes more interesting, flexible, and widely available. A study by Aldhaheri [13] on using internet via mobile devices in Oman and revealed that it was used mostly for social interaction and few for learning purposes. However, it still has not ascertained to what extent the higher education students in SQU are using mobile learning for specific purposes such as communication, research, problem solving, innovation and others.

The main purpose of this research was to study students’ level of mobile learning for higher education at Sultan Qaboos University (SQU) in Oman. The rest of this paper was structured as follows. Firstly, this study described literature review about theory and technologies model that could be explained and predicted usage of a new technology such as mobile learning. Secondly, it described research methods, hypotheses, and instrument. Thirdly, it described the results and conclusion show in the final section. In addition, the researcher hoped that this study will lead to better understanding the mobile learning utilization level in Oman students’ context and good identifying the factors that influence using mobile learning.

Mobile Learning in Higher Education:

Education is crucial for every country, as it is the route to scientific and technological advancement, cultural, and political development, and all countries have kind of interest development programs using technology in the sphere of education including Oman [14]. According to Al-adwan and Smedley [15], technology has frequency changed the ways of conducting education across higher educational institutions, training centers, organizations, and companies. Nowadays, digital media and the interfacing with new technologies are a part of day to day life for people of all ages [16]. So, both public and private institutions are rapidly adopting technology to create a comprehensive and connected learning community comprising of students, teachers, parents, and administration [9]. In Oman, tow methods were adopted and used: one is a technological interactive class used for teaching over the internet, the other one is based on the application of
self-learning, where learning and teaching resources are available to be downloaded from the education ministry website [17].

SQU began to implement e-learning in 2001 using web CT [9]. Al Musawi and Abdelrahem [18] pointed that, SQU has a large center for Educational Technology (CET), which assist all faculty members to improve the effectiveness of their teaching and learning methods by providing its expertise and guidance. SQU is also using model as the e-learning management system to support and enhance the traditional learning [19]. Although, e-learning in SQU has proven its importance in enhancing the traditional learning, e-learning is limited to the area and locations where a handheld devices exists [19]. This limitation was a burdening a lot of e-learning users, mainly if they live in rural areas of Oman. According to Serrab et al. [20], supporting the creativity of the academic professionals is by developing in the electronic learning form, such as using modern technology effectively. Therefore, using mobile learning (m-learning) can solve the e-learning limitation in SQU and support the existing environment.

Mobile learning involves the use of different types of mobile devices through connect to the internet which students can access any information about their courses, and enjoy learning environment at the comfort of their houses [21]. Mobile devices such as smart phones and tablets are becoming powerful tools in the hands for mobile learning. With the use of smart phones and mobile tablets students are able to flexibly customize, make decisions and show responsibility for their own learning and manage learning [22]. Handal et al. [23] and Uzoglu and Bozdogan [24] claimed that, using mobile learning increases engagement of students in learning setting, this is due to its portability and mobility characteristics. Also, it can save meeting time by letting users collaborate at a distance in the same cyberspace. However, mobile tablets and laptops are very portable as the students can be used in the classroom, computer lap or at home with any wireless internet connections [25]. Using such these devices in educational fields is beneficial [9]. For example, using laptops increases the opportunities to change teaching methods and allows students to have a deeper engagement with what they are learning [26]. Also, the students can access the content of courses more effectively and any time of the day by downloading many applications onto their mobile devices, also Iqbal and Qureshi [27] addressed that mobile learning can offer knowledge on variety of multimedia ways (video, SMS, Text, Pictures). Mobile learning has specific qualities of mobile devices such as ease of use, mobility, reliability and accessible applications [28]. Poong, Yamaguchi, and Takada [29] also suggested that, mobile devices provide students with the opportunity for ownership, the ability to understand without extensive training and a sense of belonging as they interact on the same level as others. Mobile learning provides an opportunity for the new generation of people with better communications and activities without taking into account the place and time. However, the utilization of mobile learning is beneficial to facilitate, enhance learning [10], and promote flexible learning [30] increase engagement [31]. In respect of utilization, understanding many valuable aspects of mobile devices, and in particular how they can be used to accommodate the needs of students, make them an excellent option to increase the utilisation of mobile learning [32]. The benefits of mobile learning have been broadly discussed in general. So, the factors that influence using mobile learning are important consideration when deciding to invest or not in mobile learning.

Based on the discussion and in order to bridge the knowledge gaps relating to the use of mobile learning, it is found that there is a need to conduct a study that is not only to investigate the utilization level of mobile devices as learning tool for certain purposes, but also to identify the factors predicting mobile learning utilization among undergraduate students in Oman, especially in SQU.

Model Development:

For the purpose of this research, utilization of mobile learning will be considered comparable to a new IT system as supported by Wang et al. [33] and Ali, Castellar, and Looy [34]. Therefore, the UTAUT theory can provide an appropriate model for determining the factors that may contribute on mobile learning utilization among undergraduates at SQU in Oman. According to Venkatesh et al., [35], the UTAUT model has been proven to account for approximately 70% of the variance in usage intention. Also, researchers have demonstrated it to be a valid and reliable theory for the acceptance and use of information technology [36]. UTAUT theory will act as the main theory to determine the factors predicting mobile learning usage, because it assists in understanding the contribution of the factors that may affect the utilization of mobile learning as well as providing a useful information in mobile learning field [37] [38] [39] [40]. UTAUT theory is illustrated in Figure 1.
According to Venkatesh et al. [35], UTAUT was developed from integrating eight theories of technology acceptance and use in literature. A total of 32 core determinants of usage such as perceived usefulness, perceived ease of use, subjective norm, social factors and several others were measured across the eight models and its framework includes four main constructs of IT use behaviour as follow:

1) Performance expectancy is the degree to which an individual believes that using the system will help him or her to attain gains in job performance.
2) Effort expectancy is the degree of ease associated with the use of the system.
3) Facilitating conditions are the degree to which an individual believes that an organization and technical infrastructure exists to support use of the system.
4) Social influence is the degree to which an individual perceives that important others believe he or she should use the new system.

In the context of this research, the researcher will use the UTAUT design model to explore the direct correlations between the four main variables besides self-management as a proposed factor and the usage of mobile learning. Hence, the UTAUT theory holds that these key constructs (performance expectancy, effort expectancy, facilitating conditions, and social influence).

Mobile learning acceptance model MLAM is an extension of technology acceptance model TAM. Akour [41] developed and tested MLAM by developing three derivatives of TRA. The technology acceptance model (TAM) developed by Davis [42] was designed to be used in IT contexts by adding the constructs of perceived usefulness and ease of use. The theory of planned behaviour (TPB) developed by Ajzen [43] extended TRA by adding the construct of perceived behavioural control in formulating a theoretical perspective for studying the factors that influence students' acceptance of mobile learning. According to Akour [41], his findings revealed that, all the construct of MLAM were contributed significantly on mobile learning before the actual implementation of mobile learning. A key strength of MLAM is that it consistently explains behaviour in academic setting and it explains 77.7% of the variance in behavioural intention to use mobile learning, which can be shown to be a strong predictor of actual use. Figure 2 represents the MLAM model including all the factors.

However, MLAM was developed to predict students' acceptance of mobile learning [41]. MLAM incorporates four main constructs as follow:

1) Users' readiness which defined as perceived students' commitment which refers to intrinsic and internal commitment to utilize mobile devices for learning.
2) Extrinsic Influence is defined as "the extent an immediate faculty members or peers directly encourage, simulate and effect on students' opinion for observing the widespread use of mobile learning services.

3) University commitment was proposed as an important facilitator for user attitudes and behavioural intention towards mobile learning acceptance.

4) Quality of service is defined as the influence perceptions of the reliability, responsiveness, quality; personalization and security of a system have on willingness to use the system.

Furthermore, in MLAM perceived usefulness and perceived ease of use are factors which have key roles regarded as determinants on attitude towards using mobile learning as well as directly influenced on behavioural intention to use mobile learning.

However, extrinsic influence in MLAM is similarly to social influence in UTAUT which refers to the social issues and it was the most significant predictor of mobile learning acceptance, which is the same result in UTAUT [35]. Also, as UTAUT, MLAM encompasses facilitating conditions in the construct namely university commitments which refers to all facilitating conditions and issues such as technical and organizational support provided from university to support the use of mobile learning system. Hence, that was completely agreed with Marrs’s [21] investigation of mobile learning acceptance by adopting MLAM as a theoretical framework. Marrs [21] claimed that this factor is an important construct to achieve high level of mobile learning acceptance. Hence, all the external variables in MLAM were directly influence the dependent variables of students' perceptions of usefulness, ease of use, and attitude which all were considered as determinants of perceived behavioural intention towards mobile learning acceptance. Similar to UTAUT, MLAM considers behavioural intention as a determiner of system intention and acceptance, but in this approach behavioural intention was determined by perceived usefulness and attitude [41]. But, the role of mediating effect of behavioural intention towards mobile learning utilisation was not specified in Akour's model. Besides that, Akour [41] did not attempt to measure other factors that related to individual aspects and organizational issues, such as self-management. Furthermore, Akour [41] did not attempt to measure the potentially moderating effects such as gender and field of study. However, Akour recommended that research is needed to understand students' perceptions of mobile learning by another variables and to assess the extent to which his results can be generalized. Akour also recommended research that investigates potential differences in perceptions between gender and between students of differing technological skill or field of study. As a conclusion from all previous discussion, in the present study, the investigation will be as a combination of MLAM and UTAUT.

Liew’s Model:

Liew et al. [44] created a model to investigate the factors that influence intention to use mobile learning by modifying UTAUT among Koreans’ higher education students. The constructs of this model were perceived self-management of learning, perceived playfulness, social influence, and performance expectancy and were considered as determinants of perceived intention to use mobile learning. According to Liew’s model [44], perceiving sufficient mobile self-management skills were very necessary to ensure a successful and effective utilisation of mobile learning. Moreover, self-management of learning was found as a critical determinant predicting intention to use mobile learning. The result of their study revealed that, the model could explain 30% of the variance in behavioural intention to use mobile learning community. Figure 3 illustrates the constructs of the Liew’s Model with the all the relationships between them.

Fig. 3: Liew’s Model of Mobile Learning (Source: Liew et al., 2013).

This model did not investigate mobile learning utilisation. Besides, the external variables did not encompass organizational support, individual differences and facilitating conditions. This model also did not specify the role of mediators (behavioural intention) on the actual use in the domain of mobile learning. This model is limited to generalize findings in that the sample size was not huge enough and limited to only first-second years college students. According to Liew et al. [44], they suggested that testing their model with a bigger sample size and a wide range of university students may provide better implementation of mobile learning. Also they stated that, this model guides the researchers to develop a sufficient model on mobile learning utilisation in the future.
Hence, social influence, performance expectancy and behavioural intention to use mobile learning will be adopted from this model as a critical factors predicting mobile learning utilization as well as mobile self-management of learning will be as a new proposed construct in the developed model. However, perceived playfulness will be not considered in the proposed model in the present study, because perceived playfulness in the model refers to an individual’s performance or engagement in an activity and the focus of the present study will be on utilization and did not regard performance of respondents. This choice supported by Wang et al. (2009) and Al-matari et al. [40], they suggested that self-management can be considered as a critical factor to investigate mobile learning usage. According to Wang et al. [45], Liaw et al. [46] and Liew et al. [44], the investigation of self-management learning towards mobile learning was contributed on behavioural intention to utilize mobile learning in their studies. This means, if the students have sufficient self-management to control their learning in terms of time and increase their skills in critical thinking or locating resources on their using mobile learning systems, then their use of mobile learning will be increased and become effective [47] [48]. From that, it is obvious that self-management learning will be able to act as important factor that may affect mobile learning utilization.

As a conclusion, based on all the previous discussion from the literature reviews, UTAUT theory will be used as a theoretical base, besides MLAM Model and mobile self-management that will be adopted from Liew’s Model, in order to conduct research which determines the critical factors predicting mobile learning utilization among SQU undergraduate students. In the content of this study, MLAM will help to determine the factors that influence behavioural intention towards utilising of mobile learning. There are a little researches using MLAM as a basic model to identify determinants for students about acceptance of mobile learning in academic setting. So, uses of MLAM in educational settings are not common; nevertheless it has been validated in some trials using students. Therefore, using MLAM beside UTAUT can offer unique benefits in educational technology systems especially mobile learning settings and to address the previous limitations of other researches when proposed a new model of mobile learning utilization. Moreover, MLAM fully meets the needs of this study as the theoretical basis for many reasons. The model is new that few research has been published validating the MLAM theoretical model [21] [49]. This study depends on use one recently proposed model and the model described 77.7% of the variance in behavioural intention to use mobile learning. The extended MLAM variables can be serving as the foundation of the research model and higher order constructs of the study. For example, extrinsic influence in MLAM can support the choice of social influence in UTAUT in the domain of mobile learning utilisation; also university commitment will support the selected factor namely facilitating conditions from UTAUT. This is unique because few studies have considered the joint effect of the different diminishes of variables. Therefore, constructs which will be developed in the proposed model will be based on the integration between MLAM in mobile learning and the use of UTAUT in utilisation of the technology. Figure 4 shows a proposed model for the present study.

**Fig. 4: Research Framework and Hypotheses**

**Research Objectives, Questions and Hypotheses:**

**Objective One:**
To determine the influence of performance expectancy, effort expectancy, facilitating conditions, social influence, self-management and behavioral intention towards mobile learning utilization among the undergraduates at SQU.

The following six hypotheses were formulated to test objective two:

H1: Performance expectancy has a significant influence on mobile learning utilization.
H₂: Effort expectancy has a significant influence on mobile learning utilization.
H₃: Facilitating conditions has a significant influence on mobile learning utilization.
H₄: Social influence has a significant influence on mobile learning utilization.
H₅: Self-management has a significant influence on mobile learning utilization.
H₆: Behavioral intention has a significant influence on mobile learning utilization.

**Objective Two:**
To examine the role of behavioral intention as a mediator for the utilization of mobile learning among the undergraduates at SQU.

The following five hypotheses were formulated to test objective three:
H₇: Behavioral intention mediates the influence of performance expectancy on mobile learning utilization.
H₈: Behavioral intention mediates the influence of effort expectancy on mobile learning utilization.
H₉: Behavioral intention mediates the influence of facilitating conditions on mobile learning utilization.
H₁₀: Behavioral intention mediates the influence of social influence on mobile learning utilization.
H₁₁: Behavioral intention mediates the influence of self-management on mobile learning utilization.

**Objective Three:**
To develop a model that predicts the utilisation of mobile learning among the undergraduates at SQU.

**MATERIAL AND METHODS**

In this study, questionnaires were distributed to the students at SQU. SQU is appropriate to conduct this research, due to the fact that, SQU is the only public (government) university of higher education in Oman, which is included the biggest number of undergraduates among other universities and colleges. The design of this research is survey design proportional stratified random sampling was used as the sampling technique to select 380 students as a sample size based on Cochran’s formula (2007). Data collection for this study was undertaken from four faculties namely; Education, Engineering, Economic, and Science who were in the third and fourth years. These selected faculties were chosen due to their accessibility and contain the highest number of students (SQU, 2015). Table 1 shows the distribution of sample size.

<table>
<thead>
<tr>
<th>Total of all population (3rd + 4th) years</th>
<th>Strata (faculty)</th>
<th>Num. of students</th>
<th>Percentage Num.of students (at faculty)</th>
<th>Proportion(Percentage * Sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>642</td>
<td>642 / 380 = 25%</td>
<td>25% * 380 = 95</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>709</td>
<td>709 / 380 = 28%</td>
<td>28% * 380 = 106</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td>647</td>
<td>647 / 380 = 25%</td>
<td>25% * 380 = 95</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>569</td>
<td>569 / 380 = 22%</td>
<td>22% * 380 = 84</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>2567</td>
<td>280 / 2567 = 15%</td>
<td>380</td>
<td></td>
</tr>
</tbody>
</table>

**Data Analysis and Research Results:**

**Respondent’s Profile and Background Information:**
Based on the demographics and other personal background information obtained, out of 380 respondents, 47% were males and 53% were females. When 43% of the respondents were 20-22 years old on the third year, 57% were 23-24 on their fourth year. Overall students used mobile devices at 100%, around 97% of students indicated that they used their own smart phones; around 36% of the students used their own tablets, and 55% of the students used both type of these mobile devices (Tablets and Smart phone). Table 2 below gives the respondents’ demographic profile. However, 93% of the respondents perceived experience with using internet via smart phones, while 37% accessed internet via their tablets. Figure 5 shows percentage of access internet by mobile devices.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency(N)</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>203</td>
<td>53%</td>
</tr>
<tr>
<td>Male</td>
<td>177</td>
<td>47%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Frequency(N)</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Year (20-22 Years Old)</td>
<td>217</td>
<td>57%</td>
</tr>
<tr>
<td>4th Year (23-24 Years Old)</td>
<td>163</td>
<td>43%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use Mobile Device</th>
<th>Frequency(N)</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>380</td>
<td>100%</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Mobile Devices</th>
<th>Frequency(N)</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPad</td>
<td>76</td>
<td>20%</td>
</tr>
<tr>
<td>Tablet</td>
<td>95</td>
<td>25%</td>
</tr>
<tr>
<td>Smartphone</td>
<td>279</td>
<td>73%</td>
</tr>
<tr>
<td>Tablet and Smartphone</td>
<td>20</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 2: Distribution of Respondents by Demographic Data Demographic Data
Analysis Validity and Reliability:

The reliability was measured by using SPSS statistical analysis from Cronbach’s Alpha coefficients which has ranged from 0.822 to 0.949. Also, the Convergent Validity was assessed by using SEM by computing the Average Variance Extracted (AVE) after CFA results. Table 6 is shown that.

Table 6: Criteria of Convergent Validity and Reliability

<table>
<thead>
<tr>
<th>Construct</th>
<th>Convergent Validity (AVE)≥ 0.5</th>
<th>Composite Reliability (CR)≥ 0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Expectancy (PE)</td>
<td>0.54</td>
<td>0.82</td>
</tr>
<tr>
<td>Effort Expectancy (EE)</td>
<td>0.65</td>
<td>0.92</td>
</tr>
<tr>
<td>Facilitating Condition (FC)</td>
<td>0.55</td>
<td>0.83</td>
</tr>
<tr>
<td>Social Influence (SI)</td>
<td>0.61</td>
<td>0.89</td>
</tr>
<tr>
<td>Mobile Self-Management (SM)</td>
<td>0.65</td>
<td>0.88</td>
</tr>
<tr>
<td>Behavioral Intention (BI)</td>
<td>0.74</td>
<td>0.93</td>
</tr>
<tr>
<td>Mobile Learning Utilization (MLU)</td>
<td>0.63</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Hypothesis Testing:

To predict the value of one variable to another, based on the results depicted in Table 7, it can be said that:

H1: Performance expectancy has a significant influence on mobile learning utilization.

The results indicated that there was a significant influence of performance expectancy on the utilization of mobile learning among the undergraduates at SQU (P=0.000), thus H1 was supported in this study.

H2: Effort expectancy has a significant influence on mobile learning utilization.

The results indicated that there was no significant influence of effort expectancy on the utilization of mobile learning among the undergraduates at SQU (P=0.093), so H2 was not supported in this study.

H3: Facilitating conditions has a significant influence on mobile learning utilization.

The results indicated that there was a significant influence of facilitating conditions on the utilization of mobile learning among the undergraduates at SQU (P=0.093), therefore H3 was supported in this study.

H4: Social influence has a significant influence on mobile learning utilization.

The results indicated that there was no significant influence of social influence on the utilization of mobile learning among the undergraduates at SQU (P=0.554), thus H4 was not supported in this study.

H5: Mobile self-management has a significant influence on mobile learning utilization.

The results indicated that there was a significant influence of mobile self-management on the utilization of mobile learning among the undergraduates at SQU (P=0.000), thus H5 was supported in this study.

H6: Behavioral intention has a significant influence on mobile learning utilization.

The results indicated that there was a significant influence of behavioral intention towards the utilization of mobile learning among the undergraduates at SQU (P=0.000), therefore H6 was supported in this study.
H7: Behavioral intention towards mobile learning mediates the influence of performance expectancy on mobile learning utilization.

There was a direct effect or no mediation effect of behavioral intention on perceived performance expectancy towards mobile learning usage. This showed that behavioral intention did not mediate the influence of performance expectancy to mobile learning usage. Therefore, H7 was not supported and the decision criteria are demonstrated below.

H8: Behavioral intention towards mobile learning mediates the influence of effort expectancy on mobile learning utilization.

There was an indirect or mediation effect of behavioral intention on perceived effort expectancy towards mobile learning usage. This explained that behavioral intention mediated the influence of effort expectancy to mobile learning usage. Thus, H8 was supported and the decision criteria are presented as follows.

H9: Behavioral intention towards mobile learning mediates the influence of facilitating conditions on mobile learning utilization.

There was a direct or no mediation effect of behavioral intention on perceived facilitating conditions towards mobile learning usage. This confirmed that behavioral intention did not mediate the influence of facilitating conditions to mobile learning usage. Thus, H9 was not supported and the decision criteria are illustrated as follows.

H10: Behavioral intention towards mobile learning mediates the influence of social influence on mobile learning utilization.

There was a mediation effect of behavioral intention on social influence towards mobile learning usage. This confirmed that behavioral intention fully mediated the influence of social influence on mobile learning usage. The factor social influence was capable influencing mobile learning utilization with the presence of behavioral intention. Hence, the H10 was supported and the decision criteria are depicted below.

H11: Behavioral intention towards mobile learning mediates the influence of mobile self-management on mobile learning utilization.

There was no mediation effect of behavioral intention on mobile self-management towards mobile learning usage. This confirmed that behavioral intention did not mediate the influence of mobile self-management on mobile learning usage. Hence, the H11 was not supported and the decision criteria are depicted below.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Beta</th>
<th>P-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>PE → MLU</td>
<td>0.268***</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>EE → MLU</td>
<td>0.078</td>
<td>0.093</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3</td>
<td>FC → MLU</td>
<td>0.22***</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>SI → MLU</td>
<td>0.034</td>
<td>0.554</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H5</td>
<td>SM → MLU</td>
<td>0.26***</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>BI → MLU</td>
<td>0.25***</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H7</td>
<td>PE → BI</td>
<td>0.044</td>
<td>0.498</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H8</td>
<td>EE → BI</td>
<td>0.264**</td>
<td>0.001</td>
<td>Supported</td>
</tr>
<tr>
<td>H9</td>
<td>FC → BI</td>
<td>0.107</td>
<td>0.094</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H10</td>
<td>SI → BI</td>
<td>0.365**</td>
<td>0.001</td>
<td>Supported</td>
</tr>
<tr>
<td>H11</td>
<td>SM → BI</td>
<td>-0.026</td>
<td>0.712</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

**Development of Model Predicting Mobile Learning Utilization:**

The last objective in this study was to develop a model that predicts the utilization of mobile learning. In order to achieve this objective, the squared multiple correlations (R2) for each of the construct and every beta value for each structural path were referred closely. The R2 and Beta (β) values were obtained once the test for behavioral intention fully mediated the influence of social influence on mobile learning utilization for an impressive 26% of the variance in BI and around 50% in mobile learning utilization (MLU) by its six predictors (PE, EE, FC, SI, SM and BI) among undergraduate’s students at SQU. As compared to the one introduced by Venkatesh et al. [35], UTAUT had capable in explaining a total of 70% of the variance in actual technology use. According to Quaddus and Hofmeyer, the squared of Multiple Correlation (R-square) makes sense only for endogenous variables which here refers to the dependent variables. Table 8 presents the overall squared of multiple correlations (R2).

**Table 8: The Squared of Multiple Correlations (R2) for each Factor**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>R-square</th>
<th>Recommended values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral Intention (BI)</td>
<td>0.26</td>
<td>0.10</td>
<td>Quaddus and Hofmeyer</td>
</tr>
<tr>
<td>Mobile Learning Utilization (MLU)</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The findings of the present study revealed that there was a significant influence of performance expectancy, facilitating conditions and self-management toward mobile learning usage directly. Besides that, there was
indirect influence of effort expectancy and social influence toward mobile learning utilization. A predictive model is formulated as a result of SEM analysis with five core factors which influence the variable mobile learning utilization and one mediator variable (behavioral intention). In this study, the predictive model has been tested among SQU undergraduate students from different faculties who in the third and fourth years at SQU. This predictive model of mobile learning usage is able to explain (adjusted R2 of 50%) of the utilizing mobile learning which is considered high. The relative importance of each factor was shown by using the beta value (β). Performance expectancy construct was identified as the most important factor (β=0.268, p=0.000) that influence the use of mobile learning directly, then mobile self-management of learning construct was identified as the second important factor (β=0.260, p=0.001) influencing the use of mobile learning directly, followed by behavioral intention construct (β=0.25, p=0.000), and finally (β=0.22, p=0.001) for facilitating conditions. On the other hand, effort expectancy and social influence constructs were perceived as factor influence mobile learning usage indirectly. Meanwhile, behavioral intention was identified as a mediator variable that mediated the influence of effort expectancy (β=0.26, p=0.001) and social influence (β=0.37, p=0.001) towards mobile learning utilization. As a conclusion, it could be concluded that the presence of behavioral intention only mediated the influences of effort expectancy and social influence. In addition, the presence of behavioral intention did not mediate the influence of the factors (performance expectancy, facilitating conditions, and mobile self-management) towards mobile learning utilization. Figure 6 shows the proposed model which is known as mobile learning utilization of SQU students (SQU-MLU).

**Fig. 6: Mobile Learning Utilization Model of SQU Students (SQU-MLU)**

**Conclusion and Recommendation:**

Mobile learning plays an increasingly important role in education. Mobile devices such as smart phones, tablets and laptops are becoming powerful tools in the hands for using mobile learning. In Oman, using mobile learning has successfully enabled higher educational institutions to provide their students and staff members with various online educational services. Despite the wide spread of mobile learning system adoption and usage, it has been noticed that there is a lack in investigating mobile learning utilization in Oman among higher education. Therefore, this study proposes an integrated framework to investigate predictors which impact on mobile learning utilization among undergraduate students at SQU. This study introduces a theoretical framework that combines the Unified Theory of Acceptance and Use of Technology (UTAUT) and Mobile Learning Acceptance Model (MLAM) as well as one new construct that is believed to influence mobile learning usage namely, self-management which was adopted from Liew’s et al. [46] model. In terms of factors influencing the utilization of mobile learning, the undergraduates perceived that performance expectancy as the most important in influencing mobile learning usage, followed by self-management then behavioral intention, finally facilitating conditions. Meanwhile, social influence and effort expectancy were identified as influencing usage of mobile learning indirectly which being mediated by behavioral intention. These findings were in congruence with the original UTAUT and also MLAM. The results of various recent studies that used UTAUT in their investigation in term of mobile learning [50] [8] [51] [52] [26] and MLAM [41] [21]. However, the results of the present study were also parallel with other theories such as TAM, TAM2, UTAUT2 and UTAUT3. Therefore, the findings not only provide evidence for outcomes of UTAUT and MLAM, but also introduce support for the outcomes of other educational theories or several models in mobile learning field. In addition that, the objectives of this study were achieved by answering the research questions through descriptive analyses using SPSS and SEM analyses. Finding predictors that influence mobile learning utilization among undergraduates at SQU in Oman is necessary because that can encourage the high educational institutions to use the recent technology applications which need to assess using mobile learning in teaching and learning purposes. So, in order to assess using mobile learning among students in higher education, administrators and
teachers need to have experience of utilizing mobile learning system. Therefore, the university administration should focus on the design mobile learning system that appropriate with students’ perception. Good perception and university policy supporting were two major factors that lead to success mobile learning system.

REFERENCES


