Proposed Model to Identify the Influencing Students' Behavioral Intention to Use Mobile Learning: A Perspective from a Different Countries Case Study

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Abstract: *Recent advancements in electronic learning and mobile computing resulted in a new technological approach called mobile learning. The concept of mobile learning is the provision of education via portable devices such as tablets and laptops. However, mobile technology remains limited by factors such as connectivity and battery life, security, memory, and screen and key sizes. This study proposes a model that can be used to identify factors that can influence intention to use mobile learning by promoting interactivity between students and instructors. A total of 23 models linked to use in mobile learning were reviewed and analyzed, and we were able to pinpoint factors such as Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and perceive enjoyment the most significant vis-à-vis influence on the intention of utilize mobile learning. This study also outlines the proposed model, the development of the hypotheses pertaining to this work, and the possibility of future works on this topic*

Keywords: mobile learning, Learning Model, intention to use, factor influence

1. Introduction

Personalizing learning empowers students by making them take ownership of the learning process, and integrating them with the digital world so that they are better prepared for the future. Access to resources beyond the classroom will inspire students to solve problems, think critically, and collaborate and create. The advent and integration of technology will instill a love of learning in students. Mobile learning is a facet of this technological advancement.

Mobile learning is defined as "learning that occurs when learners have access to information anytime and anywhere via mobile technologies to perform authentic activities in the context of their learning"[1]. It suggest that the advancement of knowledge is limitless and not curtailed by geography. The progression of portable devices and integration of learning into technology beyond that of a classroom has recently become a subject of immense interest [2]. Mobile technology allow educational institution to enhance their ability in providing services and communicating with their students more effectively [3]. [4] pointed out that instructors that utilize mobile learning because "It is important to bring new technology into the classroom" and "Devices used are more lightweight than books and PCs". Mobile learning has increased in usage over the past few years [5] [6]. Previous studies focused on the relevance of mobile technology towards enhancing students educational experiences [7, 8] [9], [10], [11], [12],[13],[14] and [15], while others focused on this aspect in the context of developing countries [16] [17, 18]. Despite the benefits of adopting mobile technology

in education being apparent, it is not immediately adaptable to local conditions in certain areas due to unavoidable factors. There are issues related to the usage of mobile devices in classrooms [19]. challenging the status quo of formal education [20]. Ethical issues are also of concern, most of it having to do with either the parents or schools being compelled to monitor the progress of learning by the students [21]. Willingness to adopt this technology is also not universal, and this needs to be addressed before we can adopt mobile learning [22]. Also, the effort needed in using mobile learning is enormous, and some instructors might hesitate to use it due to their personal unfamiliarity with its concepts and ideas [23] [24]. It should also be pointed out that the use of mobile learning in tertiary education is limited due to it not passing beyond the experience phase as of now.

Previous studies on mobile learning outlined factors that influence its use. Its adoption relies to a large extent on whether both students and instructors believe that mobile technology will address their respective needs. The fact that the adoption of mobile learning is cumbersome and complicated also makes it a hard choice to make for many [19][25]. The study on the academic and influencing factors on mobile study are regarded as the most challenging undertaking by most researchers. [26] opined that in order for mobile learning to succeed, it needs to outline the factors that influence students acceptance and adoption. This study intends to determine the influencing factors and propose a model that helps us understand the behavioral intention use of mobile learning technology.

[27] suggested the provision of a comprehensive model for a mobile learning environment from reviewing other models and frameworks. This study utilizes his suggestion by reviewing previous models and pinpointing correlated factors that influence the intention of use for mobile learning. Consequently, a set of factors were identified and compared to determine its underlying relationships. These factors were selected as they come from different countries and represent different population sets, as per Table 3. These factors are able to determine the influence on the intention to use in many countries, specifically developing countries. This study will propose a comprehensive model that can be used to identify factors that influence student behavioral intention to use mobile learning in education.

This paper is organized in the following order: Section 2 detail the literature on mobile learning, the intention of using mobile learning, and analysis pertaining to the existing model for the identification of the most important factors that influence the intention to use mobile learning. Section 3 outlines the research methodology. Section 4 details the research model and outlines the hypotheses, while Section 5 concludes the work and suggests future research directions.

2. Related Work

2.1 Overview of Mobile Learning

Mobile technology is defined as the integration of mobile computing and electronic learning. The latter complements traditional learning by using modern devices in classrooms. Mobile computing utilize several means for the provision of mobile services to its users, smartphones, tablet PCs, and laptops. E–learning is dependent upon mobile computing [28]. The publicity associated with mobile learning is fast increasing [5] . [29] defined mobile learning as "the use of mobile devices with an internet connection for educational setting", while others define it as "an educational interaction delivered through mobile technology and accessed by learners from any location"[30]. Based on the definitions, mobile learning relies upon mobile technology to access data and communicate this to others via wireless technology. Therefore, mobile device and technology is expected to improve educational activities.

Researchers investigated the benefit of mobile learning, especially in the context of students. [31] reported that students can use mobile technology to communicate and share educational resources. Similarly, [26] posits that students are aware of the fact that mobile learning complement their learning experiences. [32] stated that a mobile learning framework immensely benefit from course interactions and communications between PC users and wireless/handheld (W/H) devices. Messages sent from PCs are instantly accessible, and students using W/H devices are able to exchange messages with students using PCs. Students can also be alerted to new messages to keep the discussion going. These advantages prove to be useful towards the improvement of the learning experience for students. However, mobile learning in tertiary education is rather limited due to the fact that it remains in the testing stage. Most research into mobile learning are based upon its challenges and opportunities in general, and specifically distance learning [33]. [26] believes that in order for the mobile learning technology to succeed, it is vital that we recognize factors that influence students' acceptance and adoption.

Despite the previously outlined benefits pertaining to mobile learning, it is not without its challenges, such as technical challenges, encompassing small screens and keyboards, number of files/assets and formats supported by specific devices, limited memory, content security or copyright issue from authoring group, and multiple operating systems. Social and educational challenges are also prevalent, which includes learning assessment beyond the classrooms, results tracking and the proper use of information, the storage of personal information, and the support of learning across multiple platforms [3]. These limitations could result in the passivity behavioral intent from the students, which could prompt them to eschew the use of mobile learning [26]. It can therefore be surmised that mobile limitations form the core barrier towards the perceived ease of use and behavioral intent of students to use automated mobile learning.

2.2 Intention TO Use Mobile Learning

Behavioral intention to use is defined as "the individual's interest in using the system for future work" [34]. [35] indicated that mobile learning has emerged as a trend in learning due to increased access to mobile devices, the internet, and wireless technology. It is also assumed to be the most useful way to supplement information technology, online learning, and traditional learning, and has the potential to do much more in the near future. However, the advantages and disadvantages of mobile learning could well contribute towards further innovation in education [35] [36] [17].

Previous studies investigated the relationship and influence between factors and behavioral intention to use in mobile technology such as mobile banking [37] [38],mobile payment [39] [40], and mobile commerce[41, 42], while others investigated mobile learning [35], focusing on Behavioral Intention to use with mobile technology in education [43]. [44] conducted an online survey using a sample size of 493 students from a South Korean university, and reported that Relative advantage, innovativeness, and mobile learning resistance all had significant influence on students' intention to use mobile learning, with the factor relative advantage being the most prominent. Moreover, [45] examined factors linked to Taiwanese EFL college students' behavioral intention to use mobile English vocabulary learning. Data were collected from questionnaires administered to 84 students, and they reported that the participants behavioral intentions are highly and positively correlated to mobile devices compatibility, self-efficacy, and perceived ease of use. Data were collected from a total of 234 questionnaires of undergraduate students from different courses at two Jordanian universities , and they reported that the students' intentions to adopt m-learning can be influenced by factors such as relative advantage, complexity, social influence, perceived enjoyment, and self-management of learning.

Due to the difficulty in simulating actual behavior in an experimental setting, this study measures behavioral intentions instead. Numerous studies of technology acceptance measured behavioral intentions instead of actual behaviors [47] [48]. Previous research confirmed a strong correlation between behavioral intentions and actual behaviors [49] [50].

2.3 Factors Influence ON Intention TO Use Mobile Learning

This paper analyzed 23 models in mobile learning from the past 6 years (2013-2018). Previous models were also investigated to pinpoint factors that influence behavioral intention to use mobile learning. Most of the findings came from student perceptions [44, 51, 52], which led to studies on teachers' and trainers' perceptions. Recent works used the TAM model and its influence on the intention to use mobile learning. [53] incorporated the factors perceived usefulness, perceived ease of use, and subjective norms, and determined its influence on the intention to adopt mobile learning. Samples were collected from 401 students from a private university located in Malaysia. The three factors have a positive effect on the intention to adopt mobile learning. [54] used the survey method to collect a total of 400 responses from students in Toosi university in Iran, and they reported that only the trust factor has a positive and significant effect on behavioral intention. Similarly, [55] examined the factors perceived usefulness, perceived ease of use, perceived enjoyment, and personal innovativeness. All of the factors, with the exception of personal innovativeness, highly influence the intention to use mobile learning .

Other researchers pointed out that the usage of the UTAUT model led them to conclude that the model influences the intention to use mobile learning [24] [56] [51] [57]. [24] outlined the importance of the positive effect of the UTAUT model (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions) towards the usage of mobile intention via data gathered from 174 students in tertiary education. University students [56] were examined using the UTAUT model and other factors (affordability and pedagogical). The findings were based on 351 questionnaires, and showed that the performance expectancy, affordability, and pedagogy significantly influence the intention to use mobile learning. Other works studied the intention of use mobile learning using the UTAUT2 model, where [58] distributed and collected a total of 182 completed questionnaires. They pointed out that hedonic motivation, performance expectancy, social influence, and price value positively affect the students' mobile learning adoption.

Other studies focused on other factors that influence the intention to use mobile learning [59] [36] [44] [60]. [59] analyzed factors influencing the intention to use mobile learning, and reported that only two factors (relative advantage and complexity) significantly affect the intention to use mobile learning. Another study conducted with 493 university students reported that relative advantage is the most significant factor, followed by innovativeness and mobile learning resistance upon the students' intention to use mobile learning [44].

Table 2 show the factors extracted from the analyses of 23 models. This study focuses on factors with high (more than one) frequency, as this means that it has been successfully examined and showed the students perspectives from multiple countries (see Table 3). This could help researchers understand the issues pertaining to mobile learning, while providing insights into the factors that could influence students' intention to use mobile learning technologies and prompt universities and organizations to promote educational endeavors.

Table 1: Number of model with sources

No. of Model	Source	No. of Model	Source
I.	[53]	XII.	[55]
II.	[24]	XIII.	[52]
III.	[59]	XIV.	[60]
IV.	[36]	XV	[19]
V.	[56]	XVI.	[61]
VI.	[58]	XVII.	[62]
VII.	[51]	XVIII.	[63]
VIII.	[54]	XIX.	[64]
IX.	[57]	XX.	[43]
X.	[44]	XXI.	[65]
XI.	[66]	XXII.	[67]
		XXIII.	[18]

Table 2: Extracted factors from existing models that influnce to use mobile learning

No.	factors	No. of model	Total frequency of factor
1	Perceived Usefulness	I.,VIII.,XII.,XIII.XIV.,XV.,XVI.,XVIII.,XIX.	9
2	Perceived Ease	I.,XII.,XIV.,XV.,XVI.,XVIII.,XIX.	7
3	Subjective norms	I.,XVIII.	2
4	Performance Expectancy	II.,V.,VI.,VII.,XI.,XX.,XXI.,XXII.,XXIII.	9
5	Effort Expectancy	II.,XI.,XX.,XXI.,XXII.,XIII	6
6	Social Influence	II.,IV.,VI.,XVI.,XX.,XXI.,XXII.,XXIII.	8
7	Facilitating Conditions	II.,XVI.,XX	3
8	relative advantage	III.,X.	2
9	Complexity	III.	1
10	Reliability and Recommendation	IV.	1
11	Affordability	V.	1
12	Pedagogical	V.	1
13	Hedonic Motivation	VI.	1
14	Price Value	VI.	1
15	personal innovative	VII.	1
16	Trust	VIII.	1
17	Learning Style	IX.	1
18	Innovativeness	X	1
19	and mobile learning resistance	X	1
20	perceived enjoyment	XII.,XVII.,XX.	3
21	perceived convenience	XIII.	1
22	perceived playfulness	XIII.	1
23	Perceived resources	XIV.	1
24	basic ICT skills	XV.	1
25	Self-efficancy	XVIII.	1
26	trust expectancy	XXII.	1

27	self-management	XXII.	1
28	system functionality	XXII.	1
29	Quality of service	XIX	1

1. Methodology

This study used the secondary data collected from literature, with more than 50% coming from (2015-2018). Findings from other research investigating factors that influence the intention to use mobile learning were also used. The keywords used to narrow down the analysis materials include "mobile learning", "factors", "influencing factors", and "model". The findings are presented via the analysis of the trends and patterns garnered from literature. The factors were then tabulated into Table 2.

2. Proposed Model and Research Hypotheses

It is important to determine the suitability of models that can be combined to affect high influence on the intention to use. Table 2 shows the reviews and analyses of 23 models, which include factors such as 1 perceived usefulness ,2) perceived ease of use , 3) Performance Expectancy, 4) Effort Expectancy, 5) Social Influence, 6) relative advantage, 7) Facilitating Conditions, 8) perceived enjoyment, and independent variables. These factors were selected due to its consistent appearance in the models being analyzed, making them influential factors in the context of many countries and communities. [68] pointed out that the perceived usefulness and relative advantage help shape performance expectancy, while perceived ease of use help shape effort expectancy. Therefore, this study will combine the perceived usefulness and relative advantage under Performance expectancy and perceived ease of use under Effort Expectancy. Therefore, the independent variable will be 1)Performance Expectancy, 2) Effort Expectancy 3) Social Influence 4)Facilitating Conditions, 5) perceived enjoyment, as per other researches employing these factors to detail its influence on the intention to utilize mobile learning. This study utilize the intention to use as a dependent variable that influences independent variables. Figure 1 shows the proposed model of this study.

Table 3: The factor tht could influnce on intention to use m-learning with acceptable country

| No.	Factor	Country	No. of model
1	Performance Expectancy	British, Malaysia, China, Belgrade. United State, Egypt, Malaysia, Jordan, Nigeria	II.,V.,VI.,VII.,XI.,XX.,XXI.,XXII
2	Effort Expectancy	British, United State, Egypt, Malaysia, Jordan, Nigeria	II.,XI.,XX.,XXI.,XXII
3	Social Influence	British, Portugal, China, Pakistan, Egypt, Malaysia, Jordan, Nigeria	II.,IV.,VI.,XVI.,XX.,XXI.,XXII.,
4	Facilitating Conditions	British, Pakistan , Egypt, Nigeria	II.,XVI.,XX
5	perceived enjoyment	Laos, Uganda ,Egypt,	XII.,XVII.,XX.
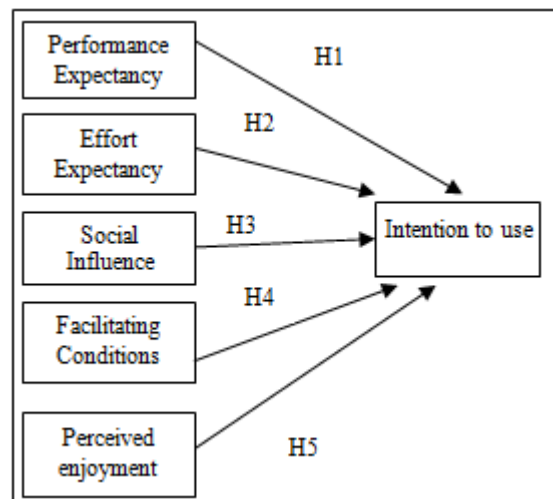
Figure 1: Proposed Model

4.1 Performance Expectancy

This term is defined as the " extent to which a person believes that using an information system would help him or her to benefit in terms of job performance"[69]. Also, previous studies confirmed that the performance expectancy had the highest influence on the behavioral intention to use mobile learning [24, 51, 56, 58, 66]. [6], in their empirical study collected from 118 students in Muhammed Bin Saud Islamic University in Saudi Arabia, reported that the perceived performance is positively related to the mobile learning behavior. Similarly, [70] reported that Performance Expectancy influence the behavioral intention of mobile learning via social network. Data were collected using a questionnaire response from 266 respondent from five shopping malls in Klang Valley, Malaysia. [56] pointed out that students believe that they can benefit from the perceived usefulness in mobile technology to improve their performance. A mobile phone connects a student to their university online groups and virtual classes. The application of performance expectancy to mobile learning will result in students finding learning to be an enjoyable process, resulting in improved productivity [22]. We developed the following hypothesis:

H1: performance Expectancy influences significantly on behavioral intention to use m-learning.

4.2 Effort Expectancy

Its defined as "the degree of ease that individuals think they will have when using an information system" [69]. It is related to three constructs, which are Depending on the previous models are ease of use (IDT) , complexity (MPCU), and perceived ease of use (TAM/TAM2) [69], as per [24]. Previous works pointed out that effort expectancy is evident in the extent students believe in the ease of use of cellphones [43, 56]. Previous empirical studies also confirmed that Effort Expectancy strongly influenced behavioral intention to utilize mobile learning [24, 66] . For example, in [65], they collected completed questionnaires from 100 respondents (Malaysians students) prior to them finishing classes. They confirmed that performance expectancy, effort expectancy, social influence, attitude toward technology, and self efficiently are all significant

determinants of behavioral intentions to use mobile devices for learning. Similarly, 444 paper-based questionnaires were collected from students at four Jordanian universities, and it was reported that effort expectancy are significant determinants of the adoption of mobile learning [67]. Therefore, the ease of use was expected to influence students' acceptance of the mobile learning system, which led to the following hypothesis:

H2: Effort Expectancy influences significantly on behavioral intention to use m-learning.

4.3 Social Influence

is defined as the " extent to which a person perceives it is important that others believe he or she should use the new information system" [69]. Today's social networks are making marked changes to our working, buying, communication, and daily habits. It is therefore time for education managers to incorporate technology into mobile learning strategies while leveraging the ubiquity of social platforms to improve the educational experiences of students and instructors [71]. Similarly, [24] pointed out that instructors' influence remains an important incentive for students' motivation to utilize new technology. Previous studies confirmed that social influence strongly influence the behavioral intention to use mobile learning [24, 36, 58]. For example, in South Korea, data were collected from 226 university students of Gyeongnam province, and it was reported that social influence had a positive effect upon behavioral intention vis-à-vis mobile learning [72]. Other studies pointed out that the impact of social influence is important towards encouraging students towards adopting new technologies for learning. This led to the hypothesis:

H3: Social Influence influences significantly on behavioral intention to use m-learning.

4.4 Facilitating Conditions

According to [69], facilitating condition is defined as "the degree to which an individual believes that an organizational and technical infrastructure will support the use of new technology". In the context of mobile learning, facilitating conditions include factors that encourage the adoption of mobile learning, encompassing resources, knowledge, Internet speed, and support personnel [61]. Another study pointed out that facilitating conditions include required resources towards accessing information and benefitting from offered services. Users are expected to possess the expertise, information, and money in order to accept the implications of technology [64]. Previous studies investigated facilitating conditions in the context of intention to utilize mobile learning [24, 43, 61]. For example, [24] proposed that facilitating conditions is an important construct that influences Students' Behavior Towards Mobile Learning (M-learning) in Egypt. A survey was conducted in 10 chartered universities operating in the twin cities of Rawalpindi and Islamabad in Pakistan, and they reported that facilitating conditions significantly influence the students' intention to adopt mobile learning [61]. Integrating this construct into mobile learning suggests that students believe that availability of devices, learning

materials, parents' support and suitable infrastructure will encourage them to utilize mobile learning and interact with each other and teachers [43]. This led to the following hypothesis:

H4:facilitating conditions influences significantly on behavioral intention to use m-learning.

4.5 Perceive Enjoyment

Its defined as ''the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated'' [73]. [55] outlined distinct characteristics of mobile learning, such as the high degree of personalization and spontaneity and the provision of a unique and fun learning experience. Literature confirmed that students believe that using mobile devices for learning is fun and motivational [74]. Furthermore, [75] show that perceived enjoyment is a significant determinant of behavioral intention to use mobile learning and mobile services. [76] pointed out that increased enjoyment by students in tablets resulted in ease of use, which means that students do not require training or support. [62] conducted an empirical study using Correlational analysis, and reported that perceived enjoyment greatly impacted the intention to use mobile learning. The study participants are made up 370 students from Makerere and Kampala Universities. Previous studies focused on the effect of perceived ease of use on perceived enjoyment[77]. Students are expected to adopt mobile learning if they think that using technology will be enjoyable [43]. [62] pointed out that the lack of research addressing the influence of perceived enjoyment as one of the main predictors towards enhancing students' intention to use mobile learning systems in Universities. This study focused on pinpointing the influence of perceived enjoyment upon the intention to use mobile learning, which led to the following hypothesis:

H5: perceive enjoyment influences significantly on behavioral intention to use m-learning.

3. Conclusion

This study looked for factors that influence behavioral intention to use mobile learning. Literature was reviewed and related models and theories were extracted in the course of this study. Based on literature, the study proposed that the highest influencing factor include performance acceptance, followed by Effort Expectancy and Social Influence, Facilitating Conditions and Perceived Enjoyment. The proposed models are expected to be of use to cellphone producers, universities, and organization for enhancing their respective corporate strategies. Universities are expected to encourage students to use mobile technology and benefit from services and applications inherent in these technologies. Design applications are expected to be easy and useful for students while improving their performances.

4. The Limitation and Future Work

This study was limited in its choice of the factors, with the proposed model being based on studies from different

countries. Therefore, future works need to empirically study and test this model in multiple countries because it is expected that the results might differ. This study also focused on the influence of factors on the intention of use of mobile learning due to its ease of simulation. Therefore, depending on the perception of students, they will require these factors to influence them to use mobile learning. This study focuses on students' perception due to only a few studies existing on the evolution of the instructors affecting the usage of mobile learning. Literature confirms that most studies are quantitative. However, mobile learning is an emerging field, therefore, there is a need for a more qualitative approach. A study using interview/focus groups to collect data would be important towards uncovering dimensions and factors that influence the intention of use and actual use of mobile learning.

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