The Bearing of Culture upon Intention to Utilize D-learning Amongst Jordanian University Students: Modernizing with Emerging Technologies

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Abstract. An investigation into the variables that have a bearing on the acceptance of D-learning (Digital-learning) services such as Electronic-learning and Mobile-learning, in two universities of Jordan is presented along with a discussion on modernizing in particular m-learning with emerging technologies. The study fuses the Unified Theory of Acceptance and Use of Technology (UTAUT) model with the cultural paradigm. 100 valid questionnaires distributed to random Jordanian students in two cities were used to collect the primary data. The IBM SPSS® (Statistical Package for the Social Sciences) software platform was used to analyze the data. The validity of the overall model was proven statistically with an acceptable data match with the measurement model. The findings show that the factor with the greatest bearing on "*Intention to use M-learning*" is the "*Attitude toward using M-learning*". Whilst the influence with the greatest indirect bearing on "*Intention to use M-learning*" is "*Compatibility*". The conclusions are that the: *cultural factor* has a significant and positive impact on the "*perceived usefulness*" and "*perceived ease of use*". "*Perceived usefulness*" and "*perceived ease of use*" have the greater impact on the "*customers' attitude*", which consequently influences the students' "*intention to use M-learning services*". Emerging technologies such as the Cloud, AI (Artificial Intelligence) and the Blockchain and how they may be utilized to enhance the delivery of M-learning is discussed throughout the paper.

Keywords: Unified theory of acceptance and use of technology model · UTAUT · D-learning · Mobile learning services · Mobile learning · M-learning · Culture · E-learning

1 Introduction

1.1 M-learning

M-learning (Mobile-learning) is a type of learning which can potentially happen anytime or anywhere through the use of a portable electronic computing device [1], which can be either online or offline. Furthermore, this method of learning creates a more personalized learning experience [2]. Additionally, through the use of portable,

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networked mobile and cellular devices, the users access learning applications in a selection of diverse contexts when interacting within their environment or with other users. Moreover, m-learning is increasingly growing and moving from asynchronous to synchronous instructor-to-learner communication and content delivery, owing to the rapid advances in computer networking and multimedia technology. Specifically, asynchronous learning encompasses gaining information without instructor-learner interaction; such as reading and understanding an online article on a mobile device solely by the user. On the other hand, synchronous learning comprises of active back and forth instructor-learner interaction, such as the learner participating in an online webinar by posting questions or making comments using video conferencing tool or a smartphone. M-learning is not restricted by time-and-space limitation, as it has now become a method that allows both educators and students to communicate utilizing a variety of learning tools through the use of mobile gadgets [3]. Even synchronous m-learning can be asynchronous in the sense that the human lecturer may be replaced by a synthetic AI entity performing the rôle of the peripatetic. The student may access this virtual person anytime. The Cloud will also offer more flexibility in delivery and access to the learning material. The use of mobile devices being many, are still traditional voice only and increasingly real-time video calls, internet browsing/shopping and social networking site access, email exchanges, capturing and sharing multimedia files (pictures/videos) and playing ever increasing amount of interactive networked games. Thus, the handheld devices function with one of these three common modes and qualities, namely that of: utility, communication or fun/leisure [4, 5].

2 Literature Review

According to [6], m-learning is a significant alternative platform for learning services in which having the knowledge on the influencing elements for m-learning acceptance amongst higher education learners is crucial. Apart from that, as stated in [7], an individual's volition and conscious participation in m-learning activities are some of the success keys for m-learning.

Further, when factors associated with acceptance of mobile learning are identified, the universities implementing this learning method can improve on the delivery of services to the students. Apart from that, when these factors are incorporated into the business process, education and learning will become more efficient and there will consequently be an increase in the loyalty of the students [5–8]. However, according to [9], the university would have to take into careful consideration the potential factors that may influence the students' intention and understand how these factors could entice them to use it in order to invest in the development of university delivered mobile services and content properly. Nonetheless, it would be difficult for the students to acquire the pedagogical information if they fail to accept the new technology designed to deliver it in the first place. Reassurances must be offered such as privacy and security. This may be enabled by the use of the blockchain technology. Payment processing in cryptocurrency will also open up m-learning to an even greater audience and consumers beyond just university students, with a potential transnational market base.

Aside from that, considering that the market for mobile learning has gradually become global, cultural difference also becomes an important factor. Thus, universities or training organizations should have the knowledge of cultural difference so that they can earn a significant competitive edge [8, 10, 11]. According to [10], the cultural perspectives of m-learning in Malaysia is an aspect that has yet to be covered. However, it must be pointed out here that m-learning needs to be cognizant of both mobile users and nomadic users. Nomadic users make use of the computing nodes, devices and platforms around them, whilst mobile users carry their own devices. M-learning needs to be deployable, accessible and functional across all types of devices, ensuring operationality when a user is offline too. Content may be downloaded for future offline use. There is thus a need to be a universal accessibility learning approach for the mobile and nomadic computing age. Inasmuch as to embrace the often, primary rôle of the user's mobility and communication to m-learning. So, the effectiveness of existing models still needs to be enhanced, to which researchers have pointed out parameters that must be considered with culture being one. With the widespread proliferation of Internet of Things (IoT) objects, it must be appreciated that m-learning devices are themselves also IoTs which may be networked to other IoTs. This study is paramount in consolidating the chasm in the development of services in order to create more efficiency and relevance in the education environment – all of which could be achieved through the expansion and use of the UTAUT model.

3 Theoretical Background

3.1 UTAUT (Unified Theory of Acceptance and Use of Technology) Model

[12] had formerly conducted a study to draw a comparison between the similarities and differences amongst established models and theories of user acceptance and from their studies they formulated the UTAUT. The steps to deriving this model involved comparisons utilizing the: technology acceptance model (TAM) [13], theory of planned behavior (TPB) [14], theory of reasoned action (TRA) [15] and several others. The resultant UTAUT model was made to counter the problems being faced by researchers in the sphere of IT during the construction of their study framework as an attempt to create understanding towards the usage of technology amongst the users [12].

Further, [13] added that acceptance models established in the past had some successful records in an estimate of 40% in their prediction accuracy of the adoption of IT (Information Technology). By contrast, [12] reported that the use of their UTAUT model helped prediction of the uptake of IT in the region of 70%, in their study of the users' intention. The UTAUT model is also appropriate in predicting equally, for a large range of groups, the individual acceptance of IT. Scales that have been adopted in previous acceptance models were brought together to develop new scales and tested for further enhancements [12].

For predicting the users' behavioral intention and the behavior of use, four constructs are used by UTAUT. These constructs are [12]:

(a) social influence;
(b) expectancy of effort to be expended on the task;
(c) performance expectancy;
(d) conditions that will facilitate undertaking the job.

With respect to the linkage between these constructs, behavior intention and behavior of use is moderated by four primary factors including the [12]:

(a) age;
(b) gender;
(c) voluntariness and
(d) experience [12].

Figure 1 illustrates the UTAUT model, whilst Fig. 2 illustrates the proposed modified model.

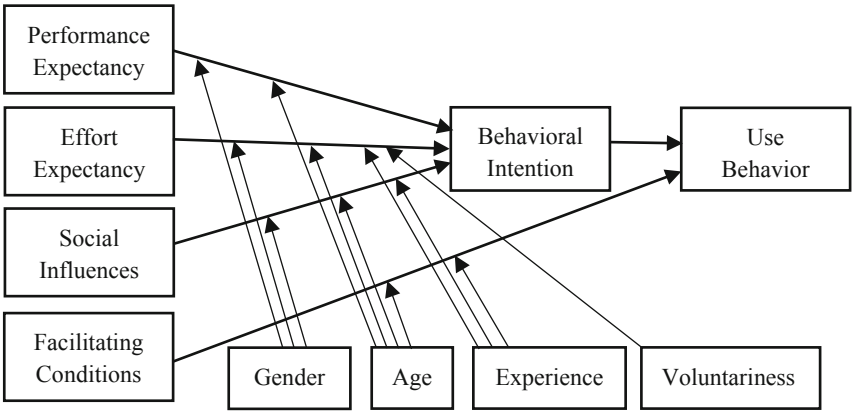

Fig. 1. The original UTAUT model [12].

3.2 Research Model Factors

Culture Factor (CF)
The word "culture" herein is understood to be this definition, "the collective programming of the mind which distinguishes the members of one group or category of people from another" [16] or basically expressed, "culture is" [any] "shared values of a particular group of people" [17]. Further, according to [18], culture indicates the individual's "core values and beliefs which" [were] "formed" [during] "childhood and reinforced throughout life", while [19] define culture being, "the beliefs, philosophy, shared values, attitudes, customs, norms, rituals, common practices, and traditions which govern the ways of living of a group of people." Culture may also be expressed in terms of norms and values, where values, according to [20], are what is worth acting upon and acquiring, and are shaped by involvement and familiarity with parents, school life, personal religion, and the media, while norms as highlighted by [21–23], encompass any shared beliefs with regard to behavior. On the other hand, [24] observes

culture as discrepancies that occur between the beliefs, values, and motivations of groups that are dissimilar from one another, while other scholars such as Samovar [25] perceive culture as the sum of values, beliefs, attitude, experience, knowledge, religion, meanings, hierarchies, spatial relationships, rôles, universal concepts, notions of time and possessions and material objects attained along the timeline of generations by the group and individuals.

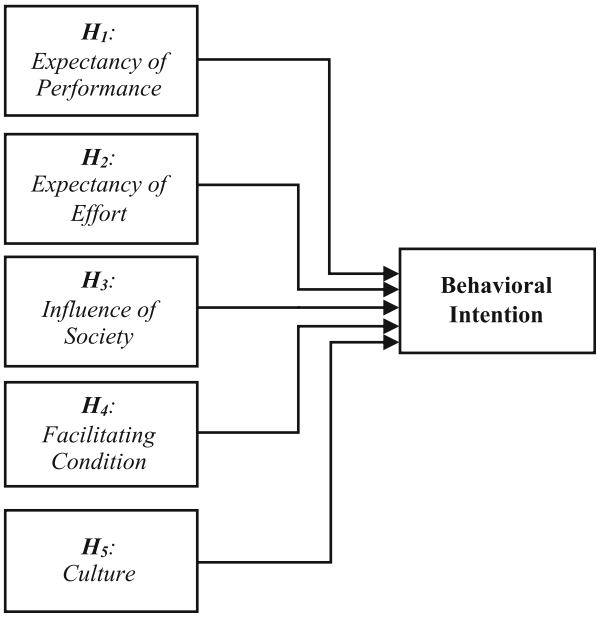

Fig. 2. Proposed model.

3.3 The Hypotheses

The following are the research alternative hypotheses factors for this case study, as shown in Fig. 2:

H_1: The *expectancy of performance* has a correlation with *intention* to utilize mobile learning.
H_2: The *expectancy of effort* to be expended has a correlation with the *intention* to utilize m-learning.
H_3: The *influence of the society* (*social influence*) has a correlation with the *intention* to use m-learning.
H_4: *Facilitating conditions* has a correlation with the *intention* to utilize mobile learning.
H_5: *Culture* has a correlation with the *intention* to use m-learning.

4 Research Methodology

This research employed 100 Jordanian university students (of both genders) aged 20 years and above as the respondents. The data was extracted from participants filling in online questionnaires from www.surveyshare.com. This contained one part which represented several constructs. The Likert scale (with five points) was used to score the user's acceptance level. This was then statistically post-processed to calculate the correlation between the elements and the intention to utilize m-learning. Regression analysis was used in this research. The results of this statistical analysis were used to create a framework that encompassed the capacity of measuring the citizens eagerness to mobile learning. Thus, validation to the *culture* parameter with the UTAUT model was ascertained.

4.1 Development of the Case Study Questionnaire

The writing of the questions were for ascertaining the subjects' knowledge of access to the e-material. Feedback based on the respondent's comments were used to make minor changes to the questionnaire. Whilst the validity and readability of the content were confirmed. Using the IBM SPSS® (Statistical Package for the Social Sciences) software platform, a pilot study was conducted. This allowed for the testing of the validation and reliability of the model. For the pilot test, the Cronbach's alpha reliability measure was used to test for internal consistency. Factor analysis was also conducted on the data, with the samples collected using convenient sampling. Table 1, below, shows that all the items have values larger than 0.70 (proposed cut-off).

Table 1. Pilot questionnaire (n = 31) for test of scale reliability, alpha ranked in order.

Order	Variable	No. of items	Alpha (a)
1st	*Culture*	4	0.897
2nd	*Behavioral intention*	4	0.874
3rd	*Expectancy of effort*	4	0.811
=4th	*Expectancy of performance*	4	0.784
=4th	*Influence of society*	4	0.784
6th	*Facilitating conditions*	4	0.747

5 Data Analysis and Results

The assessment of the structural model with respect to the model being measured was undertaken using SPSS analysis including towards the inner model. The proposed requirements in [26] were investigated. The hypotheses were tested by the method of bootstrapping for determining the path coefficients' significance levels.

The interactions between the parameters of the research model was determined using multiple regression analysis. The test indicated some influences between the

factors. Three regression models, containing the five hypotheses, were used for the analysis, as shown in Table 2.

Table 2. Summary of the research alternative hypotheses.

Hypotheses	Variable	ß	Supported
H_1	*Expectancy of Performance*»»» Behavioral intention to use (BI)	0.387**	Yes
H_2	*Expectancy of Effort* »»» Behavioral intention to use (BI)	0.411*	Yes
H_3	*Influence of Society* »»» Behavioral intention to use (BI)	0.217**	Yes
H_4	*Facilitating Conditions* »»» Behavioral intention to use (BI)	0.342**	Yes
H_5	*Culture* »»» Behavioral intention to use (BI)	0.477**	Yes

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

6 Discussion

The readiness to utilize mobile learning services amongst Jordanian students was positively identified. The parameters or factors identified and tested were: *culture*, *expectancy of effort*, *expectancy of performance*, *facilitating conditions*, *influence of society* and *intention*. As mobile learning service usage amongst students should be maximized, the educational providers must consider them carefully regarding their optimization. The collection of the data must, however, cover a broader spectrum of the population in order to be more nationally representative. The model for Jordanian university m-learning students took in constructs from the UTAUT model. With respect to *culture*, optimizing *expectancy of effort*, *expectancy of performance*, *influence of society*, *intention* and *facilitating conditions* will all contribute to an increase in m-learning in universities. The intent to utilize internet delivered services was positive if the participants were convinced that the use of the internet would result in an increase in their efficiency of learning.

For the widespread uptake of D-learning (Digital-learning) which are: m-learning and e-learning - it is essential that it embraces and utilizes emerging technologies. These pioneering technologies include, viz.: cloud delivery; artificial intelligence; the blockchain for added security, and integration with diverse IoT devices. Mobile as well as nomadic users must be catered for, taking into account transnational cultural aspects that need to modify the user interface. Thus, the plasticity of the user interface must also be carefully approached.

7 Conclusions

The last decade has seen exponential growth in d-learning (e- and m-learning) in the developed nations. This has not gone unnoticed in the rest of the world, especially in the rapidly developing and lucrative emerging nations of the Middle East. This is because of the governmental plans of many of these oil rich nations to increase the digital literacy of their national subjects. These countries must employ the technology of the Internet coupled with emerging technologies such as the Cloud, Artificial Intelligence, Deep Learning and the Blockchain - to make it appeal to a wider consumer base beyond just the academia sector. Unfortunately, internet penetration amongst the population is still lagging for nearly all the Middle Eastern countries, compared to the rest of the world. In fact, comparatively few mobile learning websites exist in the Arabic speaking world compared to the Western World.

The outcomes generated by this study has positively identified that to increase the intention to use d-learning in two Jordanian universities, the students must:

(i) be immersed in a conducive culture to internet usage for education delivery;
(ii) have the intention to follow through the online program;
(iii) see that their effort expended must not be seen to be too onerous compared to using traditional non-Internet based learning;
(iv) meet their performance expectations after using the d-learning technology;
(v) be in an environment that has a positive social influence to using this technology;
(vi) find the technology easy to use and furthermore, that it must help facilitate their learning process.

As such, the increase in the number of Arabic university websites delivering d-learning is expected to grow exponentially, especially once coupled with emerging technologies such as the Cloud with its various *x*AAS (*x*-As-A-Service) offerings.

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