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Behavioural Intention of Lecturers towards Mobile Learning and the Moderating Effect of Digital Literacy in Saudi Arabian Universities

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Behavioral Intention (BI); M-learning; Saudi Arabia; ICT literacy; Mobile ICT; elearning; TAM; UTAUT; Mobile literacy.

Abstract

The widespread of personal computers and the availability of Internet connections have been the core modern-day educational tools that aid teaching and learning, and enhance effective interaction between students and their lecturers. However, despite the appreciable level of recognition of mobile learning as a new innovative educational model in the country, there exists a wide research gap as a result of implementation and adoption. This study examines the behavioral intention of lecturers towards mobile learning and the moderating effect of digital literacy in Saudi Arabian universities. A total of 420 respondents was conveniently sampled, and a structured questionnaire was designed, administered, and analyzed using SPSS®23 and PLS-SEM software. The results obtained showed a direct and significant relationship between all the variables with behavioral intention. It revealed that mobile literacy showed the highest contribution, followed by facilitating conditions, perceived usefulness, and perceived ease of use. However, only years of experience was negatively related. The result of the moderation showed that mobile literacy, moderated with facilitating conditions. Basic ICT literacy is negatively moderated with facilitating conditions and positively moderated with learning expectancy. Based on this outcome, it is recommended that universities can design a policy that will facilitate the enhancement of digital literacy, particularly mobile literacy among lecturers by building their capacity on the use of mobile learning tools for research, teaching, and learning.

Disciplinary: Education Technology (Information and Communication Technology in Education).

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1 Introduction

The concept of mobile learning (M-learning) depends on wireless mobile devices which offer ease of accessibility and a collaborative learning atmosphere at different levels of tertiary education. The learner is not restricted within the classroom or any specific location or time. Recently, M-learning gains attention at the tertiary educational level, especially in university settings, offering mobile usage to educational resources and an effective conversation and constructive evaluation between teachers and students (Nassuora, 2012). Several universities in Saudi Arabia have adopted mobile learning (M-Learning) approaches proposed by the Saudi government and the Ministry of Higher Education. King Saud University, for example, allows its students to connect and respond to student inquiries and share information (Almutairy et al., 2015). Also, the University of King Khalid launched a coordinated digital blackboard to provide students with university announcements while using social media websites. Many other Saudi universities have signed partnership agreements to introduce M-Learning with international universities (Al-Shehri, 2013).

Moreover, mobile phones have been used by educational institutes to serve the purpose of pedagogical needs. In Saudi Arabia, such a realization of the M-Learning approach was acknowledged by the Saudi government by establishing a technological infrastructure for optimal use of information and communications technology. In 2011, Saudi Arabia allocated USD 7.2 billion of technological infrastructure to facilitate the process of M-learning. These include The National Centre for E-learning and Distance Education, JUSUR (Learn distance learning approaching Management System), Saudi Digital Library, and Saudi Electronic University (Al-Shehri, 2013).

The increased attention given to M-learning in Saudi Arabia is associated with mobile phone usage trends and its capabilities (Al-Hujran et al., 2014). It is worthy to note that the availability of mobile devices and internet connectivity alone may not necessarily be enough to achieve sustainable adoption of M-learning in tertiary institutions, especially university settings. Furthermore, despite the appreciable level of familiarity with M-Learning as a new innovative educational model in the country, there exists a wide research gap as a result of implementation and adoption-related issues among lecturers in Saudi Arabia. This study is primarily concerned about the limitation of m-learning usage among lecturers in Saudi Arabian universities. Hence, the need for in-depth research to explore the behavioural intention of lecturers towards mobile learning approaches in Saudi Arabia Universities. By exploring this concept, universities can support their academic plan currently in-use while satisfying the demand of students and lecturers. To further support the effort towards integrating technology and ICT in the teaching and learning process, However, the success of this innovation highly depends on the righty leadership framework and implementation in the university, Salihu, (2019a).

2 Literature Review

Lecturers are the key players in integrating technological innovations into education (Tai, & Ting, 2011). The sustainable implementation of m-learning relies solely on its acceptability among lecturers and their belief on how well the technology would enhance learning (Al-Shehri, 2013; Al-Seghayer, 2014). According to, Mobile Learning (M-Learning) is a form of learning through mobile devices that takes place within and beyond the traditional learning settings. Mobile learning (M-Learning) could facilitate both formal and informal learning activities using wireless mobile devices with an internet connection; many scholars and educational experts believe that M-Learning is an advanced form of electronic learning (E-learning) and distance learning "D-Learning" (Abas et al., 2009).

Nonetheless, mobile learning (M-learning) is still ambiguous and requires a clear definition. Mobile learning, according to Mohamad and Woollard (2010), refers to a form of learning using mobile devices. These devices, according to the authors, maybe big devices such as web books, notebooks, and laptops computers or small devices such as mobile phones and smartwatches. Alharbi and Drew (2014), distinguished M-learning definition based on the concept of mobility of the device or the mobility of users or earners. Differently, Kambourakis, Rouskas, and Gritzalis (2004) defined the concept based on the mobility of learners or users. They articulated that M-learning is a teaching activity that takes place with the assistance of mobile technology devices.

Cheon et al. (2012) defined M-learning as any use of a mobile device that is portable, whereby this device has instant connectivity and sensitivity. This device can be carried with users and learners anywhere. The device of mobile can conduct two-way communication and gathers information disregard being in a fixed place. According to Wang et al. (2009), M-learning is defined as a means of interaction among the users and learners using mobile devices. The users refer to the lecturers, and learners refer to the students. In this study, M-learning refers to a form of learning using mobile devices in e-learning platforms, as such the proposed research is meant to expand the knowledge and the theoretical background of how to make the M-learning approach using mobile devices in Saudi Arabia to be utilized and adopted among the lecturers in Saudi Arabia Universities.

From the perspectives of different typological institutions (Salihu 2019b), the extensive literature review revealed several studies in Saudi Arabia related to the adoption and use of the M-learning approach in various settings (i.e., high schools and universities). Nassuora (2012), surveyed about 80 students at the University of Al-Faisal to examine the M-learning acceptance level. The UTAUT model was empirically tested in his research. Given the effort of the research to empirically analyze the dimensions of the UTAUT model, the drawback of this research was the small number of sample sizes and the emphasis on a single private institute to assess students ' acceptance rate. Using a quantitative case study may, to some extent, limit the generalizability of the findings to other Saudi Arabia higher educational institutes. Likewise, Chanchary and Islam (2011) also assessed students' interests in the M-learning approach and asked students to rate the advantages and disadvantages of using the M-learning approach. Almutairy et al. (2014) also assessed Saudi Arabia's readiness to use M-learning technology concisely.

3 Conceptual Framework of the Study

This study was based on the Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM). The integration of these two theories formed the conceptual framework of the current study (Figure 1), which shows the relationship between the research variables that were integrated into the research conceptually. This study is aimed at investigating the behavioural intention of lecturers towards mobile learning approach in Saudi Arabian universities. The conceptual framework of the study as illustrated in Figure 1 shows the independent variable components with five main constructs or dimensions namely; Perceived Usefulness (PU), Facilitating Condition (FC), Perceived Ease of Use (PE), and Learning Expectancy. The dependent variable is conceptualized as Behavioral (BE) intention of Lecturers towards M-Learning whereas Digital Literacy is the mediating variable of the study, with two main constructs or dimensions namely; Basic ICT Literacy and Mobile ICT Literacy.

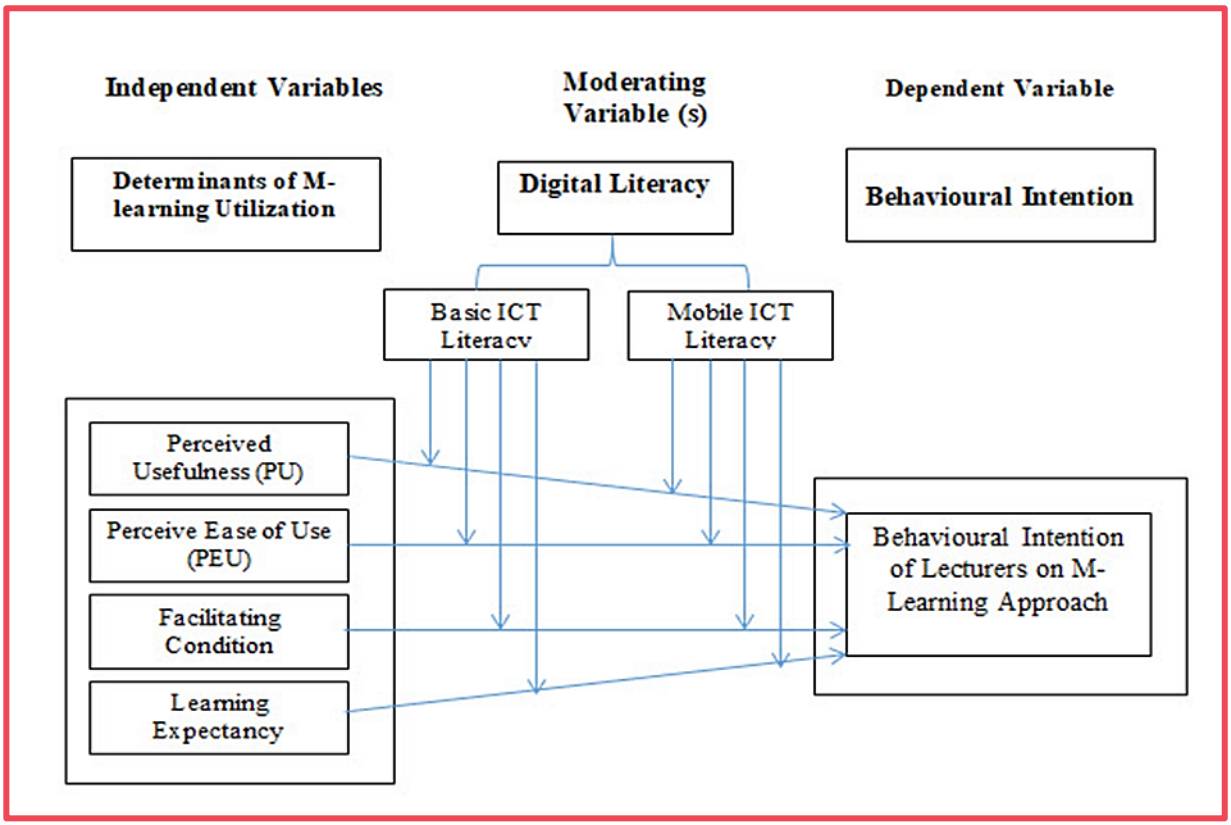

Figure 1: Conceptual framework of this study.

4 Method

4.1 Research Design

The research uses a quantitative survey design that is cross-sectional on the time horizon. According to survey research designs apply to the quantitative research method in which researchers conduct a survey to a sample or to the entire population of individuals to characterize the opinions, attitudes, behaviours, or characteristics Salihu, (2017). Furthermore, a cross-sectional time horizon was adopted because this study is limited to a specific time frame.

4.2 Population and Sampling

Many educational institutions using the M-learning approach exist throughout Saudi Arabia Yet inquiries with the Ministry of Higher Education via Internet search revealed that more than 13 Universities and Colleges are using the M-learning approach as means of teaching and providing services (Badwelan et al. 2016; Alshammari, 2016). However, information about these institutions is not available; thus, the target population for this study comprises all the academic staff of the universities in Saudi Arabia. In this study, the target population is estimated at 63388.

Sampling design involves the use of sampling procedures and methods so that the results can be used to derive conclusions. In quantitative research, the participation of a sufficiently large number of individuals is needed The sample size was determined using a table of sampling at 95% confidence level and 5% margin of error, based on the study population. According to the table, a population of 63,380 would have a sample size of 382. However, the literature suggested 10% be added to the minimum sample size to take care of missing and incomplete responses. The sample size for this study was 420 samples, which paved the way to take care of outliers, inadequate response, and missing values.

This study intended to use the non-probability sampling technique, a decision guided by the absence of a

total sampling frame of the respondents who are familiar with or going to use the M-learning approach. Such limitation inhibits the use of a probability sampling technique, as randomization may not become possible. In such a case, a convenient sampling non-probability technique is deemed to be an appropriate choice.

4.3 Data Collection and Analysis

The instrument used for this study was primarily a questionnaire to elicit information from the respondents. The questionnaire was adapted from the work of Hofstede (1980), Wilfong (2006), Mueller et al. (2008), Lee (2009), Venkatesh et al. (2003), Kennedy et al. (2008), and Davis (1989). Here in this study, selected and extracted only the items that are suitable for the present research according to the study variables. The questionnaires were distributed to the respondents using face to face method with the help of research assistants. Before the main data collection exercise, 10% of the study sample size determined (42) was administered for the pilot test of the instrument.

Before data collection, the questionnaire was verified by two experts from King Saud University who are specialized in English language and translation, to check the clarity of the linguistic formulation of the questionnaire phrases and the scientific accuracy of the questionnaire phrases. Finally, the obtained data were analyzed with SPSS and PLS-SEM software. This research approach designed as quantitative, this study applied structural equation modeling (SEM–PLS) to determine the association between the constructs. PLS-SEM is a widely used multivariate statistical tool to measure the direct and indirect relationships between one or more independent constructs as well as one or more dependent constructs (Chin & Todd, 1995).

5 Result And Discussion

5.1 Demographic Characteristics

The main demographic characteristics for participants of the present study include; Gender, age groups, years of work experience, qualification, workplace, and work position. Males were the majority. Participants aged 40-49 years got the highest incidence with 52.6%, followed by 30-39 years (28.8%) and 50-59 years (18.5%). Ph.D. holders got the highest incidence by 82.7%, followed by MSc and BSc (9.3% and 8%). Higher percentages of participants worked at university than colleges (91% vs 9%). Professor positions got a higher incidence than the lecturer position (88.7% vs 11.3%). Participants with years of experience longer than eight years got higher incidence than those less than eight years (62.2% vs 37.8%), as shown in Table 1.

Table 1: Demographic characteristics of this study

Variables		n.	%
Gender	Female	108	27.1
	Male	291	72.9
Age	30-39 years	115	28.8
	40-49 years	210	52.6
	50-59 years	74	18.5
Years of experience	Less than 8 years	151	37.8
	More than 8 years	248	62.2
Qualification	BSc	32	8.0
	MSc	37	9.3
	PhD	330	82.7
Workplace	University	363	91.0
	College	36	9.0
Work position	Lecturer	45	11.3
	Professor	354	88.7

5.2 Multiple Regression Analyses

To explore the direct relationship between the dependent and the predictors variable, multiple linear regression (dummy method) was used to find out the predictors of the overall score of behavioral intention for the participants of the current study. The result of the analyses as shown in Table 2 revealed that Perceived Usefulness is the most significant predictor (p=0.005) of behavioral intention in the model, with a positive coefficient weight value of 0.719. The second important and significant predictor of behavioral intention in the model is Mobile ICT Literacy, which has a positive coefficient weight value of 0.639 (p< 0.001). Another important variable in the model is the Facilitating Condition, which has a positive and significant coefficient with a weight value of 0.416 (p< 0.001). Perceived Ease of Use was also a positive and significant predictor of behavioral intention. However, it has less effect due to its lowest coefficient value weight value (0.155), (p< 0.001) in the model.

However, a significant but negative relationship was found between years of experience and behavioral intention. It has a negatively signed coefficient with a weight of -0.886, p< 0.005. As the comparison of contributions of predictors, mobile literacy showed the highest contribution with beta value equals to (0.533), followed by facilitating conditions (beta = 0.319), perceived usefulness (beta = 0.209), and perceived ease of use (beta =0.095). The result further revealed that these predictors cause 74.4% (adjust R2 = .744) of behavioral intention whereas the remaining 25.6%, is caused by other factors not captured in the model, which showed a perfect model.

Table 2: Predictors of Behavioural intention

Behavioral intention	Unstandardized Coefficients		Standardized Coefficients	t	*p*-value	95.0% CI for B	
	Beta	SE	Beta			Lower Bound	Upper Bound
(Constant)	3.173	1.479		2.145	.033	.264	6.081
Perceived Ease of Use	.155	.055	.095	2.819	.005	.047	.263
Perceived Usefulness	.719	.098	.209	7.320	.000	.526	.912
Facilitating Condition	.416	.046	.319	9.007	.000	.325	.507
Mobile ICT Literacy	.639	.045	.533	14.345	.000	.552	.727
Years of experience	-.886	.280	-.088	-3.167	.002	-1.437	-.336

Multiple linear regression. df (5), p <0.05, R = 0.865 (adjust R^2 = 0.744), Reference: years of experience less than 8 years.

5.3 Moderators of behavioral Intention

Multiple linear regression statistical tests were also used to determine the impact of moderators on the relationship between the independent variables and behavioral intentions. Significant moderating effects of mobile literacy and basic ICT literacy with some independent variables on the behavioural intention were observed. The result in Table 3 showed that Mobile literacy significantly moderated the relationship between facilitating conditions and behavioral intention with a coefficient weight value of 0.029 (beta = 1.066), p= 0.038. On the other hand, Basic ICT literacy negatively moderated the relationship between facilitating conditions and the behavioral intention with a negatively coefficient weight value of -0.033 (beta = -1.154), p= 0.0 22. Lastly, Basic ICT literacy moderated the relationship between learning expectancy and behavioural intention positively with a coefficient weight value of 0.029 (beta = 1.050), p=0.015. However, all other relationships between the predictor variables and the behavioural intention were not moderated by digital literacy (Mobile literacy and Basic ICT literacy).

Table 3: Moderators of behavioural Intention

Behavioural intention	Unstandardized Coefficients		Standardized Coefficients	T	*p*-value	95.0% CI for B	
	Beta	SE	Beta			Lower Bound	Upper Bound
(Constant)	23.020	.700		32.871	.000	21.643	24.398
Mobile ICT literacy * perceived ease of use	.004	.020	.113	.186	.852	-.035	.043
Mobile ICT literacy* perceived usefulness	-.009	.023	-.111	-.413	.680	-.054	.035
Mobile ICT literacy* facilitating conditions	.029	.014	1.066	2.088	.038	.002	.056
Mobile ICT literacy* learning expectancy	-.009	.012	-.358	-.774	.439	-.033	.014
Basic ICT literacy * perceived ease of use	.001	.020	.003	.006	.995	-.039	.039
Basic ICT literacy* perceived usefulness	.026	.024	.300	1.107	.269	-.021	.073
Basic ICT literacy* facilitating conditions	-.033	.014	-1.154	-2.298	.022	-.061	-.005
Basic ICT literacy* learning expectancy	.029	.012	1.050	2.448	.015	.006	.052

Multiple linear regression. df (8), $p < 0.05$, $R = 0.875$ (adjust $R^2 = 0.760$).

6 Conclusion and Policy Implication

The result of the current study indicated the contributions of predictors, where mobile literacy showed the highest contribution, followed by facilitating conditions, perceived, and perceived ease of use. Based on this outcome, it can be concluded that mobile literacy and facilitating conditions if enhanced, will have a significant impact on the intention of lecturers towards the adoption of mobile learning. The negative relationship that existed between years of experience and behavioural intention revealed that older lecturers that have been in the service of the universities prefer the traditional method of teaching as against the use of technology. Based on this outcome, it can be concluded that the younger lecturers in Saudi Arabian universities have more tendency and intention to adopt the use of mobile learning in their service delivery. On the moderation effect of digital literacy (mobile and Basic ICT literacy), it can be concluded that mobile literacy moderated positively. In contrast, Basic ICT literacy moderated negatively between facilitating conditions and behavioural intention. Basic ICT literacy moderated positively between Learning expectancy and behavioral intention.

Therefore, the essential policy recommendations that can be deduced from these findings is that universities may design a policy that will facilitate the enhancement of digital literacy, particularly mobile literacy among lecturers. This could be in the form of seminars, workshops, and conferences that will help in building their capacity and encourage their use of mobile learning tools for research, teaching and learning. Also, universities may facilitate the provision of mobile learning tools to lecturers, especially the older ones, in order to encourage them to adopt the use of mobile learning.

7 Availability of Data and Material

Information can be made available by contacting the corresponding author.

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