THE IMPACT OF ATTITUDES TOWARDS M-LEARNING ON M-LEARNING ADOPTION: THE CASE OF THE PUBLIC UNIVERSITIES IN SAUDI ARABIA

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Abstract

The current study attempted to examine the relationship between attitudes towards m-learning and m-learning adoption in the higher educational context, specifically in the Saudi public universities. 381 lecturers who teach various subjects in these universities have constituted the sample of this study. The study employed a quantitative research design where a questionnaire was used as the tool for data collection which was analysed using the Statistical Package for Social Sciences (SPSS). The findings of the study revealed that the construct of attitudes was positively and significantly related to m-learning adoption. The study concluded with a number of recommendations that could be implemented by educators and policy makers in Saudi Arabia.

Key words

Attitudes, M-learning Adoption, Saudi Public Universities, Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB).

Introduction & Background

Due to the recent and rapid advancements in the field of technology, particularly the emergence of internet accompanied with the vast availability of smart phones, it became almost imperative for all industries and institutions to incorporate such advancements as to keep up with the pace of improvement and development (Fletcher, 2004). The researcher further elaborates that the technological advancement secured an unshakeable position in the field of education in general and that of higher education in particular as such advancements have been viewed as strong and important tools to improve the process of teaching and learning and in turn lead to better educational and learning outcomes. In support of Fletcher's (2004) claims, Utulu (2012) argues that teaching and learning techniques in universities worldwide have been continuously reshaped in a way that responds to the environmental and technological changes that are rapidly taking place in today's world. The researcher further stated that among the most recent teaching methodologies that are related to the technological advances in the world today is the construct of m-learning. This type of learning is seen as latest trends in education in which a shift occurred in the educational process from d-learning (Distance Learning) to e-learning (Electronic Learning) to finally so far m-learning (Mobile Learning) as seen by Chanchary and Islam (2011).

A number of different definitions have emerged for the construct of m-learning in the previous studies in the literature and such variance shows how evolving the construct is and is even expected to continue evolving considering the rapid changes that are taking place in the new technologies of this era (Peng et al., 2009). In this context, Odabaş (2009) defines m-learning as an educational model that emerged with the development of mobile technologies and which makes use of these technological advancements in the teaching-learning process. Sarmad (2013), on the other hand, defines m-learning as a new stage of e-learning having the ability to learn everywhere at every time through use of mobile and portable devices. Regardless of the various definitions provided by different researchers, there seems to be two important aspects related to the construct of m-learning, namely its 'ubiquity' and its 'mobility'. Specifically, ubiquitous computing can be understood in terms of their access to computing technologies regardless of time or place which means they can be easily accessed whenever and wherever they are needed while mobility can be understood in terms of the learning on the go as suggested by Peng et al. (2009). Furthermore and in order to understand the conceptualisation of m-learning, while e-learning, which is also a term that has recently emerged in the educational field, is dependent upon desktop personal computing (PC), to a large extent, m-learning, on the other hand, is solely dependent on mobile devices and other similar devices such as tablets (Orr. 2010). In addressing the increasing significance of m-learning within the educational process, Tarımer, Şenli and Doğan (2010) argue that day by day, the use of mobile technological devices is preferred to those that are immobile.

Today, more people than ever are learning on the move rather than sitting in traditional classrooms and there are many universities around the world that have been adopting m-learning technology as one of their methods in the learning (Bal & Arıcı, 2011). The researchers further elaborate that m-learning has the ability to be utilised independently of time and place and that while mobile technologies were previously preferred by youths are now being widely used by all people regardless of their age.

A major contribution to the process of m-learning occurred in the past few years when mobile devices have developed so rapidly both in hardware and software especially in terms of processing power, memory and mobile operating systems (Sarrab et al., 2013). The researchers further elaborate that current mobile devices have many advanced capabilities such as rich text processing, ability to process high quality pictures, high definition (HD) videos and voices. In addition, Broadband Wireless Access (BWA) networks have provided high speed connections with low costs. This technology provided great opportunities for learners to incorporate mobile devices and wireless network technologies in the learning environment, particularly for accessing pedagogical applications on hand-held devices in different locations. The integration between these two technologies (mobile devices and wireless network) represents a huge opportunity to improve and facilitate the educational process and in turn enhance its outcomes.

Considering its ability to offer individual empowerment with greater control over their learning experience, which would in turn create autonomous learners, Smedley (2010) argues that there is no look behind whatsoever; mobile and technology-based learning cannot be abandoned and a shift from traditional classes and methods of teaching to technology-based methods is urgently needed. In support of this view, Bertea (2009) states that the question is not whether to adopt m-learning teaching styles as such styles are a necessity for this particular era but the question should be how to effectively implement m-learning and how to train our teachers on using such styles.

Al-adwan and Smedley (2012) state that the adoption of m-learning by various educational institution, particularly higher education institutions has been increasing rapidly worldwide. However, as compared to developed countries in the West such as in the States and Europe or even in some Eastern countries such as Japan, Singapore, and South Korea, it seems that emerging and developing countries have adopted m-learning activities to a less extent (Sarmad, 2013). The researcher further explain that developing and emerging countries are still way behind developed countries in the use of m-learning in the educational process, particularly in higher education context. The researcher gives an example of Bahrain and Saudi Arabia as some of these developing counties and stated that the educational policies of the two countries do not incorporate sufficient m-learning policies and training to teachers. Kennedy et al. (2008) attributed the lack of m-learning implementation to the existing gap, or what he calls 'digital divide' between younger generations of students and older generations of teachers in the knowledge about technological advancements in technology-based skills. In addressing the 'digital divide' between students and their lecturers, Prensky (2001) and others have suggested that undergraduate university students can be characterized as 'Digital Natives' due to their intense exposure to digital technologies while growing up, whereas their older lecturers can be characterized as 'Digital Immigrants'. This indicates that a knowledge gap exists between younger generations of students and their older generations of lecturers in the use of technology and technological gadgets. What this means is that there each of the two parties (students Vs lecturers) has different views and attitudes towards the use of m-learning inside classrooms, which highlights the importance of the construct of attitudes in determining individuals' intentions and decisions to adopt m-learning.

Attitudes is a construct that is generally defined as a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation as suggested by Rao and Narayan (1998). Schneider (1988, p. 179) provides a similar definition about the construct of attitudes stating that it is seen as the ways through which individuals evaluate or react to things, objects, ideas or events and this includes beliefs and feelings towards such things and events, whether these feelings are positive or negative. He also added that attitude can guide our experiences and decide the effects of experience on our behaviours. Thus, one could argue that the construct of attitudes represents the positive or negative feelings and evaluations of people towards other people, ideas, objects, or events. Furthermore, attitudes is highly influenced by our own knowledge about things; for example we may develop positive attitudes about the use of smart learning inside classrooms if we have good technical knowledge about the use of such gadgets. On the other had and given the case when our knowledge about such gadgets is limited, such limited knowledge could lead negative attitudes about the use of smart learning and in turn avoiding its use inside the classroom.

Chaiklin (2011) states that attitudes is a construct that has been frequently studied in different fields in general and in the fields related to social science in particular. However, the researcher goes on to say that there is no universally accepted convention where a definition and a measurement are integrated considering that the concept could differ according to the objectives of different studies and different fields. In addition, two main categories of attitudes have emerged, namely psychological attitude and sociological attitude. The difference between the two categories is that the earlier one identifies a verbal expression as behaviour while the latter one looks at verbal expression as an intention to act. In thinking about the difference between these two categories of attitudes, a question aroused which is related to the order of change in the relationship between attitudes and behaviours. The question addresses the idea whether it is necessary for people to change their attitudes before changing their behaviour or

do both take place at the same time. This discrepancy has been a central methodological problem in the social sciences research (Chaiklin, 2011).

Despite this discrepancy between attitudes and behaviour, there has been a consensus among researchers that attitude is highly associated with behaviour or that attitude is indeed a reflection of behaviour. In this context, Geller (1992) argues that changing attitudes may be a way to change behaviour. Furthermore, a laboratory experiment was conducted by Holland, Verplanken, and Van Knippenberg (2002) who looked at the strength of the attitude. The researchers had people who were asked both their attitude and the strength of the attitude toward Greenpeace and were later asked if they would contribute. The findings of this experiment revealed that those who had the strongest positive attitudes were the most likely to contribute. As far as educational context is concerned, there has been more emphasis on changing attitudes than on changing behaviour indicating how important attitude is in the educational field (Chaiklin, 2011).

Attitudes towards the use of technology-based learning in general and m-learning in particular constitute an important determinant of m-learning adoption in the teaching-learning process. In this context, Yun, and Murad (2006) argue that teachers' negative attitude towards the importance of gaining technical skills might highly prohibit them to participate in m-learning teaching activities. In addition, Iqbal and Qureshi (2012) argue that attitudes towards the use of m-learning in higher educational context have a great deal of impact on students' intention to use m-learning which would in turn influence their m-learning adoption. Drawing from the Technology Acceptance Model (TAM), a number of determinants for attitudes toward m-learning have been identified in Iqbal and Qureshi's (2012). Specifically, five determinants have been identifies, namely perceived usefulness, perceived ease of use, perceived playfulness, facilitating conditions, and finally social influence.

Another theory that also explained the construct of attitudes and how it is understood in relation to our behaviour was the Theory of Planned Behaviour (TPB). The theory, which was developed by Ajzen in 1988, proposes a conceptual framework that is reported to measure how individuals' actions are determined and guided. The theory predicts the occurrence of a given behaviour by a person, provided that this behaviour is intentional. Furthermore, the theory proposes that such intentions are affected by the attitudes of people towards the usefulness of this action together with the consequences of adopting a particular action. This means that the theory posits that there is a relationship between attitudes and behaviour and that these attitudes are influenced by other factors (external factors). Thus, the theory proposes a link or a relationship which is referred to as the attitude-behaviour relationship. In this relationship, the construct of attitudes is regarded as a key mediator variable in which stronger attitudes are likely to be more predictive of people's behaviour than are weak attitudes.

In the context of this study, the theory of planned behaviour was selected to from the theoretical ground of the research as stronger positive attitudes towards the use mobile learning which means stronger belief in the ability of adopting mobile learning styles in enhancing the whole process of teaching and learning would lead to more intention to adopt it and in turn more adoption of mobile learning styles. On the contrary, a week (negative) attitudes towards the use of m-learning which means weaker belief in the ability m-learning in enhancing the whole process of teaching in learning would lead to less intention to use m-learning and in turn less adoption of it. However, in this study, the intention construct is not measured as it does not constitute a variable in the study's framework. Instead, a direct relationship between attitudes

and behaviour (m-learning adoption) is utilised and this direct relationship between attitudes and behaviour is supported by a number of researchers in the different fields of behavioural studies.

M-learning in Saudi Arabia: An Overview

There seems to be a great interest by educators and policy makers in Saudi Arabia about utilising advanced and latest technologies in the educational field, particularly in higher educational context. A number of factors have contributed to the recent interest of the Saudi higher educational institutions to embark on m-learning teaching practices. One of the important factors is the rapid increase of internet users in the country. In this regard, the number of internet users in the country increased rapidly and in a sharp manner during the past decade or so and this sharp increase constituted one of the early blocks for mobile learning to take place. Specifically, the percentage of internet users was 38.10 per cent of the total population in the year 2010 as compared to only 0.09 per cent in the year 2000 (Internet World Stats, 2010). Furthermore, there was only one operating telecommunication company in Saudi Arabia before the year 2005, namely the Saudi Telecom Company (STC). Then another company came on board, namely Etisalat of the UAE followed by a third company, namely Zain of Kuwait which started their business during the late 2008 and it was in that year when 3G/4G mobile technologies were introduced which positively influenced communication and also the competition among the three companies. 3G/4G services was then introduced by the other two telecommunication companies and since that time, more reliability, faster and better digital communication services were implemented and such services are highly essential for m-learning environment (Chanchary & Islam, 2011).

Research has shown that most lecturers in the higher educational context, particularly those in developing countries avoid the integration of technology inside their classroom, particularly the use of mobile as a teaching technique (Balash, Yong, & bin Abu, 2011). A number of factors have been hypothesized to explain such resistance to using m-learning by teachers. One of the main factors is the attitudes and beliefs held by these lecturers towards the adoption of m-learning (Kebritchi, 2010). In the Saudi context, little is known about such attitudes and beliefs held by the lecturers in the Saudi universities in general and the public universities in particular as little research has been done in this aspect (MacCallum & Jeffrey, 2009). Thus, the current research attempts to respond to this gap in the literature by examining the attitudes of the Saudi lecturers in the Saudi public universities towards the adoption of m-learning techniques in their teaching styles. In addition, a number of other factors that have been hypothesized to influence the attitudes of teachers towards the adoption of m-learning are examined in this research.

In addition, most of the previous research studies on m-learning in Saudi Arabia focused on the attitudes of students towards the use of m-learning (Iqbal and Qureshi, 2012; Chanchary & Islam, 2011). Furthermore, the findings of their studies did not reveal encouraging results regarding m-learning among the students. For example, Chanchary and Islam (2011) reported that a large number of students still have no idea what m-learning means and how it can facilitate their education although they are interested to experience the blended learning method where m-learning can be assimilated with class lectures. This indicates that students' unawareness of m-learning practices could be due to the teachers' lack of usage of such learning practices or what Kennedy et al. (2008) calls it as the 'digital divide'. However, it is not feasible to support this claim as limited research has been conducted on higher education

lecturers' attitudes towards the use of m-learning in the educational process. The present study attempts to respond to such claims by investigating the attitudes of Saudi university lecturers towards the use of m-learning in a number of Saudi public universities.

Thus, it is essential that the Saudi educators and policy makers are highly interested in utilising the latest technologies such as m-learning in the process of teaching and learning. That said, before the adoption of new educational methods and techniques, it is critical that teachers' attitudes and readiness are examined so that effective adoption is achieved (Chanchary & Islam, 2011). Therefore, one could argue that there is an urgent need to examine m-learning adoption from the perspectives of the teachers in the context of higher education so that a successful m-learning implementation in Saudi Arabia is achieved in the near future (Al-Debei, Al-Lozi & Al-Hujran, 2014). Thus, the present research attempts to examine the Saudi lecturers' attitudes towards the use of m-learning and whether such attitudes are associated or related to their m-learning adoption.

Methodology

Population and Sample

The population involved in the present research included all the lecturers who teach different subjects and classes at all the public universities in Saudi Arabia. Currently, the total number of the Saudi public universities is 25 universities (Ministry of Higher Education, 2014). In addition, the total number of lecturers teaching in these universities is 54,673 lecturers and they teach different subjects in different faculties (Ministry of Higher Education, 2015). The following table (Table 1) shows the Saudi public universities including the total number of lectures working there.

Table 1
Population of the Study

No.	Public University	Number of Lecturers
1.	Umm Alqura University	4,295
2.	Islamic University	710
3.	Imam Mohammad bin Saud Islamic University	3,426
4.	King Saud University	6,322
5.	King Abdulaziz University	7,072
6.	King Fahad University for Petroleum & Minerals	1,026
7.	King Faisal University	1,511
8.	King Khalid University	3,377
9.	Al-Qassim University	3,446
10.	Taiba University	1,521
11.	Al-Taief University	2,538
12.	King Saud bin Abdulaziz University for Health Sciences	735
13.	Jazan University	2,921
14.	Hayel University	1,231
15.	Al-Jouf University	962
16.	Tabouk University	1,462
17.	Al-Baha University	1,226
18.	Najran University	1,160

19.	Princess Nourah Bint Abdulrahman University	1,767
20.	Northern Borders University	601
21.	Shaqraa' University	1,643
22.	Salman bin Abdulaziz University	1,850
23.	Dammam University	2,692
24.	Almajma'ah University	1,123
25.	Saudi Electronic University	56
Total		**54,673**

Source: Saudi Ministry of Higher Education (2015)

Based on the recommendation given by Sekaran (2003) regarding the sample size, 381 respondents were selected to constitute the sample of this study. It is noteworthy that the sample selected for the study constituted lecturers who teach various subjects and who are from different faculties and not only from one particular faculty. Choosing the participants from all the faculties at the Saudi public universities and not from a particular faculty or a particular university was done for the purpose of ensuring that the data collected and the findings that follow can be generalized to all the Saudi public universities ensure better generalisability of the findings. Simple random sampling technique was utilised to collect the data as many researchers supported the use of simple random technique in which each respondent will have "an equal and independent chance of being selected" (Fraenkel & Wallen, 2000, p. 106).

Measurements

Attitudes

On the bases of TAM (Davis, 1985; 1989), the current thesis adapts Zhu, Guo, and Hu's (2012) scale of measure to tap teacher's attitude toward the use of technologies of M-learning together with the original items on perceived usefulness and perceived ease of use in the TAM model will be used. As such, seven items scale of measure is employed to measure the construct. These items encompasses 5-point semantic differential indicating the level of agreement (i.e., strongly agree, agree, neutral, disagree, and strongly disagree). The measure of teacher's attitude encompasses the following items:

1. I would be more encouraged to teach if I could access materials anytime, any-where via mobile devices.
2. It would be desirable to use mobile devices as a way for teaching.
3. I would like to use mobile learning in the future because it will help my conducting my lessons.
4. I think utilising mobile devices for learning purposes is quite an easy task.
5. Learning to use mobile devices for learning purposes would be easy for me.
6. Using mobile devices for learning purposes would enhance my effectiveness in learning.
7. I think utilising mobile devices for learning purposes is of a great use for students.

M-learning Adoption

Similarly and on the bases of TAM (Davis, 1985; 1989), the current thesis adapts Zhu, Guo, and Hu's (2012) scale of measure to tap teacher's adoption of technologies of M-learning. In addition to this scale (single-measure item), another item tapping lecturers' perceptions about whether they believe they use enough m-learning techniques in their teaching. As such, a 2-item measure is employed to measure the construct. This measure encompasses 5-point semantic differential scale and a neutral response for the middle point, indicating the level of agreement (i.e., strongly agree, agree, neutral, disagree, and strongly disagree). The items capturing the dependent variable of m-learning adoption are as follows:

1. I decided to use mobile learning to conduct my lessons
2. I believe I use enough mobile learning techniques in my teaching.

Pilot Study

The current instruments were tested with 38 lecturers for the questionnaires, which represent 10% of the sample and the respondents were from a randomly selected sample in the Saudi public universities. In the field of conducting research in general, many researchers and practitioners suggested that 10 per cent of the final study size is appropriate and sufficient for running the pilot testing particularly in social sciences and educational studies as suggested by Lackey and Wingate (1998). In addition to choosing 10 per cent of the quantitative sample and in order to ensure accuracy and consistency of the research process, the researcher made efforts to conduct the pilot testing under conditions and circumstances that are similar to those that existed during the real study including the timing and structure. Furthermore, it is also noteworthy to state here that the respondents of the pilot study were excluded from the random sampling of the main study in an attempt to ensure that no lecturer would be selected twice, once for the pilot study and one for the main study. The following table (Table 2) shows the findings of the pilot testing.

Table 2
Pilot Testing Reliability Results

Variable	Cronbach's Alpha
M-learning Adoption	.791
Attitudes towards M-learning	.831
Capacity in M-learning	.892
Training in M-learning	.944
Readiness in M-learning	.807
University Commitment towards M-learning	.812

The table above (Table 2) the study employed Cronbach's Alpha as an indicator of reliability of the research instrument in which a Cronbach's alpha value of 0.7 was considered acceptable as suggested by Onwuegbuzie and Daniel (2002). If the value of alpha is closer to one, it shows higher reliability of the instrument and indicates higher internal item consistency. In this study, the reliability was done on the study's variables and all of the Cronbach's alpha values showed high reliability for the items of these variables as could be seen from the table above in which all values were way higher that the proposed 0.7 value.

Findings

Descriptive Statistics

In this study, a number of demographic factors were used in this study and these factors included gender, age, teaching experience, and region. The following sections provide a detailed descriptions of the respondents' demographics.

- **Gender**

It has been mentioned earlier in this study that the total number of participants included 381 university lecturer who were both males and females. Looking at the table below, it could be seen from the figures that 54.8 percent respondents were female lecturers while 45.2 percent were male respondents who are lecturers. The following table (Table 3) shows the differences among the respondents in terms of their gender.

Table 3
Respondents' Profile in Terms of Gender

Demographics (Gender)	Frequency	Percent	Accumulative Percent
Male	172	45.2	45.2
Female	209	54.8	100
Total	381	100	100

- **Age**

In this study, the age of the lecturers' respondents ranged from less than thirty years old to more than 60 years old and above. Specifically, the age factor, in this study, was divided into five categories in which those less than 30 years old were in the first category, those from 30 years to 40 years were in the second category, those from 41 years to 50 years were in the third category, those from 51 years to 59 years were in the fourth category, and finally those who are above 60 years old were in the fifth category. The following table (Table 4) shows the differences among the respondents in terms of their ages.

Table 4
Respondents' Profile in Terms of Age

Demographics (Age)	Frequency	Percent	Accumulative Percent
Less than thirty	54	14.2	14.2
30 years - 40 years	124	32.5	46.7
41 years - 50 years	80	21.1	67.8
51 years - 59 years	69	18.1	85.9
More than 60	54	14.1	100
Total	381	100	100

It could be seen from the table above (Table 4) that 54 respondents were from the first category, 124 respondents were from the second category, 80 respondents were from the third category, 69 respondents were from the fourth category, and only 54 respondents were from the fifth category. This shows that majority of the respondents were from the second category in which their ages ranged from 30 to 40 years old constituting 32.5 percent of the respondents sample. The following section addresses the second demographic factor of years of teaching experience.

- **Years of Teaching Experience**

In this study, the teaching experience of lecturers' respondents ranged from below 5 years to those with above 20 years of teaching experience. Specifically, the teaching experience factor was divided into five main categories in which those with less than 5 years of teaching experience were in the first category, those who have experience between 5 years to 9 years were in the second category, those who have experience between 10 years to 14 years were in the third category, those who have experience between 15 years to 20 years were in the fourth category, and finally those who have a teaching experience of more than 20 years were in the fifth category. The following table (Table 5) shows the differences among the respondents in terms of their teaching experience.

Table 5
Respondents' Profile in Terms of Teaching Experience

Demographics (Teaching Experience)	Frequency	Percent	Accumulative Percent
Below 5 years	50	13.1	13.1
5 years - 9 years	139	36.5	49.6
10 years -14 years	109	28.6	78.2
15 years -20 years	47	12.3	90.5
Above 20 years	36	9.5	100
Total	381	100	100

It could be seen from the table above (Table 5) that 50 respondents were from the first category, 139 respondents were from the second category, 109 respondents were from the third category, 47 respondents were from the fourth category, and 36 respondents were from the fifth category. This shows that majority of the respondents were from the second category in which their teaching experience ranged from 5 to 9 years constituting 36.5 per cent of the respondent sample. The following section addresses the third demographic factor of academic title.

Statistical Analysis of Variables

- **M-learning Adoption**

Lecturer respondents were required to respond to the items making up this construct using a five-point Likert scale ranging from 'strongly degree' (1) to 'strongly agree' (5). The following table (Table 6) shows the statistical findings regarding the construct of M-learning adoption.

Table 6
Statistical Findings for M-learning Adoption

Scale	Frequency	Percent	Accumulative Percent
Strongly agree	79	20.7	20.7
Agree	91	23.8	44.5
Neutral	139	36.5	81
Disagree	52	13.7	94.7
Strongly disagree	20	5.3	100
Total	381	100	100

The table above (Table 6) shows that slightly over third of the lecturers seem to be neutral in terms of M-learning adoption when the cumulative percentage was reported to be 36.5 % of the respondents. However, it could also be seen that nearly 44.5 % of the respondents (strongly agree & agree) reported that some form of M-learning is used with their students. The remaining lecturers seem to disagree when it comes to adopting M-learning. The following section addresses the statistical analysis of the construct of teachers' attitudes towards the use of m-learning.

- **Attitudes towards M-learning**

Attitudes are viewed as the positive or negative evaluations or feelings that people have towards other people, objects, issues, ideas or events. Thus, this study looked at the attitudes lecturers and whether these lecturers possessed positive or negative attitudes towards M-learning. Lecturers respondents were required to respond to these statements using a five-point Likert scale ranging from 'strongly degree' (1) to 'strongly agree' (5). The following table (Table 7) shows the statistical findings of Saudi lecturers' attitudes towards the adoption of M-learning tools.

Table 7
Statistical findings for Attitudes towards M-learning

Scale	Frequency	Percent	Accumulative Percent
Strongly Agree	135	35.4	35.4
Agree	112	29.4	64.8
Neutral	84	22.1	86.9
Disagree	31	8.2	95.1
Strongly Disagree	19	4.9	100
Total	381	100	100

It could be seen from the table above (Table 7) that slightly over 13 percent of the respondent teachers demonstrated negative attitudes towards the use of M-learning. Specifically, 4.9 % attained strong negative attitudes towards the use of M-learning and 8.2 % responded to the use of the construct in a negative manner. That being said, the largest segment was made of those of a positive attitudes towards the use of m-learning (64.8%) considering the percentages of the two categories of 'strongly agree' and 'agree'. Being neutral about the use of M-learning

was at 22.1 percent. This high percentage clearly shows that lectures tend to have a stronger positive attitude towards the use of M-learning.

Relationship between Attitudes and M-learning Adoption

Multiple regression is utilised to test the direct relationships between the independent and dependent variables. As shown in Table 8, lecturers' attitudes towards M-learning explains 73.5 per cent of the variance of the M-learning adoption. As such, lecturers' attitude was found to be positively predictive of teachers' adoption of m-learning ($\beta = 0.921$, $P < .01$). What this means is that the dependent variable of m-learning adoption increases by the beta coefficient value, provided that the relationship is significant at $P < .01$. In other words, when the beta coefficient is $\beta = 0.921$ and statistically significant, then for each unit increase in the predictor variable, the outcome variable will increase by 0.921 units. The following table (Table 8) shows the findings of the hypothesis testing regarding the aforementioned relationship.

Table 8
The Relationship between teacher's attitude towards m-learning and the adoption of m-learning

Independent Variables	Dependent Variable (adoption of m-learning)
Teacher's attitude	0.921**
R Square	0.735
Adjusted R Square	0.72
F Change	0.891

Note: $P < 0.01$ = **; $P < 0.05$ = *

Discussion of Findings

The relationship between attitudes and m-learning adoption was found to be positive and significant. The statistical analysis for m-learning adoption showed that a larger percentage of the participants were neutral at 36.5%. This reports that the lecturers' were neither in favour nor against m-learning adoption. This statistic shows that possibly in the region of the research – Saudi Arabia, the use of m-learning is limited. However in terms of attitudes towards the use of m-learning; 64.8% demonstrated positive attitudes towards m-learning. So the earlier finding of usage in the classroom could be down to consideration not really adoption. Lecturers may not have thought to incorporate this technology into their classroom environment. Some lecturers from the study did have negative attitudes (13.1%) towards m-learning and this would of course affect their delivery of this technology in their teaching. A reason for these negative attitudes could be due to skepticism about the technology due to age or a link to one of the variables such as capacity, and readiness. Another reason could be attributed to their belief of the usefulness of the use of technology and this directly drawn from the TAM model in which perceived usefulness will lead to perceived use. So if some lecturers do not have positive attitudes towards the usefulness of the use of technology, it would make sense that they will not use it often. Overall the research showed that the lecturers' were willing to adopt m-learning into their teaching environment.

The findings showed that if a teacher had a positive attitude towards m-learning they were more highly likely to adopt it. Mallat, Rossi, Tuunainen and Öörni (2008) and Kaigin and Basoglu (2006) provided empirical evidence that positive attitude toward M-learning to elicit the actual adoption of that technology. Guided by the previous review the relationship between teacher's attitude and the decision to adopt M-Learning technology is positive. In addition to that and in support of the positive relationship between the construct of attitudes and the adoption of a given behaviour, Chuttur (2009) addressed the role of attitude on decisions to adopt certain technology. To that end, it worthy of underscoring that TAM (Davis, 1989) posits that attitude is central to the adoption of a new technology. Furthermore, Davis (1985) argued that users' motivation to adopt a given computing technology is dependent on three elements, namely Perceived Usefulness, Perceived Ease of Use, and Attitude towards Using, though, it is assumed that the real use of a system relies on user's attitudes towards that particular system. Thus and based on the given arguments, it is expected that there would be a positive relationship between lecturers' attitudes towards M-learning and their decision to adopt m-Learning technology.

Conclusion & Recommendations

The study found that the construct of attitudes is related to m-learning adoption and that it is an important determinant of the adoption. Thus, it is important that the Saudi public university ensure that before starting implementing the m-learning system into their curricula, they should adequately work on the attitudes of these lecturers towards utilising m-learning in their teaching techniques. This could be done through providing adequate, regular, and up-to-date training. Apart from that, it is important that and the university ensure that they have the infrastructure in-place and there are many providers and software companies that offer interactive teaching aids that can be used on m-learning platforms.

Teachers need to be trained adequately to adopt m-learning into their planning and lessons. Lessons need to be uploaded to whichever online platform the university decides to use and they need training to use it. Other interactive methods that use m-learning such as interactive learning games need to be implemented in the classroom. In developing countries; teachers need to be influenced and guided by teachers from westernised countries where the technology of m-learning is widely used and available. But also the students need to be influenced and encouraged to use m-learning as the literature section demonstrated that a large majority of students did not understand the concept of m-learning as studied by Chanchary and Islam (2011). These software programs have capabilities for tracking, assessment, resources and even independent learning aids. Teaching can have a demanding workload and the emphasis is always going to be on results and data; therefore the software needs to demonstrate how this can statistically improve the success rate and decrease the workload to ensure teachers attitudes are influenced towards adopting m-learning. Teachers need convincing that it is a learning aid and will enhance their teaching strategies; this will only happen with adequately planned strategies from the university. A recommendation for this would be to introduce a timescale that introduces m-learning gradually and slowly into the teaching environment. Training should be provided first to ensure all teaching staff are up-to-date with the latest software and delivery methods. Then once the teaching staff come to a consensus about their implementation of m-learning; then the university can start purchasing software and online platforms to utilise.

The university needs to ensure all the hardware and systems installed are capable of delivering an m-learning platform. Without this vital infrastructure the platform of using m-learning will not be as effective and this can cause problems. The role of the teaching staff is ultimately to ensure each student leaves with the qualification or award that they aimed to achieve upon joining the university. Therefore a deciding factor is whether or not m-learning will affect the success rate; this factor needs to be determined before the university implements m-learning. A recommendation is that if the university wants to go ahead and develop an m-learning platform to use in-house; then they need to invest and install a fast and efficient wireless network as a minimum requirement. They also need to ensure the hardware can handle a large amount of data efficiently and effectively; otherwise they need to upgrade this. The hardware needs to be up-to-date as services and software are constantly upgrading; some older m-learning technology may not have the capability to work with upgraded software. Before any new program of mobile learning is introduced it needs to be trialled and tested with the hardware system available; then an evaluation of what the requirements are should be justified. Overall m-learning needs to be cost effective to the university; therefore upgrading the infrastructure and training staff effectively should yield better results and higher influxes of students to the universities providing m-learning platforms for all their courses.

Timescale and promptness of adoption from the universities perspective is important. M-learning is technology that is still relatively new and in today's modern society in Saudi Arabia there is a strong usage of mobile technology to communicate between the populations. Therefore in order for universities to offer courses to compete with institutions in other more developed countries after the university has researched in the use and application of m-learning; they need to start putting contingency plans into effect. But they still need to ensure they have compiled sufficient research to ensure its effectiveness. Therefore if a university wants to stay competitive in fast growing educational system of the developed world; a recommendation would be for the adopting university to put in a realistic timescale as soon as the primary research has been compiled.

Adoption of m-learning across all programs can be an important time for the university. There needs to be feedback regarding the use and development of m-learning after its introduction or its increased use if partially used already. The success rate of the courses on offer needs to be affected positively with higher statistical results. The first year of implementation is crucial for m-learning to be a success. Therefore a recommendation would be for the university to constantly monitor the progress of any new m-learning usage and regularly (approximately every 3 months) conduct a quantitative questionnaire to ensure its positively enhancing the statistics for results.

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