The Determinants Influencing Saudi Undergraduate Students' Motivation and Acceptance of Tablet Use in Learning

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Abstract: This study seeks to develop a comprehensive model of motivation and acceptance in the context of tablet computer use in learning in higher education. It proposes an adaptation of some of the variables used in the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) to explain and predict students' motivation and acceptance of of the technology in their learning activities. Also, the model identifies a number of moderating variables that can be used to explain students' attitudes and intentions. The model takes account of intrinsic motivation (including variables of perceived self-efficacy, perceived enjoyment, perceived willingness and perceived usability), extrinsic motivation (including variables of perceived usefulness, perceived achievement, perceived mobility and perceived identity), and variables of attitude, behavioural intention and actual usage. Furthermore, this model holds that access to the internet, university utilisation, teachers' role, device characteristics, personal skill, knowledge and experience are key factors which directly affect the relationship between students' attitudes and their intentions to use tablets in learning. Through an important cluster of antecedents, the proposed model aims to enhance our understanding of students' motivation and acceptance of using tablets in university education and aid efforts to prompt the adoption of this device in the higher education sector in the Kingdom of Saudi Arabia.

Keywords: TAM, students' motivation, tablet computers, mobile learning

I. INTRODUCTION

Over the past decade, the education system in general and higher education (HE) in particular have been transformed owing to advances in information and communication technology. One of the most important developments has been the field of mobile technology. Mobile technologies are widely accepted and understood and are now considered to be a normal part of everyday life (El-Hussein & Cronje, 2010). They are an easy way of maintaining literacy skills and accessing information and, importantly, they facilitate distance learning (Mehdipour & Zerehkafi, 2013; Mohseni, 2014). Against the fixed type of computers, mobile technologies may be better able to facilitate learning since they can be more convenient, more readily accessible and easier to use; those qualities are attractive to the current generation of students. According to Oller (2012) and Traxler (2007), mobile technologies are more difficult to ignore than traditional desktop technologies, since mobile technology now plays such a vital role in our day-to-day lives for a variety of different purposes, including accessing information and learning.

One of the mobile devices used in education is the tablet computer. The versatility and flexibility of tablets might provide the potential to change the learning experience of students. However, the deployment, monitoring and management of tablets are issues which need to be considered and there is

still a significant lack of evidence for the acceptance of tablet use in education (Clarke & Svanaes, 2014), especially in the Kingdom of Saudi Arabia (KSA).

Some research asserts that the HE system in KSA is not keeping pace with changing times and educational demands (Ageel, 2013). However, technology in HE has still increased and is thought to have changed for the better (Al-Wabil, 2015). Technology-enhanced learning is being promoted in the country and colleges are well-equipped with educational tools such as audio-visual systems, multimedia and the internet. Also, some of the more recent electronic teaching aids such as learning management systems are available in some universities.

Firstly, a literature review of mobile learning with specific regard to tablet computers and the theoretical framework used to investigate students' motivation and acceptance of tablets for learning purposes is presented. Next, a description of the findings of the semi-structured interviews and the research model is proposed. The hypothesis, research method, and strategy for empirically validating the model are then set out, and finally, a discussion on implications for theory and practice is followed by the conclusion.

II. Literature Review

The development and widespread use of mobile technology has led to its integration in many educational sectors, resulting in the concept of mobile learning (m-learning). M-learning is a relatively new learning approach which has become an emerging learning trend for those education systems with access to mobile devices, internet and wireless technologies (Narayanasamy & Mohamed, 2013). It is believed by some that learning with wireless handheld devices, or indeed any other electronic learning approaches, will never replace classroom learning (Liaw et al., 2010). However, Motiwalla (2007) and Robledo (2012) claim that mobile technology devices can supplement learning and so increase the value of current learning models such as conversation theory (Pask, 1975) and the social constructivist theory (Brown & Campione, 1996).

M-learning implies personalised learning; that is, it involves an individual's own wireless handheld device which can be used at their own pace, anywhere, at any time, and on any subject, with a degree of privacy. It can make learning truly personalised in that the device provides one-to-one interaction with the option to choose content depending on interest or learning need, with the result that pedagogy is changing from a teacher-centric to a learner-centric approach (Garg, 2013; Martin et al., 2013). M-learning is considered as a subset of e-learning, or as the next generation of e-learning, and provides an opportunity for the new generation of students to enjoy better communication and learning activities without taking into account place and/or time. However, the limited battery life of devices and lack of adequate support from educational institutions are considered as limitations in the adoption of m-learning in HE.

Mobile learning has recently become popular in KSA, particularly with young Saudi students (Narayanasamy & Mohamed, 2013). It has been found that approximately 90% of students in KSA use a smart phone (Alahmad, 2014). The mobile infrastructure in KSA is well established, with the result that most citizens acquire mobile devices with improved features every year; it has been found that almost everyone at Jazan University own at least one mobile phone (Narayanasamy & Mohamed, 2013). In developing countries such as KSA, the concept of a learning tool which can be used anytime and anywhere is still limited to the laptop (Nassuora, 2012). Almutairy et al. (2015) has advised KSA education policy makers to consider creating mobile learning environments at academic institutions. This interest in m-learning in KSA has grown immensely within the past few years because of increased advances in mobile technologies and devices and wireless networks (Al-Wabil, 2015; Garg,

2013). The acceptance of new mobile devices is also growing in KSA (Garg, 2013), although the acceptance of tablet use in HE remains unknown.

In many ways the tablet computer is ideally suited to m-learning. Educators need to consider that if they ignore the possibilities offered by tablets, they may miss the opportunity presented by these devices to promote collaborative, informal and interactive learning. Researchers agree that the tablet computer is a useful tool for educational purposes and that it can be used very effectively to facilitate student learning and interaction, and to increase student motivation and engagement. Thus, the tablet may well become the main device used in learning and classroom environments in the near future, although studies show that the adoption of tablets in higher education is not guaranteed to be successful (Percival & Claydon, 2015). Tablet computers, such as the Apple iPad, support access to many kinds of information and possess advantages for collaborative learning. However, these devices could also distract students and create frustration in the classroom. On the other hand, if tablets are incorporated into the classroom carefully and reflectively, educators perhaps can maximise the potential to enhance learning and minimise interference with learning. Few studies have investigated tablet computers in education in KSA; however, it is estimated that around 50% of Saudi students own a personal or family tablet computer (Alahmad, 2014). A study by Alqhtani et al., (2013) explores how tablet computers can transform the KSA education system. Unfortunately, their research showed that tablet use is still very limited among Saudi Arabian students, despite evidence of positive learning outcomes in general as a result of their use (Alqhtani et al., 2013).

III. THEORETICAL FRAMEWORK

In this study, two theories have been integrated to develop the study model. One is the technology acceptance model (TAM) and the other is self-determination theory (SDT). Interaction between humans and technology is influenced by a number of social and psychological factors and characteristics (Taiwo & Downe, 2013). Because of the complexities involved in predicting human behaviour, research has generated a variety of theories and models to explain patterns of adoption and use of new technologies (Alomary & Woollard, 2015). Technology acceptance research is a mature field and has now been active for 3 decades as technology has permeated every aspect of life but there is ample scope for research in the field of education. Fred Davis developed a technology acceptance model in his 1986 doctoral study (Davis et al., 1989) (Fig. 1). It originated as an adaptation of the more generalised Theory of Reasoned Action (TRA) and was developed more specifically later to predict and explain technology usage behaviour (Davis et al., 1989; Davis, 1989). The TAM is "helpful not only for prediction but also for explanation" (Davis et al., 1989:985) and thus can be used to predict behaviour as well as to explain why users accept or do not accept technology. The original TAM was developed by Davis in 1989 to identify the factors which lead users to accept or reject a technology by integrating the technological aspects and the organisational behaviour concepts (Davis et al., 1989; Davis, 1989). According to this model, while there are several factors affecting users' acceptance of a technology, the two most important are perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness refers to the improvement that can be expected in task performance with the aid of the technology, and perceived ease of use refers to the perceived easiness of using the new technology (Davis et al., 1989). In the TAM, attitude towards using a system refers to the evaluative effect of positive or negative feelings of individuals in performing a certain behaviour (Shroff, Deneen, & Ng, 2011).

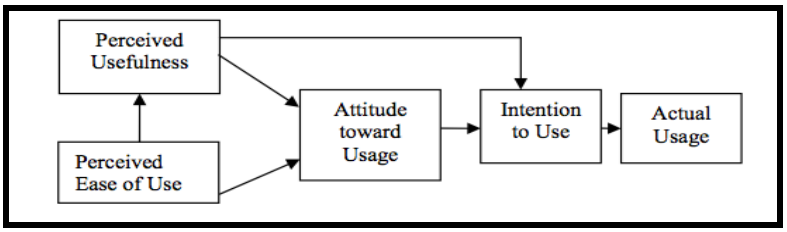

Figure 1 Technology acceptance model (TAM) (Davis et al., 1989)

It can be concluded that the TAM framework can be the basis of robust and developing models of technology use in learning environments.

It is important to identify what motivates students to use mobile devices with regard to tablet computers in order to provide a better understanding of what educators should consider when adopting m-learning in the classroom. Everyone needs motivation in life as everyone has needs and goals and behaves in ways which fulfil these according to the strength of their motivation (Holtz, 2006). Thus, motivation can be considered as a necessary aspect to almost any part of life. As a result, the term motivation refers to the need for performing an action to complete a specific activity. In other words, it is considered to be the reason for the behaviour. Studying motivation may help to predict future behaviour (Kaewprapan & Suksakulchai, 2008). In SDT (Deci & Ryan, 1985), the authors distinguish between different types of motivation based on the different reasons or goals that give rise to an action. The most basic distinction is between intrinsic and extrinsic motivation.

Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable (Ryan & Deci, 2000). Intrinsically motivated behaviour is perceived as behaviour freely engaged in, which the person finds interesting and derives spontaneous satisfaction and enjoyment from (Reinholt, 2006). Thus, it remains a main construct, reflecting the natural human propensity to learn and assimilate (Ryan & Deci, 2000). Intrinsic motivation exists inside the person, and so exists in the relation between the person and the task (Ryan & Deci, 2000). It is often associated with the involvement in a complex task (Reinholt, 2006).

On the other hand, extrinsic motivation refers to doing something because it leads to a separable outcome (Ryan & Deci, 2000). It is often associated with the engagement in the activity because this activity leads to desirable consequences separate from it, such as tangible rewards, and hence is a means to an end and not undertaken for its own sake (Reinholt, 2006). In other words, extrinsic motivation leads people to perform in order to gain external rewards.

IV. Data Collection, Analysis and Results

This study is an exploratory piece of research that attempts to identify the factors influencing HE students' motivation to use and accept tablet computers in KSA, by collecting qualitative data using semi-structured interviews with twenty undergraduate students at King Abdulaziz University, KSA. It is not possible to observe people's feelings, thoughts, intentions and opinions as such. Interviews enable direct access to the participants' perspectives (Arksey & Knight, 1999; Patton, 2002; Zohrabi, 2013). Semi-structured interviews transcripts also enable the development of the themes that are most related to the research questions (Rabionet, 2009) and the interview is a way of exploring the meanings underlying respondents' perspectives, feelings, thoughts and behaviours (Arksey & Knight, 1999). Consultation with experts in the field and experienced qualitative researchers is a useful way of providing feedback and guidance (Rabionet, 2009). Thus, before piloting the interview the researcher obtained two experts' opinions on the questions, which resulted in a number of changes being made.

The interview was subsequently piloted with two participants from the sample to help improve the instrumentation (Rabionet, 2009) and allow familiarisation with the recording equipment (Dawson, 2006). This trial run also gave a realistic indication of how long the interviews would take to conduct. In this study, thematic analysis was applied to the interview data. Thematic analysis is defined as a method for identifying, analysing, and reporting patterns within data (Braun & Clarke, 2006; Willig, 2014). The choice between inductive and deductive analysis depends on how and why the researcher is coding the data (Braun & Clarke, 2006). In this instance the data was coded in order to explore the factors influencing students' motivation and acceptance of tablet use based on the model from the literature and from the interview responses. Thus, deductive and inductive strategies were applied as in (Fig. 2) below.

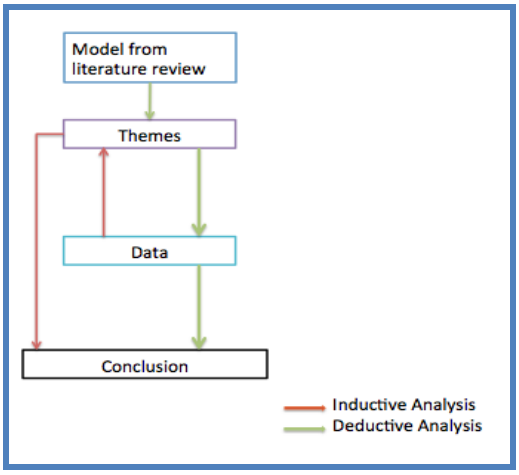

Figure 2 Inductive and deductive analysis

The process of data analysis attempts to meet the aim of this study which is to derive a better understanding of students' motivation and acceptance of tablet computer use in HE. Analysis of the twenty interviews revealed four main themes, as the mind map shows in (Fig. 3). The themes are: students' perception of tablet use; students' attitude towards tablet use; the requirements for tablet use; and tablet usage itself.

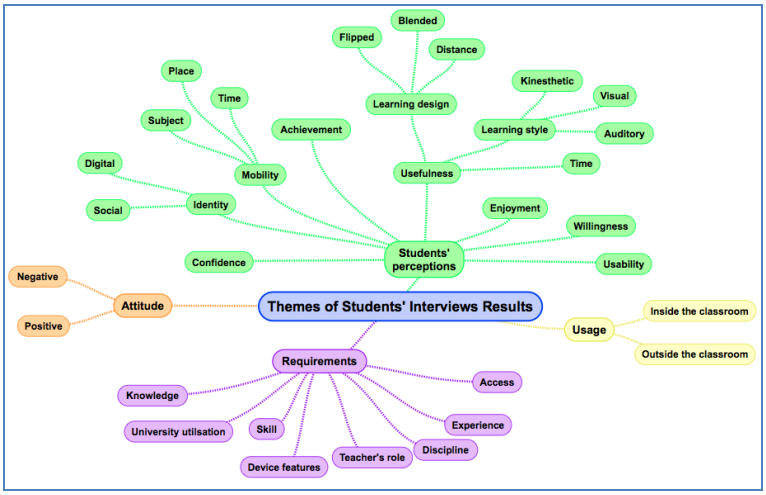

Figure 3 Themes of the interviews

V. Model Development

This study utilises the original technology acceptance model to measure the variables that affect the intention to use tablet technology as well as its actual use. In the study model (Fig. 4), the motivational intrinsic and extrinsic aspects of self determination theory have been integrated with the TAM, since educational psychologists have long recognised that motivation affects the outcomes of learning (Al-Tamimi & Shuib, 2009; Lai, 2011). The aim of the study is to analyse both motivation and acceptance in the context of tablet use to give a better understanding of students' attitudes towards tablet computers. Shroff et al. (2011), citing Dillon and Morris (1998), define technology acceptance as "the demonstrable willingness within a user group to employ information technology for the tasks it was designed to support" (p.5). From this we assume that motivation can be related to the TAM as motivation refers to the willingness to act. However, Howard et al. (2010) have stated that the TAM fails to treat motivation appropriately and that this has led to the limited understanding of motivation within the information systems field.

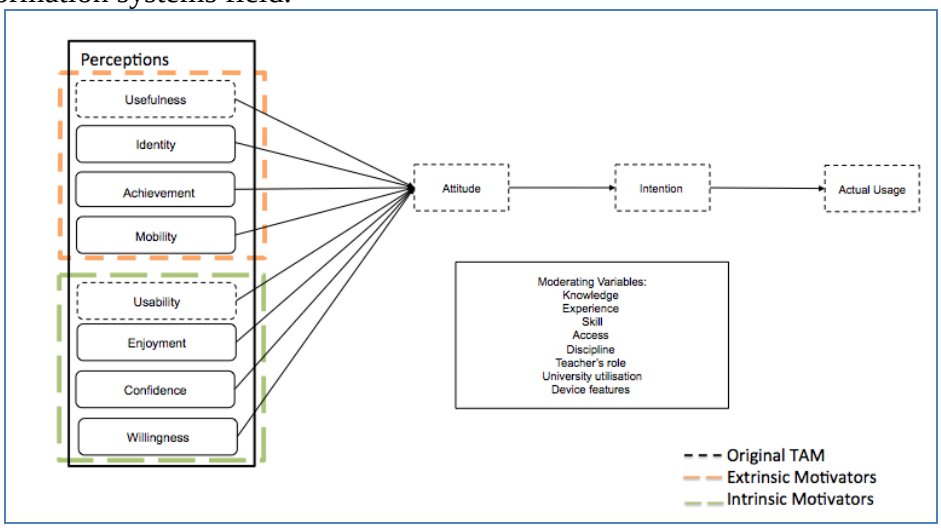

Figure 4 The study Model

Based on the literature review and the findings of the twenty interviews, the constructs of the study model were identified and refined.
The table below (Table. 1) includes all the factors/constructs involved in the motivation and acceptance of tablet use in learning, along with their definitions.

Construct	*Definition*
Actual usage	The actual activity of tablet use.
Intention	The student's intention to use a tablet in learning. It indicates the intention of that individual in making a decision, and the behaviour that may result as a consequence of this intention (Khechine et al., 2014).
Attitude	The learner's liking for or dislike of tablet use. There are a number of factors that relate to perceptions which can predict learners' attitudes towards adopting tablet use in learning.
Perceived willingness	The degree to which learners perceive that they have the desire, readiness and eagerness to use a tablet.

Perceived confidence	The degree to which learners perceive that they are confident in their ability to use a tablet.
Perceived enjoyment	The degree to which learners perceive that they have fun when using a tablet.
Perceived usability	The degree to which a learner perceives that a tablet is easy to use and effort-free physically and mentally.
Perceived identity	The degree to which the learners perceive that they will be viewed as up-to-date and fashionable as a result of their using tablets in learning.
Perceived usefulness	The degree to which learners perceive that using a tablet will enhance their learning.
Perceived mobility	The degree to which a learner perceives that a tablet is portable or movable.
Perceived achievement	The degree to which learners perceive that using a tablet will lead to better grades.

Table 1 The definition of the model constructs

The main objective of the survey is to address the research question, namely, what are the factors of student motivation and acceptance of tablet computer use in higher education in KSA and what are the relationships between them? This will be achieved by addressing the parent hypotheses and will form the basis for the development of the survey instrument. A summary of the hypotheses developed for this study are listed below:

H1: intrinsic motivations positively influence attitudes toward tablet use for learning.
H2: extrinsic motivations positively influence attitudes toward tablet use for learning.
H3: attitude toward tablet use for learning positively influences behavioural intention to use a tablet in learning.
H4: behavioural intention to use a tablet in learning positively influences the actual usage of a tablet for learning.

A moderating variable is a third variable that affects the relationship between two variables. This study uses eight moderating variables: university utilisation, teacher's role, device characteristics, experience, skills, knowledge, discipline and accessibility.
1. University utilisation refers here to all the facilities provided by the university that support students' use of tablets. These facilities are part of the organisational support which enables and encourages tablet use in education (Venkatesh & Bala, 2008a).
2. The role of the teacher is important in predicting motivation and acceptance with regard to tablet use in education. Based on the students' interviews, whether or not the teacher supports and encourages students to use tablets to complete learning tasks has an effect on how they perceive technology in the classroom. Martin et al. (2013) have pointed out that some studies indicate that technological

innovations are more likely to be embraced by students than by their lecturers or teachers, and that this may affect students' perceptions of using technology to support their learning.
3. Device characteristics are the salient features of a system that can help or hinder learners to use the technology (Venkatesh & Bala, 2008b) and which can positively influence learner acceptance of the device.
4. Experience here refers to how much experience a learner has in using a tablet. Experience is a significant moderating variable in information technology adoption contexts because, as proposed in previous research, users' reactions towards a technology may change over time (Venkatesh & Bala, 2008b).
5. Skill is defined as the learned ability to use a tablet. Black and Lynch (2001) stated that if students have the essential skills, they will have the ability to use the technology. This means that skills play an important role in technology acceptance, and that students should have computer skills to enhance their technology usage.
6. Knowledge refers to what students know about tablet computers and their use. Based on students' responses in the interviews, knowledge is considered as one of the moderating influences on motivation and acceptance of tablet use.
7. Discipline refers here to the department or faculty in which students are registered, or the main subject of their degree courses.
8. Accessibility refers to internet access when using a tablet. One of the attitudinal barriers that Pajo & Wallace (2001) identified when implementing web-based teaching by university teachers is their concern about student access to the internet.

A pilot study was developed and refined by academic peers and survey experts to ensure its validity and reliability before full scale administration of the survey. A pilot test was undertaken using students from the same planned sample. This smaller sample allowed researchers the opportunity to question the survey participants, thereby refining the structure, wording and content of the instrument. A sample of 300 undergraduate students at King Abdulaziz University, KSA is proposed for the pilot test. The survey will be administered online and responses will be collated and analysed using SPSS. On completion of this pilot stage the refined instrument will again be sent to more students. Exploratory and confirmatory factor analysis will be used in the analysis of the survey to find and examine the factors and the interrelationships between them.

VI. CONCLUSION

This study will make a significant contribution to the body of knowledge in the field of educational technology in HE. The findings will be of interest to both HE policy makers and researchers in the field of technology and mobile learning. From a theoretical perspective, the study will provide an empirically validated model for identifying antecedents of student motivation and acceptance of tablet computer use in learning that are moderated by eight factors. A new research model will be developed which relates the factors of motivation and acceptance of mobile technology with specific reference to tablet computer use for learning in the HE context. From a practical standpoint, the study will yield statistics and recommendations that can be brought to the attention of HE policy makers in KSA. It is hoped that these will serve to increase the adoption of tablet computers by HE institutions and their students.

The need has been identified for a better understanding of the different factors that influence student acceptance and motivation to use technology. This study therefore proposes an integrated model of self-determination theory and technology acceptance model. This model has been developed from findings in the existing literature relating to the original TAM and SDT, as well as an early phase of the research in which qualitative interview data identified further variables. This integrated model can be

used to investigate the motivation for and acceptance of tablet use in order to yield a better understanding of students' attitudes and use of tablet computers in the HE context.

The factors included in this model are actual usage, behavioural intention to use a tablet in learning, and attitude towards using a tablet for learning. The eight contributors to motivation are: confidence, enjoyment, willingness and usability (intrinsic motivation); and usefulness, identity, mobility and achievement (extrinsic motivation). A number of other moderating variables are also taken into account, namely, experience, skill, knowledge, accessibility, curriculum, university utilisation, teacher's role and device characteristics.

It is believed that by integrating the motivational factors and moderating variables with the constructs of the TAM and SDT, the results of this study will yield significant and useful findings relating to students' motivation and acceptance of tablet computers in HE learning.

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