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Exploring students' awareness and perceptions: Influencing factors and individual differences driving m-learning adoption

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ABSTRACT

This study investigates students' awareness and perceptions of m-learning and examines the factors affecting students' behavioral intention to adopt m-learning, by using a modified research model that integrate technology acceptance model (perceived usefulness and perceived ease of use) and unified theory of acceptance and use of technology (social influence) along with other factors (m-learning services and mobile limitations). In addition, control (gender, field of study, study level) and moderator variables (mobile capabilities, level of mobile usage, and frequent use of m-services) were introduced to verify the individual differences between respondents on the key factors affecting the adoption and usage of m-learning. Structural equations modeling and path analysis were used to test the hypotheses and the proposed model. The results revealed that perceived usefulness and perceived ease of use were found to be the primary factors driving students' intentions to use m-learning. Both m-learning services and social influence have positive effects on the acceptance of m-learning, while mobile limitations were found to be the main obstacle restraining students' participation in a m-learning environment. Most of the control variables yield no significant differences between students, but all the moderator variables were found to be significant determinants that can influence students to adopt m-learning. Overall, students have great potential to engage and integrate mobile technology into their educational environment.

1. Introduction

Although e-learning may increase learning opportunities, students express a negative attitude towards e-learning and suffer from some shortcoming such as lack of involvement, motivation, human interaction, and emotional problems (feeling of isolation and frustration). Therefore, it has become imperative for educators to build a new learning environment that can combine both real-world and digital-world learning resources and can enhance students' learning experience. Mobile technologies have the potential to provide a collaborative learning environment (Looi et al., 2009) and can assist students to access online resources via mobile devices. This approach of learning is called m-learning (Sharples, Corlett, & Westmancott, 2002), ubiquitous learning (Hwang, Tsai, & Yang, 2008), or seamless learning (Wong & Looi, 2011), which inherits the features of e-learning and extends their reach by making use of portable wireless technologies (Orr, 2010).

M-learning is the latest trend and new form of e-learning in higher education. Park, Nam, & Cha (2012) define m-learning as "any educational provision where the sole or dominant technologies are handheld or palm-top devices". Learners can continue learning away from the traditional classrooms using mobile devices and can establish wireless communication channels with educators and amongst themselves. This learning approach provides opportunity to connect informal learning experiences that occur in virtual classroom model using online learning implementations, as well as adding value and complements to the existing learning models (Motiwalla, 2007). Students who have the opportunity to engage in m-learning can access course materials, share ideas and become active participants in a collaborative environment (Nassuora, 2012), attain formative evaluation and feedback (Ciampa, 2014), and obtain guidance from educators (Crawford, 2007).

The main significant features of m-learning are ubiquity and mobility. Ubiquity is the access to technologies whenever and wherever in need, while mobility is the learning on the go (Peng, Su, Chou, & Tsai, 2009). Mobility is not the only feature of m-

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learning approach, but the learning activity itself such conversation, decision-making, and interaction amongst instructors and students (Kukulska-Hulme, 2009). Furthermore, the main reasons for the rapid growth of m-learning in the higher education environment are the increase number of mobile devices, low cost of mobile services, rapid development of mobile wireless technologies, capability enhancements of mobile devices, and multiple features (SMS, MMS, audio/video recording, pictures capturing, data storing, and internet access). However, m-learning is still in the early stages of development in higher education (Park, 2011), for m-learning to succeed, it is necessary to identify the factors influencing college students' acceptance and adoption of m-learning.

New students' generation are technology dependants (Prensky, 2001, 2009) and are expected to use m-learning in their studies because they may associate technology more with perceived ease of use (PEOU) than with perceived usefulness (PU). Therefore, this study aims to investigate students' awareness and perceptions of m-learning, as well as to identify the factors influencing students' behavioral intention to adopt and use m-learning in higher educational institution in Palestine. The author proposes a modified research model based on technology acceptance model (TAM) (Davis, 1989) and unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) to achieve the aim of the study and to enhance the learning process. The study also verify the effect of control variables (gender, field and level of study) and moderator variables (mobile capabilities, level of mobile usage, and frequent use of m-services) on the relationships between students and factors affecting m-learning adoption. The following research questions were developed to address the purpose of the research.

1. What are the reasons for students having low or high perception toward m-learning involvement?
2. Is m-learning beneficial in creating interaction environment among students?
3. Do the control and moderator variables have significant differences between students on factors affecting m-learning acceptance?

This paper is organized as follows. Section 2 presents literature review of m-learning and various theories of technology acceptance models, Section 3 presents description of the research model and hypotheses, while Section 4 proposes the measurement method and scales, followed by research results in Section 5. Section 6 presents the implications of the findings. Section 7 sets the limitations of this study and highlights the future work. Finally, the conclusions of this study are presented in Sections 8.

2. Literature and theoretical framework

Technology of mobile devices is not the only challenge in implementing m-learning in higher education, this is because technology alone does not enhance pedagogy and direct implementation of m-learning does not necessarily guarantee efficient learning. Knowledge in mobile devices and technologies does not ensure technology adoption (Corbeil & Valdes-Corbeil, 2007) and hence the adoption of m-learning does not guarantee the usage of m-learning services (MLS) because both m-learning adoption and usage of MLS are asynchronous. The effectiveness of learning process depends heavily on educators and students whom are influenced by social, cultural, and organizational factors (Cheng, 2005; Phillipson, 2007). Of interest to this study, an evaluation of students' awareness and perceptions of m-learning and examining the factors influence students' acceptance and readiness to use m-learning should be provided as the first step in implementing m-learning in the higher education environment.

2.1. Mobile learning

Some studies on m-learning adoption have focused on system architectures to enhance the learning process (Bomsdorf, 2005; Capuano, Gaeta, Miranda, & Pappacena, 2005; Sharma & Kitchens, 2004). Other studies based their work on technology-related enablers only (Huang, Lin, & Chuang, 2007; Liu, Han, & Li, 2010; Tagoe & Abakah, 2014). However, limiting the understanding of technology acceptance to technology-related enablers only may provide a narrow understanding of what influence students' intention to adopt m-learning (Hashim, Tan, & Rashid, 2015). Therefore, researchers have to consider not only technology-related factors, but other factors that may influence and motivate students' adoption and usage of technology.

Several studies have conducted learning activities using m-learning in various application domains, such as science (Lan & Huang, 2012), medical science (Pimmer, Mateescu, Zahn, & Genewein, 2013; Wu, Hwang, Su, & Huang, 2012), social science (Chiou, Tseng, Hwang, & Heller, 2010), and language courses (Hsu, Hwang, & Chang, 2013). Recent researches conducted on students who adopted m-learning indicate that students became active learners, obtain high scores, achieve high level of collaboration, and have control over the learning process (Al-Fahad, 2009; Mcconatha, Praul, & Lynch, 2008). Therefore, if m-learning is implemented effectively, it adds values to the existing learning approach, ascertains students' flexibility and interaction, and creates a collaborative learning environment.

Some studies conducted on m-learning that examine students' perception (Jacob & Issac, 2008), involvement (Abas, Lim, & Woo, 2009), achievement (Nordin, Embi, Yasin, Rahman, & Yunus, 2010), satisfaction (Ismail, Gunasegaran, Koh, & Idrus, 2010), and readiness (Hussin, Manap, Amir, & Krish, 2012) indicated that students perceive m-learning as an effective learning supplement that motivates, fosters interaction, and enhances their learning process. In general, most students were satisfied using m-learning in their studies and they are ready to integrate it into the existing blended pedagogies because they could easily access information at any time anywhere.

2.2. Theories of technology acceptance models and usage

Over the past two decades, user acceptance and adoption of technology have been an important field of study and an area of interest for many researchers. However, some studies carried out fall short to produce reliable measures or explain the acceptance or rejection of technology, and in particular, to predict the behavioral acceptance of m-learning among current and future users, this is because most technology acceptance theories were related to users' beliefs, perceptions, and attitudes (Ajzen, 1991; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Fishbein & Ajzen, 1975).

TAM aims to predict user acceptance and usage behavior of information system (IS) and information technology (IT) (Davis, 1986; Davis et al., 1989), which derived from the theory of reasoned action (TRA) model (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The theory meant to explain computer usage behavior and explore the influence of external factors associated with the acceptance of technology on users' internal beliefs (PU and PEOU), attitudes, intentions, and technology use. The model posits that both PU and PEOU are the key determinants of individual's intention to adopt IT (Bagozzi, Davis, & Warshaw, 1992). However, some researchers claim that TAM has given less attention to the real problem of technology acceptance (Lee, Kozar, & Larsen, 2003).