

Adult learners' intention to adopt mobile learning: A motivational perspective

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Abstract

Mobile learning (m-learning) is gaining popularity as the “anytime, anywhere” online learning channel. Academics and practitioners alike are showing interest in examining its ability to support online learning. However, prior studies have highlighted the challenges in promoting m-learning adoption. The extant m-learning literature has mainly focused on technology-related factors to examine m-learning adoption. However, few studies have investigated this topic from the users' motivation perspective and even fewer from an adult learner context. Hence, this study employs the uses and gratification theory to provide a better understanding of what motivates m-learning adoption in adult learners. The research findings suggest that adult learners' intention to use m-learning is influenced by their cognitive, affective and social needs through attitude. This paper concludes by noting the theoretical and practical contributions.

Introduction

With today's world that puts so much emphasis on efficiency and mobility, people are relying more heavily on the use of mobile technologies (Liu, Li & Carlsson, 2009). Mobile technology is acknowledged as the emerging technology stream that plays an increasingly important role in business and society (Chin, 1998; Scornavacca, Barnes & Huff, 2006). In recent years, there is emerging interest shown by academic and practitioner communities on the ability of mobile technology to carry out online learning activities (Morris, 2010; Petrova & Li, 2009). In general, mobile learning (m-learning) is defined as the delivery of learning activities to students anytime and anywhere through the use of mobile devices (Wang, Wu & Wang, 2009). M-learning can take place through the use of applications such as mobile phones, personal digital assistants, smartphones, tablets and portable multimedia players. According to Park, Nam and Cha (2012), m-learning is a new and independent part of e-learning where the education content is handled solely by mobile technology devices.

Although m-learning is gaining popularity as the next emerging technology to support online learning, a recent study reveals that there are actually challenges. Among them are promoting the adoption of m-learning (Huang, Lin & Chuang, 2007; Liu *et al.*, 2009; Liu, Han & Li, 2010), students' readiness to accept the use of m-learning (Corbeil & Valdes-Corbeil, 2007) and technology restrictions (Siau, Lim & Shen, 2001). Of interest to this study is the m-learning adoption issue, as previous works have highlighted this as an issue that has been largely ignored, and promoting m-learning adoption is becoming increasingly a challenge for providers (ie, academic institutions) (Chin, 1998; Liu, 2008; Tenenhaus, Vinzi, Chatelin & Lauro, 2005). Furthermore,

Practitioner Notes

What is already known about this topic

- For the past 5 years, there are growing interests toward examining topic related to mobile learning adoption among university students. Previous works are focused on understanding the enablers and barriers of mobile learning adoption among university students.
- Previous works are more directed to use by normal cohort students (aged 18 to 21 years old) as sampling frame.

What this paper adds

- Despite the focus given on normal cohort students, lack of attention has been given on adult learners as they are said to have difficulties adopting online learning (ie, mobile learning). This is because many education institutions tailored their online programs to support the needs of normal cohort students.
- This paper adds to the body of knowledge (ie, mobile learning adoption) by examining the needs of adult learners when adopting mobile learning.
- Uses and gratification theory is adopted to examine adult learners' motivation to adopt mobile learning.

Implications for practice and/or policy

- The finding of this paper can help education institutes formulate strategies to motivate adult learners to adopt mobile learning.

previous works are more directed at examining the adoption issue from e-learning compared with m-learning context (Chin, 1998).

Currently, our observation of the m-learning adoption literature shows that the understanding of what influences students' adoption behavior is heavily dominated by works that focus on technology-related enablers (Chin, 1998; Huang *et al*, 2007; Liu *et al*, 2009, 2010). For instance, most of previous works adopted information system (IS) adoption theories to ground their study (eg, technology acceptance model). Limiting the understanding only to technology-related enablers is not likely to provide a clear understanding of what influence students' intention to adopt m-learning. This is because students today are becoming more complex, requiring the researcher to look beyond technology-related enablers (eg, motivation, social).

Thus, in order to get a better understanding of what influences learners' decision to adopt m-learning, this study examines this issue from a motivation perspective. In this study, motivation-related enablers are selected because they have been identified as an essential perspective to help understand why users prefer certain learning platforms compared with others (King, 2002). Hopefully by examining this issue based on motivation-related enablers, this study can add new insights to the existing body of knowledge.

Further, this study is also different from others as it focuses on the adoption of m-learning by adult learners. This study defines adult learners as students who are over the age of traditional students (18 to 21 years old) (Kasworm, 1990; Katz *et al*, 1999). One of the reasons why the adult learner is selected is because they face difficulties with online learning as many institutions tailor their online programs to support the needs of traditional, aged students (Morris, 2010). Based on the adult learners' literature, this group of students has been identified to have a different set of needs compared with traditional students (Eastmond, 1998). Adult learners are also said to exhibit

significant differences in their academic and live involvement compared with traditional students (Song & Fox, 2005). Thus, examining their needs in using m-learning is essential so that it can help institutions in promoting the use of mobile application as one of the media to support their learning activities. In addition, it can also help institutions avoid developing tools that will receive strong resistance from students.

Finally, this study contributes to the m-learning adoption body of knowledge in two ways: (1) it extends the current understanding of m-learning adoption by examining this issue from a motivational perspective and (2) to the best of our knowledge, this can be considered as the first to examine m-learning adoption in the adult learner context. In order to do so, this study employed uses and gratification theory (UGT) as the underlying theory as it has been widely used to examine user motivations in technology use. This theory has also been used to examine students' motivation to use technology for learning purposes. For instance, UGT was used to examine Internet adoption for distance learning (Stafford, 2005), the use of computer-mediated communication media for learning purposes among university students (Guo, Tan & Cheung, 2010) and the use of virtual community as students' learning resources (Mondi, Woods & Rafi, 2008).

This paper is organized as follows. The first (this) section outlines the research motivations. The second section discusses the literature related to m-learning adoption, adult learners and the UGT. The third section presents the research hypotheses followed by the study's methodology and results. The final section concludes by noting the study's theoretical and practical contributions.

Literature review

M-learning adoption

According to Park *et al* (2012), the rapid advancement of information and communication technologies (ICT) is changing the landscape of how learning is delivered to students. Education providers are using ICT as alternative media to conventional face-to-face interaction between professor and students within a classroom setting. M-learning is said to widen the spectrum of education by offering learning activities beyond the four walls of a classroom. Through m-learning, students can participate in learning activities—everywhere, anywhere (Tenenhaus *et al*, 2005). In recent years, there are growing numbers of studies of m-learning adoption. For instance, Park *et al* (2012) examined the factors that influence Korean university students' intention to use m-learning. Their study revealed that Korean students' intention to adopt m-learning is determined by their perceived usefulness, system accessibility, subjective norms and attitude to use m-learning. Ozdogan, Basoglu and Ercetin (2004) identified perceived usefulness as the strongest determinant for students' intention to adopt m-learning. Liu *et al* (2010) identified that China university students' intention to adopt m-learning is influenced by personal innovativeness and long- and short-term usefulness of the tool. Lawrence, Bachfischer, Dyson and Litchfield (2008) outlined five factors that are considered important by Australian university students in order to adopt m-learning: technology availability, effort involved when using the tool, technology control and convenience, the input and output mechanism, and privacy and security issues.

Two major observations can be made from the literature: (1) prior research that examined m-learning tended to focus heavily on technology-related enablers to explain students' intention to adopt m-learning; and (2) majority of these works surveyed traditional age students, who are doing their first-degree program. Hence, this study proposes to extend the existing body of knowledge by examining m-learning adoption from a motivational perspective (using UGT) in the context of adult learners.

Adult learners

Based on the adult learning literature, adult learners can be characterized as self-directed, highly motivated and know what they want to achieve from their education program (Huang, 2002).

These students are usually over the age of 21 and usually working either full time or part time (Katz *et al.*, 1999). These students are motivated by career development, job security, upward mobility, re-careering and other professional and personal reasons (Eastmond, 1998). Adult learners are usually aided by their life experience, and their reflections and actions are integral components of the adult learning process (Merriam & Caffarella, 1991).

According to Ruey (2010), for the online learning process to be successful, adult learners should be able to interact with the course materials, discuss and collaborate between instructor and other students, and integrate their past experience with the course content or assignment. Adult learners enjoy having discussions and relating course materials to their lives, use their experiences as a learning resource, are problem centered and prefer “immediacy of application” (Morris, 2010). In other words, to actively engage adult learners in online learning, the program should be able to encourage them to discuss, argue, negotiate ideas and to collaboratively solve problems (Ruey, 2010). This approach is said to be appropriate for adult learners because their learning context usually require them to integrate their rich life and employment experiences in learning. Thus, to make adult online course a success, the tools used should be able to support these needs. Tools that offer these needs are said to have better likelihood to be used and adopted by adult learners (Eastmond, 1998; Huang, 2002).

UGT

UGT is a popular theory for studying individual motivation and behavior when using media in the communications domain (Lin, 1999; Stafford, Stafford & Schkade, 2004). Based on this theoretical lens, students’ motivation to use a medium can be categorized into three main categories: (1) cognitive need, (2) social need and (3) affective need. Empirical evidence shows that these attributes can generally be applied to any media usage, including media technologies used in online learning context (Guo, Zhang & Stevens, 2009; Guo *et al.*, 2010; Mondri *et al.*, 2008). For instance, to fulfill cognitive needs, the tool (ie, m-learning application) should be able to motivate adult learners to seek information—knowledge that is related to the course. On the other hand, to fulfill social needs, the tool should be able to motivate adult learners to interact with other students in order to promote collaborative learning. While to fulfill affective needs, the tool should be able to capture the feeling of personal fulfillment using the medium during the learning process. Because of the importance of collaboration among adult learners, sharing their personal fulfillment about how the medium is able to help them construct new knowledge can increase the likelihood of students adopting the medium (ie, m-learning).

In addition, it is important to acknowledge that this theory (ie, UGT) is not the only theory that can be adopted to examine adult learners’ motivation to use e-learning application. From the literature review, it shows that a number of researchers that focus on this topic used Keller’s motivation model (Motiwalla, 2007) as their underlying theory. In general, this theoretical model evaluates user’s motivation from instructional and managerial perspectives. A comprehensive evaluation process is conducted based on student’s actual experience using the e-learning application. For instance, using this theoretical model, a researcher can assess student’s major motivation (ie, attention, relevance, confidence and satisfaction) using the e-learning application. However, in the context of this study, the implementation of m-learning application is still in its infancy and most faculty members use it (ie, m-learning application) as a supporting teaching tool. Hence, adopting Keller’s motivation model might give different interpretation of the user’s motivation to adopt this application.

Research hypotheses

This study contends that adult learners’ intention to adopt m-learning is influenced positively by their attitude. Attitude on the other hand is influenced positively by the students’ cognitive, affective and social needs.

Students' intention to adopt m-learning is positively influenced by their attitude. This positive relationship has been identified in previous works that examined online learning adoption (Huang *et al.*, 2007; Liu *et al.*, 2009, 2010). In the m-learning context, attitude has been identified as an important factor in determining students' m-learning adoption intention (Chin, 1998). Hence, based on the above discussions, the following hypothesis is proposed:

Hypothesis 1: Adult learners' attitude has a positive influence on their intention to adopt m-learning.

Cognitive needs refer to students' motivation to use a medium to seek for information in order to be critical and creative thinkers (Mondi *et al.*, 2008). Students are more likely to have positive attitude toward adopting a medium if it (the medium) is able to provide them with a wide range of information and also ensure the quality and accuracy of the information. Hence, based on above discussions, the following hypothesis is proposed:

Hypothesis 2: Adult learners' cognitive needs have a positive influence on attitude to adopt m-learning.

Affective needs refer to students' personal fulfillment of using the media toward knowledge construction during the learning process (Mondi *et al.*, 2008). Students are more likely to have positive attitude toward adopting a medium if it is able to encourage learners to achieve personal fulfillment and pleasant experience when using the medium during learning activities. Hence, based on the above discussions, the following hypothesis is proposed:

Hypothesis 3: Adult learners' affective needs have a positive influence on attitude to adopt m-learning.

Social needs refer to students' motivation to use a medium that is able to assist them to interact and collaborate with other fellow students during the learning process. Students are more likely to have positive attitude toward adopting a medium if it is able to assist them in making a consensual meaning and co-creating knowledge. A medium that is able to support across time and space communication is said to be able to fulfill students' social needs (Guo *et al.*, 2010). Hence, based on the above discussions, the following hypothesis is proposed:

Hypothesis 4: Adult learners' social needs have a positive influence on attitude to adopt m-learning.

Methodology

Data collection

The research instrument for this study was adopted from previous works (Mondi *et al.*, 2008). It consisted of 22 items. This research measurement is adopted because it focused specifically on understanding user's motivation to adopt e-learning as medium of learning. Furthermore, all items are measured using 7-point Likert scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

The content validity of the instrument was established by consulting a group of experts (ie, one professor, two senior lecturers) in the field of ISs and m-learning. They were asked to comment on the research instrument. From the discussions, 20 minor wording changes were made and no items were removed or added. Meanwhile, a pilot survey was conducted to establish the reliability of the research instrument. The pilot survey follows the procedures of the real data collection phase. The pilot survey only involved 25 postgraduate (PG) students studying in one of the universities in New Zealand. The measurement and structural model were analyzed (using SmartPLS 2.0 [Ringle, Wende & Will, 2005]) and from the analysis, the research instruments indicated satisfactory reliability and validity of the measures.

This study used web survey as the main method to collect data. The web survey was open to respondents for almost 2 months. Adult students doing both undergraduate (UG) and PG degree from a university in the USA were invited to participate in this web survey. In total, 255 adult students participated in the web survey. Out of that, only 191 responses were completed and could be used for data analysis.

Partial least square (PLS) is suitable when the research objectives focus on (1) identifying the best prediction of relationships between variables and (2) to test/predict the theoretical model that has been suggested based on the literature and not to test which alternate model fits the data better (Sosik, Kahai & Piovoso, 2009). Because the main objective of this study is to predict factors influencing adult learners' motivation to adopt m-learning, PLS was selected as the analysis technique. This study used Smart PLS 2.0 as the statistical software to analyze the measurement and structural model. This study follows the standard reporting technique as suggested by PLS scholars (Chin, 2010).

Results

Demographic information

In this study, majority of the respondents were female (65%). With 39.2% aged between 25 to 34 years old, 49.2% aged between 35 to 49 years old and 11.6% were aged between 50 to 64 years old. Further, 85.9% were adult PG students while the remaining were adult UG students. Of the respondents, 67.1% were full-time workers and 32.9% were part-timers. All respondents have had experience using m-learning devices for learning purposes.

There were more female respondents than male. In order to ensure reliability, an additional analysis (ie, analysis of variance) was conducted to examine the mean differences between male and female in their decision to adopt m-learning. Our analysis shows that there are no significant differences between male and female. This result is not surprising as there are previous studies (Perse & Courtright, 1993; Tenenhaus *et al*, 2005) that show similar results. One of the plausible explanations for this is because gender does not influence user's decision to adopt a technology when both male and female users are equally motivated to adopt the technology. Perhaps in the context of this study, both male and female students are motivated to use the m-learning applications for learning purposes.

Measurement model

The quality of the measurement model was analyzed based on its convergent and discriminant validity. The convergent validity was evaluated based on Fornell and Larcker's (1981) two criteria: (1) all the indicators must be significant (at least at .05 value) and their loading should exceed .7 and (2) average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (in other words, the AVE should exceed .50). Table 1 demonstrates that all item loadings exceed .7 on their respective construct and are all significant at the level of $p < .001$. Also, the AVE values are above .50, ranging from .7416 to .8684. Hence, both criteria for convergent validity are satisfied.

Meanwhile, discriminant validity was evaluated using one of the most commonly used criteria in PLS: the square root value of the AVE for each construct should be greater than the intercorrelations between constructs in the model (Chin, 1998). The square root value of AVE for each construct are bolded in Table 2. The analysis shows all AVE square root values are greater than the intercorrelation values between constructs. Hence, the criterion for discriminant validity is satisfied.

Structural model

Figure 1 shows the results of the structural model. The model explains a significant amount of variance in the dependent variable, intention to adopt m-learning ($R^2 = .637$) and attitude ($R^2 = .418$). Adult learners' m-learning adoption intention is strongly influenced by their attitude ($\beta = .798$, $p < .001$). Meanwhile, adult learners' attitude is significantly influenced by their social needs ($\beta = .324$, $p < .001$), cognitive needs ($\beta = .306$, $p < .001$) and affective needs ($\beta = .136$, $p < .05$). All the proposed hypotheses received significant statistical support.

Table 1: Items loading, CR and AVE values

Construct	Items	Questions	Loading	t-Statistics	CR	AVE
Cognitive need	CN1	I use my mobile device to help me know many things.	.870	31.621	.9198	.7416
	CN2	I use Internet on my mobile device to search for new information.	.895	29.688		
	CN3	I carry out Internet search through my mobile device to answer questions coming from class discussions.	.810	22.174		
	CN4	I use Internet on my mobile device to explore topics of interest beyond my normal school assignment.	.868	36.122		
Affective need	AN1	I like to talk to others about mobile technologies.	.946	108.727	.9564	.8459
	AN2	I like showing my friends how to use mobile device in different ways.	.955	128.636		
	AN3	Mobile-based courseware layout, animation and illustrations are good to look at.	.863	29.304		
	AN4	I enjoy learning using a mobile device.	.912	50.447		
Social need	SN1	Using e-mail on mobile device give me the feedback I need from others.	.949	72.755	.9643	.8711
	SN2	I use e-mail on mobile device to interact with my friends.	.944	63.009		
	SN3	Mobile Internet prepares me to join the extended learning community outside the class.	.923	48.318		
	SN4	Using mobile device improves my ability to communicate with other people.	.916	41.463		
Attitude to adopt m-learning	ATT1	I like the idea of using mobile device for learning.	.898	43.478	.9519	.8684
	ATT2	Using mobile device for learning is a wise idea.	.897	41.586		
	ATT3	Using mobile device gives me a pleasant experience.	.888	38.360		
Intention to adopt m-learning	INT1	I intend to use mobile device for learning in the future	.918	53.809	.9519	.8684
	INT2	I will use the mobile device for learning in the future.	.940	70.650		
	INT3	I will regularly use mobile device for learning in the future.	.937	83.717		

AN, affective need; ATT, attitude to adapt; AVE, average variance extracted; CN, cognitive need; CR, composite reliability; INT, intention to adopt; m-learning, mobile learning; SN, social need.

Discussions and conclusions

This study was conducted to examine the influence of motivational determinants on adult learners' intention to adopt m-learning. Based on the literature review, this study posited that adult learners' intention to adopt m-learning is influenced by cognitive, affective and social needs through attitude.

Table 2: Intercorrelation matrix and AVE square root values

	CN	AN	SN	ATT	INT
CN	0.8611				
AN	0.5912	0.9197			
SN	0.5523	0.4663	0.9333		
ATT	0.5659	0.4684	0.5568	0.9319	
INT	0.5267	0.4963	0.5422	0.7979	0.9319

AN, affective need; ATT, attitude to adopt; AVE, average variance extracted; CN, cognitive need; CR, composite reliability; INT, intention to adopt; SN, social need.

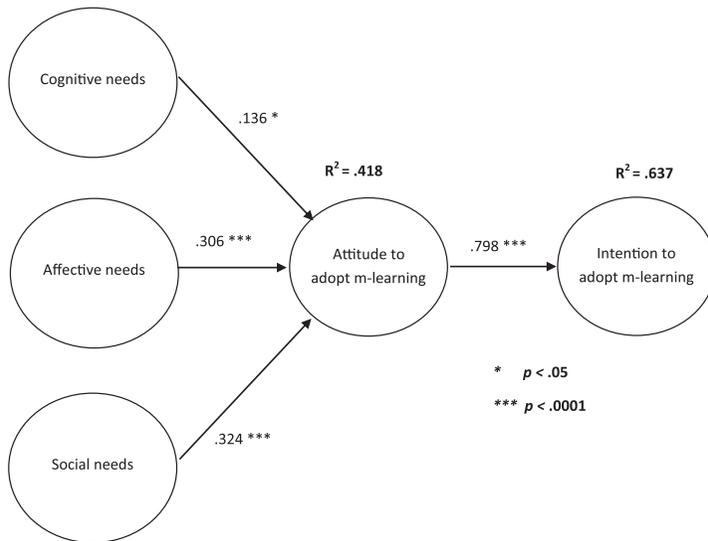


Figure 1: Result of structural model. M-learning, mobile learning

This study demonstrated that adult learners have a strong preference to adopt m-learning for learning purposes. The ability of the technology to support adult learners who are always travelling and engaged with work and family contributed to their strong intention to adopt m-learning (Huang *et al.*, 2007). Thus, to drive adult learners' motivation to adopt m-learning, attention should be given toward the three instrumental motivation dimensions proposed in UGT namely social, affective and cognitive needs. From the findings, adult learners are most likely to adopt m-learning if the medium is able to support their interaction needs. Being a student and also working at the same time required them to expand connectivity, which allows them to connect and collaborate with other students (Guo *et al.*, 2010). Besides that, adult learners' decision to adopt m-learning is also strongly influenced by the ability of the medium to allow them to achieve personal fulfillment and a pleasant experience when using the medium. Technology used to support learning should not be too complicated and able to allow them to have positive personal fulfillment toward knowledge construction during the learning process (Mondi *et al.*, 2008). Also, the m-learning medium should be able to provide assistance to adult learners in seeking accurate and quality information. Above all, the results of this study are in line with previous studies (Guo *et al.*, 2010; Huang *et al.*, 2007; Mondri *et al.*, 2008; Stafford *et al.*, 2004).

Theoretically, the main contribution of this paper is that it extends the understanding of what motivate adult learners to adopt m-learning. This is an early attempt at examining adult learners'

m-learning adoption intention. Also, the findings of this study are able to provide researchers and practitioners with new insights of what influence adult learners' attitude to adopt m-learning.

In practical terms, this study can help practitioners motivate adult learners to adopt m-learning. From the results, adult learners' attitude to adopt m-learning can be increased by (1) embedding the m-learning platform with varieties of collaborative communication applications (ie, Wiki, Facebook, Twitter) that allow them to communicate and work in group. Based on the survey, adult learners are using e-mail as one of the important medium to communicate and work collaboratively; (2) the m-learning platform should allow adult learners to personalize and customize the platform so that it can support different learning styles and preferences; and (3) providing adequate learning resources that are supported by the m-learning platform. This is because the finding suggests that adult learners are using mobile technology to acquire information related to the course.

Finally, the results of this study must be interpreted with some caution. The limitations are (1) the results are not generalizable as this study only collected data from one higher education institute and (2) the students involved in this study are from a developed country and as such, are more exposed to mobile technology advancements. Perhaps, the results might not be the same if this study is replicated in other countries (ie, developing countries). In addition, a comparative analysis should also be conducted to see the differences in motivation between normal cohort students and adult learners. It might be helpful for future research to examine the differences in motivation needs between these two cohorts of student (traditional vs. adult learners). Examining these differences is worthwhile as it can give better understanding on how these two cohorts are different when it comes to m-learning adoption decision.

As a conclusion, m-learning can be seen as among the suitable mediums to widen the spectrum of learning. The need to understand how to promote this technology in order to support adult learning is essential. Perhaps in future research, researchers will be encouraged to include social-related enablers (interpersonal communicative skills, interdependence of task) (Ryu & Parsons, 2009) in their predictive model so that a more holistic understanding of what influence adult learners' intention to adopt m-learning can be formed.

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