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Learner self-efficacy and mobile learning adoption among community health trainees, Kenya

Gatotoh, Augustine Mwangi Ph.D[ab]; Gakuu Christopher. M. Ph.D[a] & Keiyoro Peter. N, Ph.D[ab]

[a] Open Distance and eLearning (ODeL) Campus,
University of Nairobi, P.O. Box 30197 -0100, Nairobi, Kenya
[b] **Corresponding author**

Abstract

There is a growing need for the usage of mobile learning (mLearning) technologies for teaching and learning in order to expand the possibilities of learning anytime anywhere for Open, distance and e-learning programmes. However, the full adoption of mLearning is largely dependent on end user factors such as learners' self-efficacy. The design of a mobile learning system is as important as the end user efficacy. This study therefore, sought to establish the relationship between learner self-efficacy and adoption of mLearning among Community Health Trainees enrolled on the mHeath platform run by Amref Health Africa in Kenya. Four learner self-efficacy attributes were considered for this study; Self-Efficacy for Navigating the Learning Platform , Self-Efficacy for Peer Interaction , Self-Efficacy for Dependency and Self-Efficacy for Innovativeness . The study population was 3081 participants of the two phases of mHealth project. A sample size of 354 participants was obtained through simple random sampling procedures. A positive and significant relationship was found between learner self-efficacy and adoption of mLearning. It is therefore, concluded that, institutions offering mLearning content should ensure they design mLearning solutions that are interactive and easy to use in order to improve adoption of mLearning by the end user. The study recommends the need for orientation and continuous training in order to improve learner efficacy. The study also recommends 24hour learner supports system to enhance learner adoption of mobile learning.

Key words: Mobile learning, Self-efficacy, mLearning, adoption of mLearning.

Introduction

Mobile Learning (mLearning) refers to the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime. mLearning presents a paradigm shift in distance education settings by closing the space between the learner and the tutor (Mahat, Ahmad &Wonga, 2012; Gatotoh, Gakuu and Keiyoro., 2017; Kukulska-Hulme, 2007). The training of health care workers in the within the rapidly changing health care system is a leading example of how mobile technologies have the potential to support and enhance teaching, training and learning (Kenny, Van Neste-Kenny, Burton, & Meiers, 2009).

The use of mobile phones in the mLearning environment is either enabled or constrained by the learner self-efficacy (Koole, 2009). Learner self-efficacy therefore becomes a critical determinant in the acceptance and subsequent adoption of Information and Communication Technologies (ICTs) for teaching and learning (Mahat et al, 2012). Learner self-efficacy is an individual's judgment of their capability to organize and perform a course of action efficiently (Schunk, 2008; Mahat et al, 2012). It refers to the way a person determines the options they choose in terms of effort and perseverance when they undertake a specific task (Usher & Pajares, 2008). In the current study we define self-efficacy as the learner's ability to competently utilize the mLearning platform.

The association between self-efficacy and adoption of mLearning has been identified by researchers such as Lu and Viehland (2008), and Kenny, Park, Van Neste-Kenny, and Burton, (2010). In their study, Lu and Viehland (2008) identify mobile self-efficacy as having the highest ranking compared to other factors related to students' acceptance of mLearning. A cross-sectional study by Kenny, et al., (2010) conducted among nursing students and staff showed that the respondents had a very high level of mobile self-efficacy thus the acceptance of its use. On the other hand, the study by Tsai, Tsai, and Hwang (2010) showed that learners have a positive self-efficacy of using Personal Digital Assistants (PDAs) in a ubiquitous learning context. These studies all point to the significance of the learners' self-efficacy in the adoption technology.

While significant research exists on learners' self-efficacy concerning computer technology and online learning (Tsai, et al 2010, Kao & Tsai, 2009; Koh & Frick, 2009; Liang & Wu, 2010), it does not seem to have been examined in detail in mobile learning situations. Furthermore, Claggett & Goodhue, (2011) and Moos & Azevedo, (2009) allude to the importance for researchers to examine self-efficacy in order to inform the implementation of mLearning.

Literature Review

In the context of mobile learning, learner's self-efficacy has an effect on their use of mobile technology (Wang, Wu &Wang 2009; Lu and Viehland, 2008). Learners with high mobile self-efficacy are generally expected to competently use a variety of different devices related to mLearning (Mahat et al, 2012; Claggett & Goodhue, 2011; Moos & Azevedo, 2009). Studies have also found that individuals with a relatively higher self-efficacy for mobile devices are

more willing to make use of such devices to learn and vice versa. This is mainly because when a person's self-efficacy for mobile devices increases, their anxiety for using such devices reduces (Tsai et al. 2010).

A study conducted by Schunk, (2008), revealed that learner perceptions of their own self-efficacy influences their decisions about the choice of activities in which they engage in. Downey and McMurtrey, (2006) add that self-efficacy helps establish the choice of the activities one engages in as well as the effort and persistence they show. They further contend that, individuals with high levels of efficacy will have a greater chance of succeeding in the given task.

Several factors have been found to influence learners self-efficacy in the use of any technology, these factors include intrinsic motivation (Zhao, Lu, Wang & Huang 2011; Deci & Ryan, 2012); level of confidence Claggett & Goodhue, (2011); training, frequency of use, type of use, and feedback (Moos & Azevedo, 2009); user's past ICT experience (Hasan & Ahmed, 2010) and ICT anxiety (Parayitam, Desai, Desai, & Eason; Saade & Kira, 2007; Beckers, Wicherts, & Schmidt, 2007). In the current study, we focus on four key practical attributes of learner self-efficacy; ability to navigate the mobile learning platform, their ability to use the platform independently, ability to interact with their peers and innovativeness.

Navigation efficacy is the process by which a user explores all the levels of interactivity, moving forward, backward, and through the content and interface screens. A good navigation system will leave the user with little question about where they are in the document and where they can go from there (Tucker, 2008). The user's ability to navigate through a platform is listed as a key driver of use of the platform (Pearson, Pearson & Green 2007; Melia´n-Alzola and Padro ´n-Robaina, 2006). Similarly, a study by Chen (2015) found that navigation efficacy had significant effect on the learners' perceived usefulness of mLearning. Navigational efficiency is particularly important, as restrictive visual interface is usually regarded as a major impediment for adoption (Lee and Benbasat, 2003).

Another element of self-efficacy in mobile learning is the learner's ability interacts with fellow learners. A study by Liaw and Huang (2013) indicated that learner satisfaction and subsequent use of the eLearning system can be affected by interactive learning environments and perceived self-efficacy. Mobile learning systems should therefore, be carefully designed to ensure ease of interactivity for the user. In another study conducted by Ismail and Azizan (2012) attested that in general, interactivity is viewed as an important factor by the learners in their learning process. Specifically, interaction between students and lecturer was mostly preferred by the students, not only for learning communication, but also as a support to the SMS (Short Message Service)-based learning system. Raban and Litchfield (2007) further suggest the need develop learners' ability for self and peer evaluation, feedback, and review skills using available online tools for teaching and learning.

Additionally, personal innovativeness is another important variables in the new learning environment involving information technology. Mahat et al. (2012) suggest that it is important for researchers to investigate personal innovativeness before deciding to implement a learning process that involves the use of the mobile phone for learning purposes. Studies on personal innovativeness in technology have been conducted in various areas such as; eCommerce Herrero-Crespo, Ángel & Rodríguez-del-Bosque, Ignacio (2008); computer self -efficacy on online purchasing intent Boyle and Ruppel (2006); online shopping (Bigné-Alcañiz, Ruiz-Mafé, Aldás-Manzano, & Sanz-Blas, 2008), virtual learning (van Raaij & Schepers, 2008), blog (Wang, Chou, & Chang, 2010), wireless mobile services (Lu, Liu, Yu, & Wang, 2008). Another study on innovativeness was conducted by Jiunn-Woei and Yen (2017) focussing on understanding the relationships between online entrepreneurs' personal innovativeness, risk taking, and satisfaction. Notably, all these studies support the need to assess end user innovativeness as a determinant for adoption of the technology in use.

Methodology

The study was guided by the pragmatism paradigm. This paradigm was selected because it applies to mixed methods. It was assumed that the combination of qualitative and quantitative approaches would provide a more complete understanding of the research problem than either approach alone (Teddlie & Tashakkori, 2010). The study further utilised a decripto-explanatory survey research design. The design facilitated detailed description and analysis of the variables under study. Combined designs enabled the researchers to achieve optimal results as there was no single perfect design as is suggested by Saunders, Lewis and Thornhill (2009).

The study population was 3081 participants of the two phases of mHealth programme. To achieve the expected threshold for a sample size, the researchers drew the sample size using the formula suggested by Yamane (1967) for calculating sample sizes. This formula gave a sample size of 354. The data was collected from six counties in Kenya of the thirteen counties where the mHealth programme took place. Adoption was measured based on the Mobile Learning Management System (MLMS) data on learner time taken to complete timed assigned topics. The Technology Adopter Category Index further was used to compute adopter categories. The self-efficacy attributes considered for this study included; Self Efficacy for Navigating the Platform (SENP), Self-Efficacy for Peer Interaction (SEPI), Self-Efficacy for Dependency (SED) and Self-Efficacy for Innovativeness (SEI). To measure self-efficacy, the tool used for this study was adapted from Tsai and Tsai's (2003) on internet self-efficacy survey. However, some items were modified in order to fulfil the requirements of mobile-learning. To guide the modification, further reference is made from Yang (2012) and Mahat, et al (2012) for items on peer interaction. For personal innovativeness, the study adapted items by Agarwal and Prasad (1998). The research model consisted of 28 items with each of the 4 constructs had 7 items being measured by 5 Likert scale options (strongly agree, agree, uncertain, disagree and strongly disagree).

Results

Descriptive analysis was done to study respondents' self-efficacy for the use of the mobile learning platform in their learning. The 28 self-efficacy items were divided as per the sub variables for self-efficacy considered for this study, and the means and standard deviations calculated. Results of the analysis were summarized and presented in Table 1.

Table 1: Navigating Efficacy

Self-efficacy Construct	Question	Mean	Std. dev.
Self-Efficacy for Navigating the Platform (SENP)	SENP 1	4.26	1.086
	SENP 2	4.08	1.034
	SENP 3	4.36	.893
	SENP 4	4.20	.936
	*SENP 5	2.46	1.396
	SENP 6	4.21	1.018
	SENP 7	3.37	1.415
Self-Efficacy for Peer Interaction (SEPI)	SEPI 15	4.34	.831
	SEPI 16	4.23	.903
	SEPI 17	3.51	1.372
	SEPI 18	3.94	1.229
	SEPI 19	4.20	1.033
	SEPI 20	4.22	.995
	SEPI 21	4.08	1.097
Self-Efficacy for Learner Dependency (SED)	SED 15	4.34	.861
	SED 16	4.24	1.002
	SED 17	4.45	.806
	SED 18	4.38	.780
	SED 19	4.33	.874
	SED 20	4.32	.836
	SED 21	4.37	.809
Self-Efficacy on Innovativeness (SEI)	SEI 22	3.72	1.170
	SEI 23	4.26	.876
	SEI 24	3.84	1.113
	SEI 25	4.30	.823
	SEI 26	4.19	.926
	SEI 27	4.02	1.000
	SEI 28	4.11	.994
N= 294		$\bar{x}$=4.08	

Overall, the average mean had a value of 4.08 which is considered high suggested that the learners have a high self-efficacy for mLearning. The standard deviation ranged between 0.78 and 1.4 which means that there was a relative spread between the responses. This implies that the learners' efficacy on various items varied. Therefore, although the overall self-efficacy was high, a big variation in the among individual learners existed. This was validated by focus group discussions which revealed that learners' efficacy varied.

"… I enjoyed the chat…however, there were challenges with the transmission of SMS and clarity of IVR…. the help desk and the feedback meetings was useful in rectifying and improving issues raised…"

This further implies that much as the learners experienced challenges with navigation of the mLearning platform, the challenges were resolved in the course of the programme thus improving their efficacy with time. Further validation from the FDGs showed that the respondents found mLearning use easy independently since the technology used was highly comparable to their ordinary use of their mobile phones.

"…. mLearning is easy to use….it was just like any other use of the phone with only small differences... with the training we received it became even more easy to use …"

In order to identify the influence of the respondents' self-efficacy the selected mobile learning attributes on adoption of mLearning, Pearson correlation used. Correlation results were summarized in Table 2.

Table 2: Self-Efficacy and Adoption of mLearning

		self-efficacy
Adoption of mLearning	Pearson Correlation	.428**
	Sig. (2-tailed)	.000
	N	294

**. Correlation is significant at the 0.01 level (2-tailed).

As can be seen, the correlation analysis confirmed a significant positive relationship between learner self-efficacy to use the mLearning platform and adoption of mLearning ($r=.428^{**} p < 0.01$). This means that learners' adoption of mLearning is influenced by their self-efficacy to use the mLearning platform

It was further hypothesized that: H_0: There is no relationship between learner self-efficacy and adoption of mLearning for the mHealth community health training programme in Kenya.
To test the hypothesis, the model $Y = \beta_o + \beta_2 X_2$ was fitted.

A regression analysis was thus done. The regression results showed that the association between the learner self-efficacy and mLearning adoption was positive and significant $F(1,248) = 55.620$, $p<0.001$, $R^2 = 0.183$. The finding that $R^2 = 0.183$, implies that about 18% of variation in mLearning adoption is explained by variation on learner self-efficacy. The model equation therefore is;
$Y = 2.223 + 0.501X_2$

Where Y is mLearning adoption and X_2 is learner self-efficacy

With, $\beta = 0.501, t = 7.977, p < 0.05$ the results mean that for one-unit increase in self-efficacy, mLearning adoption increases by about 0.501.

Given that the p-value is < 0.05, the null hypothesis was rejected and it was concluded that there is significant relationship between learners' self-efficacy and mLearning adoption. This implies that institutions offering mLearning will need to ensure that the learners gain high efficacy in their ICT skills for them to achieve high adoption rates. This can be achieved through training the learners as well as designing mLearning platforms that are easy to use or that are modelled on everyday mobile phone usage as was the case in the this study.

Discussions

The findings of the study revealed a high mLearning self-efficacy with an average mean of 4.08 for all the sub variables of self-efficacy. These findings are consistent with Kenny et al. 2010: Lu and Viehland 2008; Tsai et al 2010; Mahat et al. 2012 who found that most of the students in their study having high self-efficacy for mLearning.

The finding that mLearning adoption is explained by variation on learner self-efficacy is confirmed by Downey and McMurtry, (2007) and Claggett & Goodhue, (2011) who argue that individuals with high levels of efficacy will have a greater chance of succeeding in the given task. In particular, Hauang (2003) and Young (2005) find personal innovativeness as one of the main factors that influence acceptance of new technology, this is equally consistent with the findings of the current study findings. These findings are also in agreement with Jeffrey, (2009) whose findings suggest that students that are more self-directed or independent are more likely to succeed in the online learning context. Conversely mobile learners may be more successful if they are more self-directed and can learn independent from their educators.

It can be inferred that, that there are other factors other than those selected for the study that influence adoption of mLearning since the contribution of self-efficacy is 18%.

Conclusions

In conclusion, despite demonstrating reasonably high levels of self-efficacy and interest towards use mobile learning among the end users. Learner self-efficacy contributed less than 20 percent in the adoption of mobile learning. In light of the study findings, is can be concluded that, institutions offering mLearning content should ensure they design mLearning solutions that are interactive and easy to use in order to improve adoption of mLearning by the end user. Additionally learner self-efficacy must not be considered in isolation for mLearning adoption. Other factors such as training, orientation and learner support must be put into consideration for mLearning adoption.

Recommendations

The study recommends that institutions considering offering mLearning programmes, need to design mLearning platforms that are simple to use since learner efficacy is a determinant of mLearning adoption. The study further recommends the need for orientation and continuous training in order to improve learner efficacy. The study also recommends 24hour learner supports system to enhance learner adoption of mobile learning.

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