

Factors driving the use of Moodle: An empirical study on Malaysian practising teachers' perspective

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In Malaysia, there is widespread recognition that technology can play a significant role in supplementing and complimenting the process of teacher's teaching and learning. Given current recognition of the advancement of educational technology, as well as the high costs of investing in schools or higher institutions, this study attempted understand teachers' acceptance of blended e-learning in teaching and learning. It examines the effects of the endogenous variables towards with blended e-learning acceptance, which involved 98 teachers. Computer attitudes (CA), computer teaching efficacy (CTE), school environment (SE) and Moodle use (CU) were analysed to understand its influences in Moodle use. Structural Equation Modelling (SEM) was employed for the data analysis. All hypotheses were supported by the data and have direct effects towards blended e-learning acceptance.

Keywords Educational technology, technology integration, Moodle, structural equation modelling

Introduction

In this Information Age, web-enhanced teaching and learning platforms have become very common in schools or higher institutions in delivering materials to students. Furthermore, there has been a recent surge in published studies on web-enhanced teaching and learning platforms and most studies has proven its recognition. Like other developed countries, there is a clear recognition that technologies can transform conventional education system and bring more advantages and benefits to Malaysians, especially for the younger generation. Malaysian schools have devoted considerable resource to technology. Many schools and higher institutions in Malaysia have highlighted web-based teaching and learning platform in the curriculum agendas. This is to ensure younger generations have equipped with skills and knowledge necessary to thrive in the 21st century. Many ministers have expressed strong desire to equip

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classrooms with web-based technology tools as a way to foster its implementation and create cultural awareness among educators and learners.

The study

With the innovation and web-based commercialisation of educational technology, Moodle or as blended e-learning environment has been widely employed in the teacher institutions throughout Malaysia. However, despite the impetus to build hybrid learning via Moodle realisations among teachers in higher institutions, integrating and understanding on blended e-learning environment among teachers are in the alarming rate. Many teachers revealed that the opportunity to integrate blended e-learning environment is often severely constrained by the limited information, skills and knowledge that they have gained from teacher education professional development training. It is pertinent to point out that in the School Based Assessment (PBS), blended e-learning platform provides room for students to improve their results (band) accordingly based on their own initiative. Teachers could furnish differentiated instructional for diverse students where demonstrated varying degrees of learning style and intelligences. Teacher can design activities for those in need without holding back those who are ready for new challenges. Furthermore, grooming of creativity and innovation, and integration of Information and Communication Technology (ICT) are highlighted in the new curriculum.

There is a growing corpus of research that suggests that the use of Moodle improves teaching and learning (Blount & McNeill, 2011; Davies & Sinclair, 2013; Horvat, Dobrota, Krsmanovic & Cudanov, 2013; Jeremic, Markovic & Radojicic, 2011; Wu & Hwang, 2010). The use of technologies in teaching could be easier to capture students' imagination and attention if compared to conventional instructional methods. Advocates also noted that, technology tools have become very suitable to encourage collaborative and constructive learning which highly emphasized in current pedagogical practices to enhance learning. Indeed, based on Malaysian curriculum, all subjects in which educational technologies are frequently highlighted.

Given the immature stage of the web-enhanced learning environments in Malaysian educational environment and numerous researches of hybrid teaching platform have proven its positive effects, time has come to review and examine factors that influence Moodle use among educators. From the findings of this study, policymakers and teacher educators can have a better picture on the factors which have the most influential impacts on Moodle use and thus, design a curriculum that can boost the level of Moodle use among teachers. Hence, this study seeks to assess the extent to which computer attitudes (CA), computer teaching efficacy (CTE), school environment (SE) explain the Moodle use among teaching in teaching and learning.

Research model and hypotheses development

Computer Attitudes

Several models have explained the relationship between attitudes and intention or actual behavior. Among those notable models are Technology Acceptance Model (TAM) (Davis, 1989), Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), Theory of Planned Behavior (TPB) (Ajzen, 1985) and Multi-Attribute Attitude Model (MAA) (Wilkie & Pessemier, 1973). TAM, TPB, TRA and

MAA were based on the relationship of attitude-intention-behavior (actual) constructs. Based on those models and theories, attitudes construct has been the main focus. Ajzen and Fishben (1977) argued that by understanding an individual's attitude toward an object, one can predict his or her overall pattern of response to the object. An individual's attitude represents an individual's personal convictions and feelings towards a specific object or behavior. Generally, a person who believes that performing a given behavior will lead to positive outcomes will hold a favourable attitude toward performing the behavior.

H1. CA will have a significant influence on MU.

Computer Teaching Efficacy

According to Bandura's social cognitive theory (Bandura, 1977), individual with high self-efficacy will have better ability to cope with roadblocks and endure stress related to change. Conversely, an individual with low self-efficacy will be less likely to attempt innovation or follow through as barriers arise. Many previous researchers, such as Gibson and Dembo (1984), Riggs and Enochs (1990), Marcinkiewicz (1994), Torkzadeh, Pfulghoeft and Hall (1999), Gibson (2001), Tracey *et al.* (2001), Bandura (2001), Cassidy and Eachus (2002) and Sugar (2002) have suggested that self-efficacy, by itself, will influence actual performance and practices.

According to the Bandura's theory, there are two dimensions of expectancies of behavior; efficacy beliefs and outcome expectation. Efficacy belief is the feelings of confidence in performing certain task. Outcome expectation was defined as the belief about the consequences that action will produce.

H2. CTE will have a significant influence on MU.

School Environment

In this study, school environment refers to the support from administrators, such as non-academic staff, principal and senior assistants and technical support like facility availabilities when adopting computer in teaching and learning process. The study has hypothesized that the higher the support from school environment, the higher the use of computer in teaching and learning. In Goldstein and Ford's (2002) model, the working environment acted as important variable towards actual outcomes. ChanLin, et al. (2006) and ChanLin (2007) noted that the school environment play important role in the use of computer in teaching and learning. Based the above statement, the following hypothesis was formulated.

H3. SE will have a significant influence on MU.

Method

Research Design

The purpose of this study is to modelling the determinants of teachers in the use of Moodle as a platform in teaching and learning. Structural equation modelling (SEM) was used in the process of developing a model that represents the relationships among five variables in this study: computer attitudes, computer teaching efficacy, school

environment and Moodle use. Survey questionnaire comprising items related to personal selected demographics and five variables items were constructed and collected for data analysis in the study.

Participants in this study were 98 teachers. From the data, it has shown that 94% of participated teachers have change access computer either at home or during school hours. The mean length of computer use and Moodle use were 6.78 years and 2.4 months respectively.

The participation was wholly voluntary and no credits or rewards were given to them All participants were briefed on the objectives of the research and told of their rights to withhold their participation anytime either during or after the data collection by informing the researchers. On the average, respondents took about 10 minutes to fill out the survey question. Researchers or research assistants were presented while data were collected to answer any doubts from participants about the survey items.

Analysis and Results

The first phase revealed the preliminary analysis which examined the descriptive statistics of the measurement items, and assessed the reliability and validity of the measure used in this study. This was to ensure the data adequate for structural equation modelling testing.

Preliminary Analysis

A descriptive analysis was preliminarily carried out on variables involved. Computer attitudes, computer teaching efficacy, school environment and Moodle use have been identified for their mean and standard deviation (Table 1). According to Kline (2005), Multivariate normality can be assessed through the inspection of univariate skew indexes and kurtosis indexes. The acceptable indexes should be less than 3.0 and 10 respectively. From the preliminary analysis of the collected data, it has shown that all skew and kurtosis indexes are below .02. Based on the results, the data in this study is regarded as normal for the purposes of structural equation modelling.

Table 1. Descriptive statistics of the study constructs

Construct	Mean	Standard deviation	Skewness	Kurtosis
Computer attitudes	3.63	.48	-1.20	1.12
Computer teaching efficacy	2.12	.66	.02	-.58
School environment	2.37	.94	-.12	-.01
Moodle use	2.46	.72	-1.09	-1.17

Besides assessing multivariate normality, Cronbach's alpha was employed for testing the composite reliability (CR) of each construct. The composite reliability for computer attitudes, computer teaching efficacy, school environment and Moodle use in the measurement model range from 0.53 to 0.79 (Table 2) and it exceeds the recommended threshold value (Sekaran, 2003). Under the recommended threshold value, ff the value of Cronbach's alpha is coefficient more than 0.08, the composite reliability is

high and between 0.60 to 0.80 is moderate and acceptable, but if less than 0.60, is consider unacceptable and can be rejected.

Table 2. Results for the measurement model

Latent Variable	Item	Factor Loading (>.60)*	Average Variance Extracted (= or >.50)*	Composite Reliability (= or >.70)*
Computer Teaching Efficacy	CTE1	.821	.59	.532
	CTE2	.798		
	CTE3	.672		
Computer Attitudes	CA1	.811	.62	.571
	CA2	.781		
	CA3	.772		
School Environment	SE1	.691	.56	.793
	SE2	.835		
	SE3	.722		
Moodle Use	MU1	.618	.57	.743
	MU2	.818		
	MU3	.811		

^a AVE: Average Variance Extracted is computed by adding the squared factor loadings divided by number of factors.

^b Composite Reliability = $(\sum \lambda^2) / (\sum \lambda^2) + (\sum (1 - \lambda^2))$.

^c This value was fixed at 1.00 in the model for identification purposes.

*Indicates an acceptance level or validity.

** $p < .01$

In order to ensure the Average Variance Extracted (AVE) indexes are adequate for testing structural equation modelling, it should equal or exceeds 0.50 (Segars, 1997). Table 2 indices that the AVEs for all factors have exceeded 0.50. This results provide evidence that more than one-half of the variance examined in the survey items was accounted for by their hypothesized factors. Overall, the above findings, factor loadings, composited reliability coefficient and AVEs, meet the recommended guidelines and providing conformation that the convergent validity for the proposed constructs of the measurement model is adequate for structural equation modelling.

Hypothesis Testing

Table 3 shows parameter estimates for the significant hypothesized paths. All hypotheses were supported by the data. Computer teaching efficacy was a significant influence on Moodle use ($\beta=.19$, $p<.01$) and computer attitudes has a significant influence on Moodle use ($\beta=.22$ $p<.01$). Finally, Moodle use was found to be influenced by school environment ($\beta=.63$, $p<.01$).

Table 3. Hypothesis testing results

Hypotheses	Path	Path coefficient	Results
H1	CA→MU	0.11**	Supported
H2	CTE→MU	0.18**	Supported
H3	SE→MU	0.60**	Supported

* $p < .05$; ** $p < .01$.

Moodle use was found to be significantly determined by computer attitudes, resulting in an R^2 of 0.11. That is, computer attitudes explained 11% of the variance in Moodle use. Moodle use was also significantly determined by computer teaching efficacy and the percent of variance explained was 18% ($R^2 = 0.18$). Moodle use was significantly determined by school environment resulting in an $R^2 = .60$. That is, the combined effects of computer attitudes, computer teaching efficacy and school environment explained 55.9% of the variance of Moodle use.

Discussion and implications

The findings of this research offer several important implications for the research and practice of computer integration among teachers. As anticipated, computer attitudes, computer teaching efficacy and school environment have direct effects towards the levels of integration of Moodle use in teaching and learning for science. Together, the variables in the research model in this study explain 55.9% of the variance in Moodle use among teachers towards Moodle use in teaching and learning.

From the results, it has been corroborated that computer attitudes and computer teaching efficacy have positively influenced the use of Moodle in teaching and learning among practising teachers. The finding is in line with previous findings in Western settings. Henceforth, in this regard, the Malaysian Ministry of Education and the related government departments should do more in terms of encouraging positive computer attitudes and confidence among teachers. Schools should provide training, funding and support required for this process. By strengthening staff training in technologies, schools can help encourage more positive attitudes toward computers, especially to reduce teachers' anxiety towards computers in general. The school boards of management should ensure that teacher education technology training program to be a part of their yearly activities. By meeting the needs related to technology integration and helping to instil more favourable computer attitudes will directly assist in the integration of computer into the teaching and learning activities.

It was also conclusively reported that school environment has very strong impacts on Moodle use. This is consistent with previous research by ChanLin, et al. (2006) and ChanLin (2007). The significance of school environment in enhancing the use of computer in teaching and learning could be due to the fact that teachers need administrative and technical support to encourage them to use the computer. Teachers need strong and enthusiastic leadership from principal in order to achieve higher confidence and belief in the use of computers. Technical support is vital when teachers are having difficulties in operating the computer based technologies equipment. Having knowledgeable people and willingness to answer questions are critical in overcoming the obstacles of using computer. Furthermore, in the Malaysian schools, especially in the rural areas, lack of availability of web-enhanced learning facilities and incompatibility between the software and hardware are very common situations. The government should

inject more financial support and attention to rural schools which with intention to minimize the digital divide between the urban and rural schools. Training for principals is vital in ensuring that they are conscious of the importance of computer in teaching and learning.

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