Asian Social Science; Vol. 10, No. 11; 2014
ISSN 1911-2017 E-ISSN 1911-2025
Published by Canadian Center of Science and Education

Technology Acceptance on Smart Board among Teachers in Terengganu Using UTAUT Model

Arumugam Raman[1], Yahya Don[1], Rozalina Khalid[1], Fauzi Hussin[1], Mohd Sofian Omar[1] & Marina Ghani[1]

[1] School of Education and Modern Languages, Universiti Utara Malaysia, Sintok, Malaysia

Correspondence: Arumugam Raman, School of Education and Modern Languages, Universiti Utara Malaysia, Sintok, Kedah, Malaysia. Tel: 60-4-4928-4852. E-mail: arumugam@uum.edu.my

Received: February 23, 2014 Accepted: March 21, 2014 Online Published: May 30, 2014

doi:10.5539/ass.v10n11p84 URL: http://dx.doi.org/10.5539/ass.v10n11p84

Abstract

The purpose of this study is to seek the acceptance level of Smart Board among teachers in schools based on the construct presented by the UTAUT Model (Venkatesh et al., 2003). 68 questionnaires were distributed to respondents who are teachers in five schools in the Besut District. These schools are among the many schools that are provided with Snmart Boards by the Terengganu government. The questionnaire consists of 4 items on demography, 19 items related to the usage of Smart Boards which uses the Likert Scale. The respondents were teachers who are familiar with using the Smart Boards. The data was analysed using SPSS to get the descriptive statistics and SmartPLS to find the coefficient correlation. The findings showed that there is positive significant influence between the Performance Expectancy factor (β=0.569, $p<0.01$) and the Facilitating Conditions factor (β=0.295, $p<0.01$) towards Behavioural Intention with the value of R^2=0.72. Both the Performance Expectancy and the Facilitating Conditions factors showed that 72% of the teachers have Behavioural Intention to use the Smart Board during their teaching and learning process. Further study on the acceptance of Smart Board either among the teachers or students are vital because there are not many study has been and this technology is still new in Malaysian schools.

Keywords: smart board, unified theory of acceptance and use of technology (UTAUT), unified theory of acceptance and use of technology (UTAUT), virtual classroom, technology acceptance

1. Introduction

The era of information technology started in school when the Minitry of Education providing computers and the teaching and learning of information technology and communication happened at once and in one spot that is the computer laboratories or computer rooms in the 1970s. When the Terengganu government started the netbook supply or known as the e-book Project, teaching and learning using information technology and communcation has increased to computer use with a ratio of one student one computer. Therefore, learning and teaching strategy has to change from computer laboratory environment to classroom environment.

In the effort to practice Education Transformation, the Terengganu government has tried all aspects and avenues to strengthen the education system. Besides the e-book project which has been implemented, by distributing notebooks to all upper primary students in the state, the government has also proceeded with virtual class project in several selected schools in the districts of Terengganu whereby it acts as a pilot project before implementing it to all the schools in Terengganu. Through this project, each selected school in each district is provided with a Smart Board which is placed either in the access center or the laboratory of the school.

1.1 Problem Statement

The teaching and learning in virtual class utilises multimedia gadgets and equiments interactively and teachers no longer use the white board or the chalk board. Instead, teachers use the Smart Board which is directly connected to the internet and the students' e-Books. The Smart Board also has touch screen feature for teachers to flip to another page and also identify students' errors or mistakes during their learning practices.

Teaching and learning instructions using the Smart Board is the latest tranformation in technology of education which is in line with the government's vision to produce students who are IT literate and savvy. Various efforts have been done by the Ministry of Education to increase the integration of ICT in the teaching and learning instructions. The ideas have been introduced to the teachers and courses organized, but, whether they are

accepted and practiced as prescribed, are still questionable.

The objective of this study is to gauge the level of acceptance of the Smart Board among teachers in primary schools in the Besut district, which has been selected as one of the pilot schools, to use this new technology, based on the construct by Venkatesh et el. (2003) using the UTAUT Model. The main instrument used to collect data is based on the variables set in the UTAUT Model by Venkatesh et. al., 2003. Among others, the findings of this study will also reveal:-

1) the relationship between Performance Expectancy (PE) and Behavioral Intention (BI) in the use of the Smart Board by the teachers.

2) the relationship between Effort Expectancy (EE) and Behavioral Intention (BI) in the use of the Smart Board by the teachers.

3) the relationship between Social Influence (SI) and Behavioral Intention (BI) in the use of the Smart Board by the teachers.

4) the relationship between Facilitating Conditions (FC) and Behavioral Intention (BI) in the use of the Smart Board by the teachers.

2. Literature Review

2.1 Teachers' Acceptance towards the Use of the Smart Board

The research findings by Turel, Y. K., & Johnson, T. E. (2012) claimed that teachers believe the Smart Board can be utilised to ease teaching and learning instructions under the conditions stated below:

1) with help from other teachers.

2) training sessions using the Smart Board for effective teaching strategy.

3) Regular use of the Smart Board to increase teachers' competency.

Miller and Glover (2007) claimed that teachers need time to understand or grasp understanding of the new technology. They need time to adapt to the principles and the pedagogical aspects of the materials and then to adapt the materials or to build materials using the Smart Board to make their teaching effective. Therefore, by encouraging teachers to use the Smart Board regularly can help them:

1) integrate the Smart Board effectively in their teaching.

2) have a positive attitude towards the Smart Board technology.

3) accept the technology as one of the effective tools to aid their teaching.

4) face with new ideas or issues with regards to the use of the Smart Board as authoritative user.

2.2 Acceptance of UTAUT Model

In the study, 'Interactive Whiteboard Acceptance: Applicability of the UTAUT Model to Student Teachers', done by Wong et al. (2013), it is found that teachers will only involve themselves with the new Smart Board technology when they can see the benefits and value of using it. It clearly shows that policy makers and curriculum designers should consider promoting the advantages of using this technology and organize training sessions of its usage. A higher Effort Expectancy level of the Smart Board will increase the level of Behavioral

2.3 Intention of the Teachers in Using the Smart Board.

Dasgupta et al. (2007) in their study 'User Acceptance of Case Tools in Systems Analysis and Design: An Empirical Study', found that students use the CASE tools if they believe that the tools can help improve their performance in class (Performance Expectancy). Besides that, students are more inclined to use the CASE tools if they are instructed (Social Influence) and also if they receive adequate encouragement to use the CASE tools (Facilitating Conditions) by their teachers.

The study 'Using UTAUT to Explore the Behavior of 3G Mobile Communication User' done by Wu et al. (2007) found that among the four determining factors that influence the acceptance of 3G hand phones, only Effort Expectancy has no influence on the users' Behavioural Intention.

In another study, ' Assessing User Acceptance Toward Blog Technology Using the UTAUT Model', done by Bens Pardamean & Mario Susanto (2012), found that the media interactive function in e-learning has managed to attract students' interest and attention. They also agreed that e-learning media is suitable for collaboration and sharing of ideas among students. It clearly shows that social and environmental factors are the catalysts to influence students to use blogs in the e-trading lessons. To enhance the use of blogs in e-trading classes, peer

influence and support is vital.

University lecturers and instructors can influence students to use blogs by promoting and supporting this new social network during course orientation. This approach will increase the students' level of Behavioural Intention to use this technology. By using blogs in e-trading classes, discussions can be continued even after the classes are over and students can participate in discussions without any limit. Students can also participate and give their response in the forum at their own comfort of place and time.

El-Gayar et al. (2011) in their study ' Student's Acceptance of Tablet PCs and Implications for Educational Institutional Technology & Society ', found that the main acceptance factor for the Tablet PCs is students' attitude followed by Performance Expectancy, Facilitating Conditions, Effort Expectancy and Social Influence.

Oye et al. (2011) in their study 'A Model of ICT Acceptance and Use for Teachers in Higher Education Institutions', found that among the four UTAUT constructs, Performance Expectancy is the most influential factor in the acceptance and use of ICT among teachers. 78% of the respondents believed that the use of ICT in their workplace can increase their opportunity in job promotion. They claimed that there is monetary reward or incentive related to the usage of ICT and also a future prospect to get a better job with better salary.

Effort Expectancy is positively perceived when using and understanding ICT is considered easy and user friendly. Social Influence, on the other hand, is perceived satisfactorily positive by looking at the personal support or promotion done by other service provider to use the product. Facilitating Conditions is considered as averagely positive by the respondents because they admit that they have the knowledge to use ICT and they look at how the service provider provide support to users when they need help.

2.4 UTAUT

2.4.1 UTAUT Model by Venkatesh et al. 2003

UTAUT (Unified Theory of Acceptance and Use of Technology) is a technology acceptance model proposed by Venkatesh et. al 2003). This model explains how behavioural intentions of users in using a technology are influenced by factors such as Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions (Figure 1). In addition, there are four other factors that can affect the mentioned factors.

Performance Expectancy (PE) is defined as the level where an individual believe that by using the system/new technology can help increase the performance in their work.

Effort Expectancy (EE) is defined as the level of ease provided to an individual when using the system/new technology.

Social Influence (SI) is defined as how far an individual perceives that other individual who is of a higher level than him/her believes that s/he should use the system/new technology.

Facilitating Conditions (FC) is defined as how far an individual believes that the organization or the technical infrastructure exists to support the system/new technology.

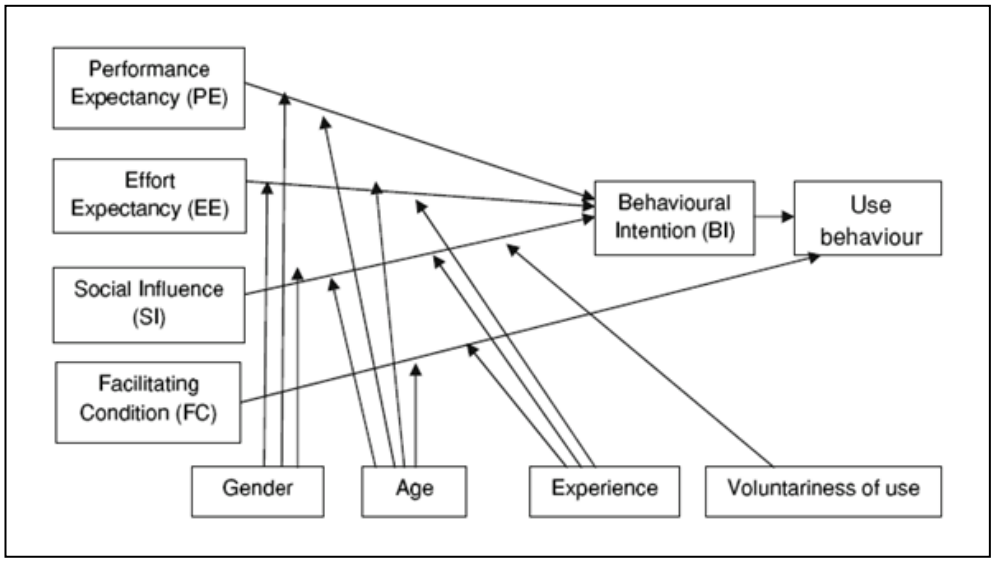

Figure 1. UTAUT Model suggested by Venkatesh et al. (2003)

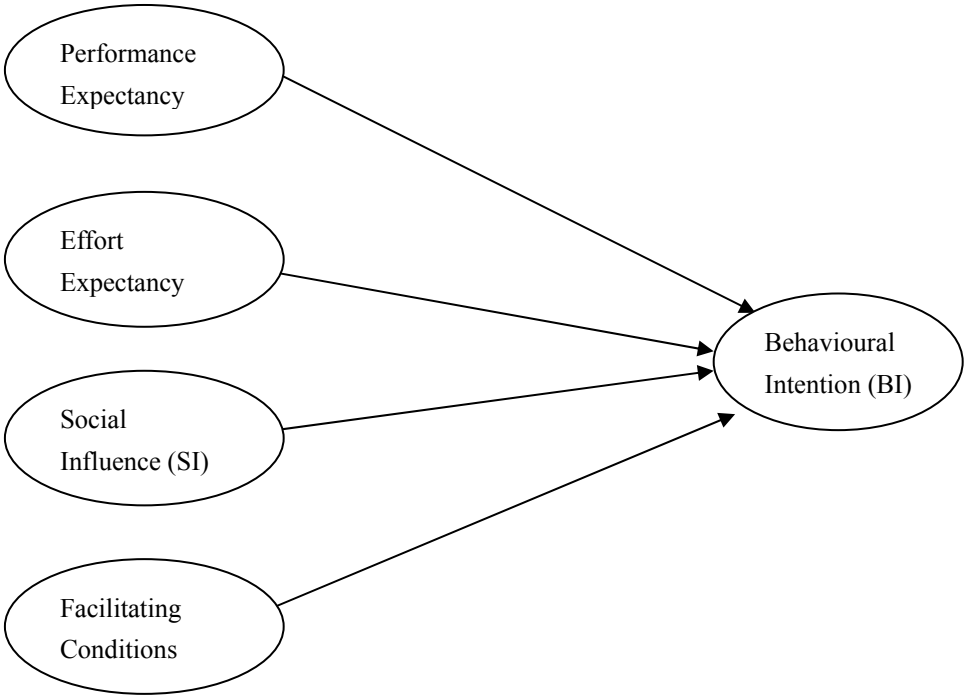

Figure 2. Researcher's specified model

2.4.2 Researcher's Suggested Model

The researcher has discarded several constructs and moderators from the original UTAUT Model. This is due to cost and time constraints to conduct this research. The constructs discarded are from the Use Behavior section and all the moderators that give effect to this constructs in the UTAUT Model are not researched in this suggested model, the Specified Model (Figure 2).

3. Method

This study uses the exploratory quantitative method of research. The researcher used items based on the variables in the UTAUT Model which have been tested by Venkatesh (2003) in his study.

The dependent variables in this study are the Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions whereas the independent variable is Behavioural Intention.

The sample consisted of 68 teachers from 5 primary schools in the district of Besut in Terengganu. All the samples were selected among those who are involved with the integration of the Smart Board in their teaching, at their own respective schools. The selection was done in such a way so that the findings will portray a general view and represent all the schools that are provided with the Smart Board in Terengganu.

The items from the different constructs were adopted from the study by Venkatesh et al. (2003), which were then adapted based on the characteristics intended for this study. Validity and reliability of the items were done using SmartPLS software. If any of the items showed loading value (λ) < 0.5, then the items would be omitted. This is because the items would have measured the same characteristics as other items in the constructs.

Based on the reliability and validity tests, it was found that two items have a loading value (λ) of < 0.5 that is PE4 and FC3. The items were omitted before further analysis were conducted.

4. Results

4.1 Descriptive Statistics

Table 1 showed the respondents' details for this study. This study involved 68 teachers from 5 primary schools in the district of Besut in Terengganu. 72% from the total respondents were between 31 – 50 years of age. Only 5 respondents were between the ages of 21 – 30, while respondents over 50 years of age were 14 (20%).

82.3% from the respondents have more than 11 years of teaching experience. 49 respondents (72.1%) have

average knowledge in ICT. 52 respondents (76.5%) admitted minimal use of the Smart Board in their teaching that is less than 2 hours a week.

Table 1. Respondents' profile

Characteristics		Frequency	Percentage (%)
Respondents' Age	21-30 years	5	7.4
	31-40 years	23	33.8
	41-50 years	26	38.2
	>50 years	14	20.6
Teaching Experience	below 5 years	7	10.3
	6-10 years	5	7.4
	11-15 years	20	29.4
	16-20 years	13	19.1
	>20 years	23	33.8
Level of ICT Skills	minimal skill	4	5.9
	average skill	49	72.1
	High skill	15	22.1
Use of the	<2 hours a week	52	76.5
Smart Board	3 hours a week	8	11.8
	4 hours a week	8	11.8
	Total		

Table 2. Description of constructs

Constructs	Total Items	Mean	SD
Performance Expectancy (PE)	4	4.7390	1.15451
Effort Expectancy (EE)	4	4.8566	1.14631
Social Influence (SI)	4	4.8676	1.15212
Facilitating Conditions (FC)	4	4.3051	.85502
Behavioural Intention (BI)	3	5.0098	1.22301

4.2 Construct Validity

All the items have been validated (Venkatesh et al., 2003). Nevertheless, the instruments were re-validated. An instrument is said to be valid when the Cronbach Alpha is more than 0.8 and not less than 0.6 (Chua, 2006; Henseler et al., 2009; Nunnally & Berstein, 1994).

The Cronbach Alpha for all the constructs in this study are more than 0.7 (Table 3). This shows that the instrument used has a high internal validity.

Table 3. Alpha Cronbach score

Constructs	Cronbach α
Performance Expectancy (PE)	0.961
Effort Expectancy (EE)	0.950
Social Influence (SI)	0.893
Facilitating Conditions (FC)	0.768
Behavioural Intention (BI)	0.965

4.3 Composite Reliability

A construct is said to be reliable when the construct has a composite reliability (CR) value > 0.7. Hair et al., (2010) said that the composite reliability (CR) value of 0.7 and above is accepted while the average Variants Extracted (AVE) has to be more than 0.5.

The result of the analysis showed that all the constructs have a CR value more than 0.7 and the AVE is more than 0.5. Table 4 shows the result of the reliability test using SmartPLS software.

Table 4. Composite reliability

Constructs		Loadings	AVE	CR
Performance Expectancy (PE)	PE1	0.962	0.928	0.975
	PE2	0.955		
	PE3	0.973		
Effort Expectancy (EE)	EE1	0.906	0.869	0.964
	EE2	0.930		
	EE3	0.941		
	EE4	0.952		
Social Influence (SI)	SI1	0.895	0.758	0.926
	SI2	0.925		
	SI3	0.792		
	SI4	0.865		
Facilitating Conditions (FC)	FC1	0.907	0.691	0.869
	FC2	0.867		
	FC4	0.704		
Behavioural Intention (BI)	BI1	0.961	0.935	0.977
	BI2	0.972		
	BI3	0.969		

4.4 Discriminant Validity

Discriminant validity is done to measure the level of different constructs. It will test either an item also measures another item. According to Fornell and Larcker (1981) when the average square root value of two variants extracted is more than the correlation value between all the variables, then discriminant validity is achieved.

Discriminant validity is achieved when the AVE (*BOLD*) average square root value of two variants extracted is more than the correlation value between all the variables (Table 5)

Table 5. Construct correlation matrix

	Behavioural Intention	Effort Expectancy	Facilitating Conditions	Performance Expectancy	Social Influence
Behavioural Intention	**0.967**				
Effort Expectancy	0.753	**0.932**			
Facilitating Conditions	0.741	0.762	**0.831**		
Performance Expectancy	0.817	0.875	0.714	**0.963**	
Social Influence	0.758	0.825	0.786	0.825	**0.870**

4.5 Testing Suggested Model

Figure 3 shows Path Coefficient R^2 for each construct (latent variable) showed that there is difference in the level of collaboration. The result showed that Performance Expectancy (β=0.569, p<0.001) and Facilitating Conditions (β=0.295, p<0.01) have positive effect on Behavioural Intention (BI). However, Performance Expectancy is found to show the biggest influence on Behavioural Intention (β=0.569).

Therefore, Ho1 and Ho4 for this study are accepted because the value R2=0.72 showed that 72.0% of the variants is the use of the Smart Board by the teachers. Nevertheless, Effort Expectancy (β=-0.051, p>0.01) and Social Influence (β=0.099, p>0.01) have no positive effect on Behariourial Intention (BI).

Table 6. Regression analysis (dependent variable = BI)

Hypothesis	Relationship	*Coefficient* (β)	*t value*	Result
Ho_1	PE → BI	0.569	4.000	Accepted
Ho_2	EE →BI	-0.051	0.274	Rejected
Ho_3	SI →BI	0.099	0.873	Rejected
Ho_4	FC →BI	0.295	2.931	Accepted

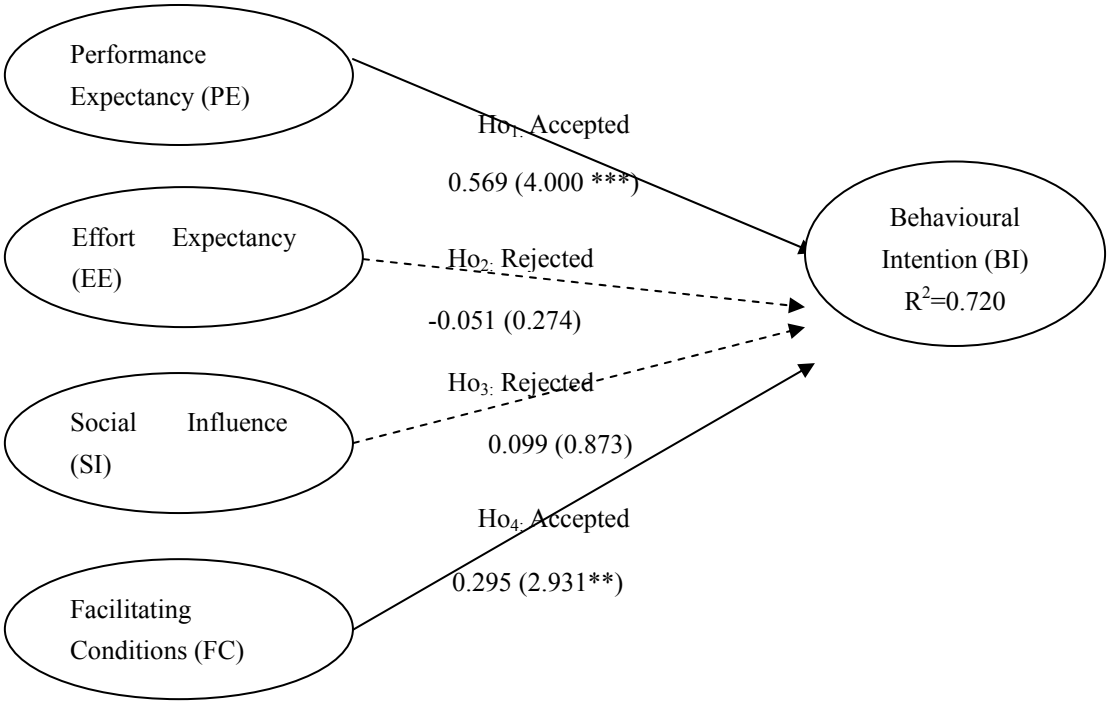

Figure 3. Specified model analysis

Note: The value shows Path Coefficients whereas the value () represents t-value.

** shows t-value is larger than 2.58, p<0.01, *** shows t-value is larger than 3.29, p<0.001.

5. Discussion

The analysis on the four constructs of the suggested model showed that two of the hypotheses are accepted while the other two are rejected. Performance Expectancy and Social Influence have significant relationship with Behavioural Intention whereas Effort Expectancy and Facilitating Conditions have no significant relationship with Behavioural Intention.

The result from the findings of this study is hoped to be able to give MOE a clearer understanding of how far teachers accept the new technology that is the Smart Board which is introduced to the Terengganu government. The study concludes that the acceptance factors of the Smart Board among teachers are that the teachers believe

that the Smart Board can help them increase the teaching performance; there is technical infrastructure and also support from the administration in the use of the Smart Board.

Nevertheless, this study also found that teachers claimed that the Smart Board is not easily use and operated. Therefore, perhaps the MOE can organize more training with regards to the use of the Smart Board for the teachers.

The researcher believes that the scope of the population has to be widened to obtain a more solid and rich data collection. Besides, the constructs that were studied were only four and they are based on the constructs from the UTAUT I Model which was introduced by Venkatesh et al., (2003). The researcher suggests that the UTAUT II Model which has been revised and updated from UTAUT I Model be used. This is due to the fact that the second model has added three new constructs.

References

Dasgupta, S., Haddad, M., Weiss, P., & Bermudez, E. (2007). User acceptance of case tools in systems analysis and design: An empirical study. *Journal of Informatics Education Research, 9*(1), 51-78.

Digregorio, P., & Sobel-Lojeski, K. (2009). The effects of interactive whiteboards (IWBs) on student performance and learning : A literature review. *J. Educational Techonology Systems, 38*(3), 255-312. http://dx.doi.org/10.2190/ET.38.3.b

El-Gayar, O. F., Moran, M., & Hawkes, M. (2011). Student's acceptance of tables PCs and implications for educational instructions. *Educational Technology & Society, 14*(2), 58-70.

Manny-Ikan, E., Dagan, O., Tikochinski, T. B., & Zorman, R. (2011). Using the interactive whiteboard in teaching and learning – An evaluation of the Smart Classroom pilot project. *Interdisciplinary Journal of E-Learning and Learning Objects, 7*, 249-273.

Miller, D., & Glover, D. (2007). Into the unknown: The professional development induction experience of secondary mathematics teachers using interactive whiteboard technology. *Learning, Media and Technology*, *32*(3), 319-331. http://dx.doi.org/10.1080/17439880701511156

Northcote, M., Mildenhall, P., Marshall, L., & Swan, P. (2010). Interactive whiteboards: Interactive or just whiteboards?. *Australian Journal of Educational Technology, 26*(Special issue, 4), 494-510.

Oye, N. D., Iahad, N. A., & Rabin, Z. A. (2011). A model of ICT acceptance and use for teachers in higher education institutions. *International Journal of Computer Science & Communication Networks, 1*(1), 21-40.

Pardamean, B., & Susanto, M. (2012). Assessing user acceptance toward blog technology using the UTAUT model. *International Journal of Mathematics and Computers in Simulation, 1*(6), 203-212.

Turel, Y. K., & Johnson, T. E. (2012). Teachers' belief and use of interactive whiteboards for teaching and learning. *Educational Technology & Society, 15*(1), 381-394.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly, 36*(1), 157-178.

Wong, K. T., Teo, T., & Russo, S. (2013). Interactive whiteboard acceptance: Applicability of the UTAUT model to student teachers. *Asia Pacific Edu Res, 22*(1), 1-10. http://dx.doi.org/10.1007/s40299-012-0001-9

Wu, Y.-L., Tao, Y.-H., & Yang, P.-C. (2007). *Using UTAUT to explore the behavior of 3G mobile communication users.* IEEE International Conference on Industrial Engineering and Engineering Management. Singapore. Disember 2-5.

Copyrights