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The Effects of School Management Support on the Use of Interactive Whiteboard (IWB) in High School

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Abstract

The interactive whiteboard has become one of the most important innovations in the delivery of 21st century education due to the rapid expansion of information technologies. This research study aims to identify the factors that promote the use of interactive whiteboard (IWB). A multidimensional research model has been proposed based on the technology acceptance model. Total of 500 samples collected from the high schools teachers. The results showed that the research model could significantly predict teachers' actual use of interactive whiteboard. The findings would be valuable for academicians and practitioners in the implementation of IWB.

Keywords: Interactive whiteboard, Partial least squares, High school

Introduction

Information and communication technology is part of the e-learning approach that is used widely in schools. One of the new information and communication technological tools that has been exploited in numerous ways to enhance the teaching and learning process is the interactive whiteboard (IWB). It is a touch-sensitive board typically connected to a computer and digital projector. According to (Coyle et al., 2010), this whiteboard enables users to gain access to any file or software saved in the computer by merely tapping on the board. Meanwhile, the projector helps to display the computer screen on the surface of the board. This enables teachers and students to work with the contents by writing or drawing on the board (Coyle et al., 2010) . Previous researchers have suggested that the use of interactive whiteboard (IWB) in the class makes the teaching and learning process more effective, productive and creative (Murcia & Sheffield, 2010;Preston & Mowbray, 2008). Furthermore, the learning environment in the class become collaborative as the use of interactive whiteboards (IWBs) is a student-central tool (Al-

Qirim, 2011). Also, it can be easily integrated into traditional pedagogy (Betcher & Lee, 2009). There are numerous advantages of using IWBs in the classrooms.

One advantage is the teachers are encouraged to use different strategies and techniques in their teaching process (Glover et al., 2007). Another advantage is the increase in social interaction between teachers and students as well as among students. Finally, the IWBs can be used with voting systems, document cameras, and electronic microscopes (Bell, 2002). Many researchers have investigated the usefulness of the interactive whiteboards (IWBs), which have been installed widely in the schools. However, DiGregorio & Sobel-Lojeski, (2010) stated that identifying the factors related to user's intention and acceptance of the interactive whiteboard has become an important issue. The previous research does not reflect teachers' behavioural intentions accurately because of various intentions to use based on the technological type, applications, and the involvement of organizations (Wong et al., 2013). If a teacher opines that the Interactive Whiteboard could enhance instruction and interaction, the result is very likely to show a positive influence on students' learning (Isman et al., 2012)

Thus, the aim of this present study is to provide findings that indicate the successful factors that make the teachers possess the intention to use IWB. This result assists curriculum designers in their tasks. Inevitably, this will improve the skills of teachers and ensure that future teachers can use new technologies in their teaching practices. Previous studies have only achieved the advantages in the integration of interactive whiteboards (IWBs) into educational programs (Betcher & Lee 2009; Harlow, Cowie, & Heazlewood, 2010; Murcia & Sheffield, 2010). Only a few studies were carried out to understand teachers' behavioural intention to use IWBs.

In Palestine, especially in Gaza Strip, the IWBs have been implemented in the schools since 2011. The Islamic Relief Palestine (IRPAL), which is responsible for developing an educational sector in the Gaza strip supports this project. Islamic Relief Palestine (IRPAL) collaborates with the Ministry of Education - Gaza strip to improve the education quality and make the interactive whiteboards (IWBs) available in every school in Gaza strip. They try to replace the regular board with this smart board. The Ministry of Education has directed all education directorates in Gaza strip to offer training courses to teachers and supervisors who work in the schools equipped with the interactive whiteboard. Despite all these initiatives, the adoption of IWBs is still at the experimental stage. The actual use of this tool is limited to only a few teachers teaching in high schools. Hence, this study, proposes a theoretical model for the evaluation of the factors that affect the teachers' use of IWB in the teaching process in high schools in the Gaza Strip-Palestine, for the purpose of this study, a modified Technology Acceptance Model (TAM) is proposed followed by its application.

Literature Review and Research Model

The following sections provide the theoretical foundation of the development of the model and hypotheses.

Theoretical Background

Davis (1989) developed the Technology Acceptance Model (TAM) to identify the factors that have caused people to accept or reject an information technology tool based on the Theory of Reasoned Action. He suggested two important individual beliefs about the use of information technology, namely perceived usefulness and perceived ease of use (Fred D. Davis et al., 1989). TAM links the elements namely perceived usefulness, perceived ease of use, users' attitudes, intentions and actual behaviour of computer adoption behaviour based on the Theory of Reasoned Action (TRA). TAM was specifically

designed for the application of computer usage behaviour. In many studies, the 'intention to use' and the 'actual use' are tested as independent variables (W. Hong, Thong, & Wai-Man Wong, 2002; Plouffe, Hulland, & Vandenbosch, 2001; Venkatesh, Morris, Davis, & Davis, 2003). In recent years, TAM framework has been used to investigate the users' intention in the application of technology such as, online learning portals (Drennan et al., 2005), mobile information management (Lindsay et al., 2011), and a course management system (Sivo et al., 2007) . Some researchers have included other factors such as a 'subjective norm', 'perceived behavioural control', and 'self-efficacy' in their investigation on the use of the TAM model (Hartwick & Barki, 1994; Mathieson, 1991;Taylor, S., & Todd, 1995). Meanwhile, some researchers added belief factors such as trainability, visibility, or result demonstrability from the diffusion of innovation literature, (Agarwal & Prasad, 1997; Karahanna & Straub, 1999 ; Plouffe, Hulland, & Vandenbosch, 2001). Yet, there are researchers who have examined the effects of external variables or moderating factors such as 'personality traits' and 'demographic characteristics' on the major factors (perceived usefulness and perceived ease of use) that affect the use of TAM (Gefen & Straub, 1997;Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

School Management Support

Venkatesh & Bala, (2008) posit that School support refers to the degree, to which an individual believes that schools are committed to the successful implementation and use of the interactive whiteboard. In this study, "school management support" refers to the degree to which a school supports the adoption of the use of the interactive whiteboard as a new technological tool in teaching. Mutohar, (2012) states that if the school actively motivates teachers to use the interactive whiteboard, teachers will be more likely to use the interactive whiteboard. He also puts forth the idea that an important measure is the provision of support for teachers in the integration of technology. Ideally, schools should provide technological support for example: teach the teachers to troubleshoot and to overcome instructional issues.

H1.a: school management support will positively influence on perceived usefulness

H1.b: school management support will positively influence on perceived ease of use

Perceived Usefulness

According to TAM, the variable, perceived usefulness affects the behavioural intention to use technology. Davis (1989) defined perceived usefulness as "the degree to which a person believes that using a particular system will enhance his or her job performance." In this research study, the perceived usefulness of the IWB is defined as the degree to which the teachers believe that the use of this tool will improve their teaching skills. Many studies found perceived usefulness to be the most dominant predictor of the intention to use (e.g., S. Hong, Thong, & Tam, 2006; Limayem & Cheung, 2008)

Findik Coskuncay & Ozkan, (2013) Proved that perceived usefulness (PU) showed a positive significant relationship the behavioural intention to use (BI).

H2: perceived usefulness will positively influence on behavioural intention to use interactive whiteboard

Perceived Ease of Use

Davis (1989) defined perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort." Individuals who perceive that a system is easy to use are more inclined to believe in its usefulness (Robey & Farrow 1982); as well as the ease with which they can access the system (Amoako-Gyampah, 2007). If users feel that the technology is easy to use, they will take note of the usefulness of the ICT tool and they will willingly use this technology (Arteaga Sánchez et al., 2013). Many researchers have used TAM in their e-learning research and they have found that perceived ease of use has significant effects on the individual's behavioral intention to use the e-learning system (Liu, Liao, & Pratt, 2009 ; C. S. Ong, Lai, & Wang, 2004 ; Sheng, Jue, & Weiwei, 2008).

H3.a: perceived ease of use will positively influence on behavioral intention.

H3.b: perceived ease of use will positively influence on perceived usefulness.

Behaviour Intention

The concept of behavioural intention was introduced as a key construct in formulating the theory of reasoned action (TRA). According to Venkatesh & Davis, (2000), TAM postulates that two unambiguous behavioural beliefs, perceived ease of use and perceived usefulness, determine an individual's behavioural intention to use a technology. Thus, the behavioural intention to use is determined together by perceived ease of use and perceived usefulness (Davis, 1989). Previous studies have found that behavioural intention of use shows positive influence on actual use (Sadaf, Newby, & Ertmer, 2012; Cheung & Vogel, 2013).

H4: behavioural intention will positively influence on actual use

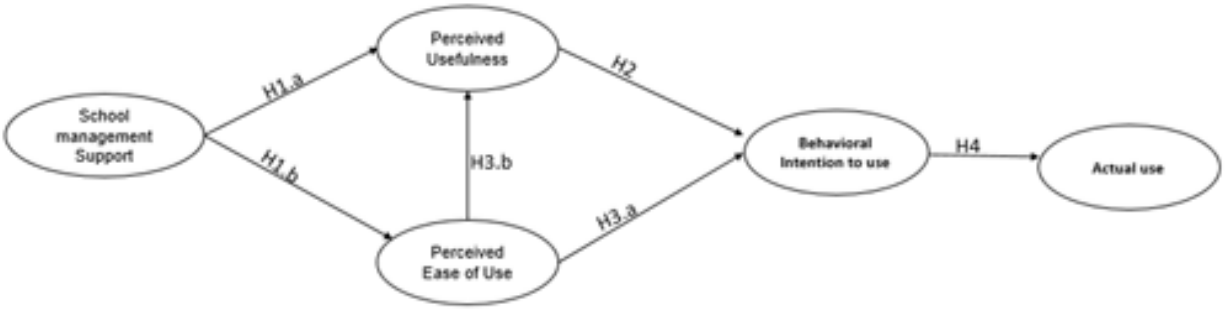

Fig.1 Proposed research model

Research Method

A survey was conducted to investigate the factors influencing teachers' use of interactive whiteboard for the purpose to test the research model and the hypotheses empirically.

Instrument Development

The survey instrument consists of a two-part questionnaire. The first part employs the use of nominal scales to collect demographic information such as the respondent's gender, age, experience in the use of technology, class level, subjects taught, years of teaching, the number of hours received for training on the use of interactive whiteboard, and perception on interactive whiteboard usage from the respondents.

The second part uses subjective measures to evaluate respondents' perceptions of the theoretical constructs. Each construct contains four measures graded using a 5-point Likert-type scale. Most of the survey instruments are adopted from current scales except for the demographic survey. The scale used to measure perceived usefulness is adopted from the instrument used by Davis, Bagozzi, & Warshaw, (1989) in their research work. Meanwhile, the scale used to measure perceived ease of use is adopted from the instrument used by Venkatesh et al. (2003) in their research work. The scale used to measure school management support is adopted from the instrument used by Lai & Chen, (2011) in their research study. Finally, the scales used to measure behavioural intention to use and actual use are adopted from the instruments used by (Fred D. Davis et al., 1989).

The respondents of this research study are selected from teachers who teach in high schools with interactive whiteboards. The research questionnaire was delivered via e-mail to those respondents. The First, an invitation letter was sent to the teachers who teach in the high schools with interactive whiteboards. The letter provided a brief introduction to the study and requested for volunteer participants. Interested teachers could simply click on the hyperlink provided in the invitation letter to complete the questionnaire online. A follow-up letter was sent to the non-responding teachers after two weeks. This reminder serves as the purpose to gather more responses. Of the 400 invitation letters sent out, 335 questionnaires were considered valid after (discarding the replicated and uncompleted questionnaires).

The effective response rate was recorded at 83%; 39.4% of respondents were males and 60.6% were females. The respondents of this research study were teaching in different levels in high schools: (42.4%) of the respondents teaches level three, while, (19.1 %) of the respondents teaches level one in high schools. Table 4.2 tabulates the experiences of respondents in the use of technology. The findings show that (54%) of respondents are good in the use of technology while (30.7%) of respondents are excellent in technological use. only, (15.2%) of respondents are week in the use of technology. It is reported that (60.3%) of respondents teaches literacy subjects and (39.7%) of them teaches scientific subjects.

Scale Validation

The partial least square (PLS) method was used for assessing the validity of the scales and the testing of hypotheses. This method is a structural equation modelling technique that employs a non-parametric approach. Also, it is a and component-based method for a predictive research model (Jöreskog & Sörbom, 1993).The method is preferred over covariance-based analytical techniques such as LISREL, in terms of requirements of the sample size and distribution restrictions. In addition, this method is able to model latent variables as either formative or reflective constructs (Chin et al., 2003).The SmartPLS software is used to test the hypotheses (Ringle,Wende, & Will, 2008). Unlike LISREL, SmartPLS estimates the

parameters of the measurement model as well as the structural model together. Thus, the relative statistics of the research model are rearranged to meet the requirements of the measurement model and the structural model. The assessments performed in the measurement model are convergent validity and discriminant validity of scale items. Meanwhile, the assessments performed in the structural model are the path coefficients and explanations of variances. Because the PLS did not provide a significant test or intervals of estimation of confidence, a bootstrapping technique with 100 subsamples was used to obtain the values of parameter means, standard errors, and significance for item loadings, item weights, and path coefficients.

The Convergent and discriminant validity of each first-order construct are assessed in the measurement model. Each first-order construct is modelled as a reflective latent construct to account for its indicators. The three criteria used for the assessment of convergent validity are: (Fornell & Larcker, 1981): (1) item loading (l) that should be statistically significant with a value greater than .71, (2) composite reliability (rc) for each latent construct that should be than .70 and it should be interpreted like a Cronbach's coefficient, and (3) average variance extracted (AVE) for each latent construct should exceed 0.50.

Table 1 Assessment of convergent validity

Construct	Items	Item loadings	Composite reliability	Cronbachs Alpha	AVE	Correlations				
						AU	BI	PEU	PU	SS
AU	4	.87-.91	.93	.91	.78	.88				
BI	4	.79-.88	.90	.86	.70	.52	.83			
PEU	5	.81-.88	.93	.90	.72	.41	.60	.84		
PU	5	.80-.88	.92	.90	.72	.40	.63	.61	.84	
SS	5	.81-90	.92	.90	.72	.42	.49	.38	.41	.84

Meanwhile, the estimation for Discriminant validity between constructs is based on the criterion that the square root of every AVE should exceed the correlations among any pairs of latent constructs (Chin, 1998; Fornell, C. and Larcker, 1981). Table 1 shows that standardized item loadings that range from .79 to .91, composite reliability that ranges from .90 to .93, and the average variance extracted (AVE) the range from .70 to .78. All the item loadings exceed .71 and they are significant at the level of $p < 0.001$ l. The composite reliabilities of each latent construct are greater than .7, and all the values of AVE exceed .50. In addition, the square root of AVE for each construct (diagonal elements) exceeds its correlations with all other constructs (off-diagonal elements). These results demonstrate the achievements of the target in satisfactory reliability, convergent and discriminant validity. Table 2 shows the loadings and cross-loadings of the structural matrix.

Table 2 Factor structure matrix of loading and cross

* The bold characters are item loadings that are significant and greater than 0.71

Scale items	AU	BI	PEU	PU	SS
AU1	0.8962	0.4321	0.3519	0.3122	0.3669
AU2	0.8757	0.4330	0.3749	0.3508	0.3126
AU3	0.9115	0.4514	0.3486	0.3180	0.3737
AU4	0.8700	0.5226	0.3881	0.4328	0.4392
BI1	0.4157	0.7966	0.5054	0.5896	0.3840
BI2	0.4532	0.8803	0.4978	0.5459	0.4197
BI3	0.4116	0.8376	0.4576	0.4641	0.3432
BI4	0.4706	0.8523	0.5717	0.5396	0.5020
PEU1	0.3459	0.5464	0.8173	0.5574	0.3298
PEU2	0.3905	0.5445	0.8510	0.5031	0.3277
PEU3	0.2975	0.4332	0.8407	0.4649	0.2811
PEU4	0.3377	0.4958	0.8836	0.5285	0.3329
PEU5	0.3821	0.5512	0.8738	0.5436	0.3574
PU1	0.3872	0.5956	0.5569	0.8727	0.3841
PU2	0.3690	0.5791	0.5227	0.8871	0.3816
PU3	0.2601	0.4847	0.5299	0.8082	0.3046
PU4	0.3310	0.4979	0.4773	0.8391	0.3095
PU5	0.3543	0.5449	0.5100	0.8444	0.3789
SS1	0.3729	0.3907	0.2975	0.3157	0.8141
SS2	0.3979	0.4216	0.2871	0.3441	0.8830
SS3	0.3928	0.3931	0.3168	0.3256	0.9011
SS4	0.3222	0.4568	0.4053	0.3956	0.8226
SS5	0.3260	0.4210	0.3017	0.3697	0.8306

Assessment of Structural Model and Hypotheses Testing

The SMART PLS is used to assess the statistical significance of each hypothesis with consideration to the values of path coefficients that are standardized betas. The data set composed of 335 samples. It was analyzed with a bootstrapping procedure to evaluate the significant level of relationships between the constructs. Figure 2 shows the estimated path coefficients of the structural model.

Table 3 is a summary of results obtained from the hypotheses tests. The T values are taken into consideration in the evaluation of the significance of path coefficients and β values stating the standardized path coefficient. When the T and β values were considered, it was found that the relationships between SS-PU, SS-PEU, PEU-PU, PU-BI, PEU-BI and BI-AU at the level when $p<0.001$ are strong and positive. Therefore H1.a, H1.b, H2,H3.a, H3.b, and H4 are accepted. A newly constructed hypothesis was constructed to measure the relationship between SS and PU as well as the relationship between SS and PEU. The analysis of the, structural model showed the relationship between PEU and PU at the level where $p<0.001$ is strong thus, the acceptance of the newly constructed hypothesis that indicated positive and direct relationship between SS and PU, and between SS and PEU.

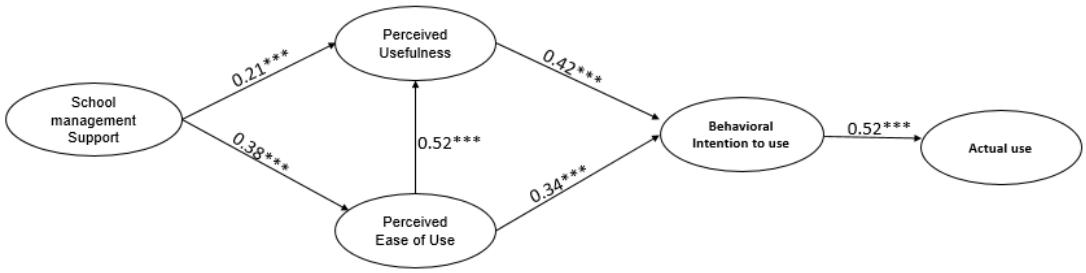

Fig.2 Result of the proposed research model

Table 3 Path Coefficients

Relationships	Hi	T-values	Path coefficient	Decision
SS → PU	H1.a	3.8023	0.2122	Accepted
SS → PEU	H1.b	8.0368	0.3836	Accepted
PU → BI	H2	7.7784	0.4265	Accepted
PEU → BI	H3.a	6.5539	0.3454	Accepted
PEU → PU	H3.b	11.2929	0.5298	Accepted
BI → AU	H4	14.7215	0.5213	Accepted

Note: ***p < 0.001, **p < 0.01, *p < 0.05

Discussion

In this empirical study, a number of relationships are examined to investigate the use of the interactive whiteboard (IWB) among teachers in high schools. The findings revealed that the support of the school management has a direct and statistically significant effect on perceived usefulness and perceived ease of use (H1.a, H1.b). But the effect of support of school management on perceived ease of use is more evident than the effect of support of school management on perceived usefulness. This means that it is more effective for teachers to get support from the management of the school in the use of the interactive whiteboard rather than to get the usefulness of this tool from the use in the classroom.

Perceived usefulness shows strong effects on behavioural intention of use in comparison with the influence of perceived ease of use on behavioural intention of use (H2,H3.a). This means when the teachers find interactive whiteboard useful in their teaching, they will have the intention to use this technology all the time in their classroom. The result shows that teachers will have the intention to use the interactive whiteboard in the classroom when they find this tool useful rather than when they find it an easier tool to use in the classroom. The results are consistent with previous studies (Calisir et al., 2014; Teo, 2011)

Behavioural intention of use has strong effect on actual use (H4) so this means teachers when they have intention to use interactive whiteboard, they will use it in their classes interactive whiteboard. This result is consistent with the previous studies (Pynoo et al., 2011; Joo et al., 2014).

Conclusion

This study intends to examine the effects of support of school management on teachers' use of the interactive whiteboard based on technology acceptance model (TAM). The research findings revealed that support of school management is an important determinant in the acceptance of interactive whiteboard in classroom use. For total effect on perceived usefulness and perceived ease of use, support of school management has been proven to be more critical and effective on perceived usefulness than perceived ease of use. This result has provided a new theoretical basis with empirical support for better understanding on the acceptance of the use of interactive whiteboard and the practical implications for developers and practitioners of interactive whiteboard. To increase the acceptance of the use of interactive whiteboard, developers and practitioners must not only focus on how make this technology easier to use but they should also consider ways on how to make the interactive whiteboard a useful tool in the classroom. In order to promote technological use among teachers, school management should focus on enhancing teachers' use of the interactive whiteboard. The school management should provide training courses for the teachers on ways to use interactive whiteboard and draw up programs to make this tool easier and useful for classroom use.

The present research studies show that the construct support of the school management is still lacking. Therefore, more efforts should be made on the evaluation of this construct and the development of multi-dimensional measures in an e-learning context for future research studies. The research model should be retested with a broader and larger sample of teachers. Another, important area for future research in technology adoption is the examination of the role of other predictors of technological use. An understanding of the determinants for behavioral intention would allow leaders to understand why some teachers opt to use technological tools while others do not.

References

Agarwal, R., & Prasad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. Decision Sciences, 28(3), 557–582.

Al-Qirim, N. (2011). Determinants of interactive white board success in teaching in higher education institutions. Computers & Education, 56(3), 827–838.

Amoako-Gyampah, K. (2007). Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation. Computers in Human Behavior, 23(3), 1232–1248.

Arteaga Sánchez, R., Duarte Hueros, A., & García Ordaz, M. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model. Campus-Wide Information Systems, 30(2), 135–160.

Bell, M. A. (2002). Why Use an Interactive Whiteboard ? A Baker ' s Dozen Reasons !

Betcher, C., & Lee, M. (2009). The Interactive Whiteboard Revolution Teaching with IWBs. Camberwell, Victoria: ACER Press.

Calisir, F. et al., (2014). Predicting the Intention to Use a Web-Based Learning System: Perceived Content Quality, Anxiety, Perceived System Quality, Image, and the Technology Acceptance Model. Human Factors and Ergonomics in Manufacturing & Service Industries, 24(5), pp.515–531.

Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies : An extension of the technology acceptance model for e-learning. Computers & Education, 63, 160–175.

Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. JSTOR.

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. Information Systems Research, 14(2), 189–217.

Coyle, Y., Yañez, L., & Verdú, M. (2010). The impact of the interactive whiteboard on the teacher and children's language use in an ESL immersion classroom. System, 38(4), 614–625.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989a). User acceptance of computer technology : A comparison of two theoretical models. Management Science, 35(8), 982–1003.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989b). User acceptance of computer technology: a comparison of two theoretical models. Management Science, 35(8), 982–1003.

DiGregorio, P., & Sobel-Lojeski, K. (2010). The effects of interactive whiteboards (IWBs) on student performance and learning:Aliterature review. Educational Technology Systems, 38(3), 255–312.

Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors affecting student attitudes toward flexible online learning in management education. The Journal of Educational Research, 98(6), 331–338.

Findik Coskuncay, D., & Ozkan, S. (2013). A Model for Instructors' Adoption of Learning Management Systems: Empirical Validation in Higher Education Context. Turkish Online Journal of Educational Technology-TOJET, 12(2), 13–25.

Fornell, C. and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of e-mail: An extension to the technology acceptance model. MIS Quarterly, 389–400.

Glover, D., Miller, D., Averis, D., & Door, V. (2007). The evolution of an effective pedagogy for teachers using the interactive whiteboard in mathematics and modern languages: an empirical analysis from the secondary sector. Learning, Media and Technology, 32(1), 5–20.

Harlow, A., Cowie, B., & Heazlewood, M. (2010). Keeping in touch with learning: the use of an interactive whiteboard in the junior school. Technology, Pedagogy and Education, 19(2), 237–243.

Hartwick, J., & Barki, H. (1994). Explaining the role of user participation in information system use. Management Science, 40(4), 440–465.

Hong, S., Thong, J. Y. L., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. Decision Support Systems, 42(3), 1819–1834.

Hong, W., Thong, J. Y. L., & Wai-Man Wong, K.-Y. T. (2002). Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics. Journal of Management Information Systems, 18(3), 97–124.

Isman, A., Abanmy, Fahad AbdulAzizHussein, H. B., & Al Saadany, M. A. (2012). Saudi secondary school teachers attitudes' towards using interactive whiteboard in classrooms. The Turkish Online Journal of Educational Technology, 11(3), 286–296.

Joo, Y.J. et al., 2014. FACTORS INFLUENCING ACTUAL USE OF MOBILE LEARNING CONNECTED WITH E-LEARNING. International Journal of Computer Science & Information Technology, 6(6).

Jöreskog, K. G., & Sörbom, D. (1993). LISREL 8: Structural equation modeling with the SIMPLIS command language. Scientific Software International. Scientific Software International.

Karahanna, E., & Straub, D. W. (1999). The psychological origins of perceived usefulness and ease-of-use. Information & Management, 35(4), 237–250.

Lai, H.-M., & Chen, C.-P. (2011). Factors influencing secondary school teachers' adoption of teaching blogs. Computers & Education, 56(4), 948–960.

Limayem, M., & Cheung, C. M. K. (2008). Understanding information systems continuance: The case of Internet-based learning technologies. Information & Management, 45(4), 227–232.

Lindsay, R., Jackson, T. W., & Cooke, L. (2011). Adapted technology acceptance model for mobile policing. Journal of Systems and Information Technology, 13(4), 389–407.

Liu, S.-H., Liao, H.-L., & Pratt, J. A. (2009). Impact of media richness and flow on e-learning technology acceptance. Computers & Education, 52(3), 599–607.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2(3), 173–191.

Murcia, K., & Sheffield, R. (2010). Talking about science in interactive whiteboard classrooms. Australasian Journal of Educational Technology, 26(4), 417–431.

Mutohar, A. (2012). The Case of Teacher Utilization of Government-Sponsored Technological Resources. In Society for Information Technology & Teacher Education International Conference (Vol. 2012, pp. 3411–3414).

Ong, C. S., Lai, J. Y., & Wang, Y. S. (2004). Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. Information and Management, 41(6), 795–804.

Ong, C.-S., Lai, J.-Y., & Wang, Y.-S. (2004). Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. Information & Management, 41(6), 795–804.

Plouffe, C. R., Hulland, J. S., & Vandenbosch, M. (2001). Research report: richness versus parsimony in modeling technology adoption decisions—understanding merchant adoption of a smart card-based payment system. Information Systems Research, 12(2), 208–222.

Preston, C., & Mowbray, L. (2008). Use of SMART Boards for teaching, learning and assessment in kindergarten science. Teaching Science, 54(2), 50–53.

Pynoo, B. et al., (2011). Assessing teachers' acceptance of educational technologies: Beware for the congruency between user acceptance and actual use. In Proceedings of the 19th International Conference on Computers in Education (ICCE-2011). Ghent University, Department of Educational Studies.

Robey, D., & Farrow, D. (1982). User involvement in information system development: A conflict model and empirical test. Management Science, 28(1), 73–85.

Sadaf, A., Newby, T. J., & Ertmer, P. a. (2012). Exploring factors that predict preservice teachers' intentions to use Web 2.0 technologies using decomposed theory of planned behavior. Journal of Research on Technology in Education, 45(February 2015), 171–195.

Sheng, Z., Jue, Z., & Weiwei, T. A. N. (2008). Extending TAM for Online Learning Systems : An Intrinsic Motivation Perspective. TSINGHUA SCIENCE AND TECHNOLOGY, 13(3), 312–317.

Sivo, S. A., Pan, C., & Hahs-Vaughn, D. L. (2007). Combined longitudinal effects of attitude and subjective norms on student outcomes in a web-enhanced course: A structural equation modelling approach. British Journal of Educational Technology, 38(5), 861–875.

Taylor, S., & Todd, P. (1995). Understanding information technology usage: a test of competing models. Information Systems Research, 6(2), 144–176.

Teo, T., 2011. Factors influencing teachers' intention to use technology: Model development and test. Computers & Education, 57(4), pp.2432–2440.

V., Vekantes, V, Morris, M, Davis G., Davis, G., D. F. (2009). Technology Acceptance Model - Research Front Map – Science. Page 2 of 7, 1–7.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. Decision Sciences, 39(2), 273–315.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186–204.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. MIS Quarterly, 115–139.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003a). User Acceptance of Information Technology : Toward a Unified View. MIS Quarterly, 27(3), 425–478.

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

Wong, K.-T., Russo, S., & McDowall, J. (2013). Understanding early childhood student teachers' acceptance and use of interactive whiteboard. Campus-Wide Information Systems, 30(1), 4–16.