The Social Sciences 6 (6): 513-520, 2011
ISSN: 1818-5800

Acceptance of E-Learning for Users in Higher Education: An Extension of the Technology Acceptance Model

Veera Bhatiasevi
Business Administration Division, Mahidol University International College (MUIC), Thailand

Abstract: The emergence of e-learning has been possible due to the use of Information and Communication Technologies (ICT) which enables the creation, fostering, delivering and the facilitation of learning, anytime and anywhere. The Thai government has been the driving force behind the growth of e-learning as evident by the national ICT plans. However, although there has been initiatives by the government and adoption by universities very few studies have been conducted about e-learning in Thailand and little of which is known to the international field of e-learning. It is therefore, interesting to understand the level of adoption made by these universities and what factors affect acceptance of the e-learning systems. The study proposes the following variables an extension to the Technology Acceptance Model (TAM); Computer Self-efficacy (CSE), System Functionality (SF) and Teaching Materials (TM). Data was collected from 207 participants in Thailand in an undergraduate program. Satisfactory reliability and validity checks were performed followed by the testing of the structural model using AMOS. Results indicate that CSE, SF and TM have a positive effect with Perceived Ease of Use (PEOU) while TM also has a positive effect with Perceived Usefulness (PU). PU positively effects Intention to Use (ITU) while PEOU posits a positive effect with PU. Suggestions for researchers and practitioners are discussed.

Key words: E-learning, technology acceptance, delivering, fostering, TAM, Thailand

INTRODUCTION

The information age has seen a paradigm shift from teacher-centered education to learner-centered education which has been possible due to the emergence of e-learning (Lee *et al*., 2009). This emergence has been possible due to the use of Information and Communication Technologies (ICT) which enables the creation, fostering, delivering and the facilitation of learning, anytime and anywhere (Liaw, 2008). Now-a-days students are able to access e-learning systems and interact with materials in the form of text, pictures, sound and video on demand (Lee, 2006). E-learning has four advantages; freedom to choose the lesson to be learnt, no dependence on the time constraints caused by the lecturer, no limits in expressing ones thoughts or asking questions and the ability for the students to access the courses' online materials at any given time (Bouhnik and Marcus, 2006). The development of e-learning in Thailand is also related to the rapid growth of ICT.

The Thai government has been the driving force behind the growth of e-learning as evident by the national ICT plans. National plans have targeted universities to become e-universities and how Information Technology (IT) can become a facilitator in teaching and learning is a national concern. The National ICT Plan (2001-2010) by the National Electronics and Computer Technology Center (NECTEC) in 2001 and the National ICT for Education Master Plan (2004-2006) by the office of the Education Council in 2004 are examples of initiatives taken by various public organizations to ensure that ICT is used in education (Puangthong and Malisawan, 2005). Bates (2000) believes that the following are the benefits of using new technologies (the internet, email, presentation software, video-conferencing, the world wide web, multimedia and CD-ROM) for education; to improve the quality of learning, to improve students' everyday IT skills they will need in their work and life and to respond to the technological imperative.

ICT also plays an important role in pedagogical activities such as instructional delivery, material preparation, class communication and evaluation from which e-learning has become the most accepted form of ICT-enhanced instruction (Siritongthaworn and Krairit, 2006). In the context of Thai universities, the application of e-learning varies across course depending on the objectives, existing physical, financia and managerial environment faced by each university. Although, most courses in Thai universities are taught in classrooms, some have adopted e-learning as a supplement to the

Corresponding Author: Veera Bhatiasevi, Buddhamonthon, Salaya, 73170 Nakhon Pathom, Thailand

traditional face-to-face instruction. However, although there has been initiatives by the government and adoption by universities, very few studies have been conducted about e-learning in Thailand and little of which is known to the international field of e-learning.

It is therefore, interesting to understand the level of adoption made by these universities and what factors affect acceptance of the e-learning systems. The motivation of this study is to understand why some students use while some do not use e-learning. The objectives of this study are; to develop a Technology Acceptance Model (TAM) that integrates external variables (extending TAM) that can be used as key determinants of the acceptance of e-learning and to investigate the relationship effects of these determinants on the acceptance of e-learning. The rest of this study will provide a brief review of the literature, research model and hypotheses a description of the research methodology, results of the tests, discussion and conclusion of the tests and limitations of the study.

Technology acceptance model: Several models in the literature have attempted to explain technology adoption but TAM has been the most researched one (Van Raaij and Schepers, 2008). In comparison with another competing models such as the Theory of Reasoned Actions (TRA) and the Theory of Planned Behavior (TPB), TAM is the model that is best suited for the computer technology acceptance that provides high research significance (Lee *et al*., 2005).

With its roots from the TRA model (Fishbein and Ajzen, 1975), the technology acceptance model was proposed by Davis (1989) in an effort to explain the acceptance of information technology. TAM was the 1st model that included psychological factors that would affect computer acceptance and since its inception, it has moved away from TRA by not including subjective norm as part of the model. The model also assumes that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of the technology will have a major influence on the users' attitude towards using the technology (Van Raaij and Schepers, 2008).

According to Davis (1989), PU and PEOU were the key determinants of technology acceptance. Davis defined PU as the degree of which a person believes that using a particular system would enhance his or her job performance and perceived ease of use as the degree of which a person believes that using a particular system would be free of effort. Davis (1989) proposed that PU and PEOU influence the attitude of users towards th use of technology while attitude influences the Behavioral Intention (BI) to use a particular technology which in turn

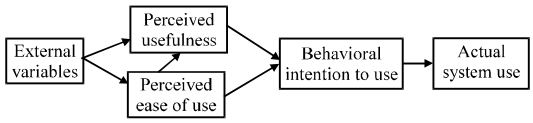

Fig. 1: Technology acceptance model

predicts the actual use of the system/technology. PU influences BI while PU is also influenced by PEOU. External variables also mediate indirectly influencing both the PU and PEOU. However in a refined model proposed by Davis *et al*. (1989), attitude was removed from the original TAM model because of its weak correlation with both BI and PU. Figure 1 shows the model proposed by Davis.

Although, TAM has been widely used in the past two decades as a tool to predict the extent to which information technology will be adopted, research has also suggested that the overall applicability of the TAM should be broadened (Lee, 2006). A number of studies conducted on TAM for example (Davis *et al*., 1992; Gefen and Straub, 1997; Venkatesh, 2000; Venkatesh and Davis, 2000; Hsu and Lu, 2004; King and He, 2006) have shown that PU and PEOU important antecedents of technology acceptance. TAM has also been applied to a wide range from individuals, students and consumers to intra-organizational technology acceptance (Van Raaij and Schepers, 2008). A model that has been successful in predicting user acceptance to information technology, TAM could also be useful in predicting students' acceptance of e-learning, a system that today promises the delivery of education using a new approach (Lee, 2006).

E-learning: The emergence of e-learning in education dates back to the mid-1990s, although the definition of the term e-learning differs for researchers (Lee *et al*., 2009). Though the definitions may differ, the core functionality is that e-learning allows users to integrate a variety of functions such as instructional material which includes audio, video, text, email, live chat sessions, online discussions and forums, quizzes and assignmentsand the internet (Pituch and Lee, 2006).

Some researchers define e-learning as web-based learning that makes use of web-based communication, collaboration and knowledge transfer to individuals and organizations (Kelly and Bauer, 2004). The fostering, deliveringand the facilitation of anywhere and anytime learning can be accomplished through e-learning by using different network technologies (Liaw, 2008). Furthermore, e-learning also allows for asynchronous interaction, group collaboration and new educational approaches

(Capper, 2001). With extensive investments made in e-learning systems by businesses and educational institutions, it is important that users use them otherwise the benefits of these systems will not be fully realized (Pituch and Lee, 2006). Even though, the use of the internet has grown significantly, its potential will not be fully realized if students do not except it as a medium that they can use to access learning materials. Teachers have become reluctant to use e-learning as a medium if they are not confident that the students will use them. A study by Bouhnik and Marcus (2006) stated the following reasons as to why students were satisfied with e-learning; lack of a firm framework, high level of self-discipline is required, absence of learning atmosphere, the level of contact and discussion is minimized in a web-learning format and the efficiency of the learning process is reduced. Therefore, it is important to investigate the acceptance of e-learning among students in order to understand the drivers of e-learning acceptance (Lee *et al*., 2005). The definition of e-learning in this study has been adapted from (Lee *et al*., 2009) as web-based learning that utilizes web-based communication, collaboration and knowledge transfer to support students' learning minimizing time and space barriers. This study will propose the following external variables that should be extended to the TAM model; computer self-efficacy, design of learning contents and system functionality. The three external variables cover the three dimensions of e-learning as shown in Fig. 2.

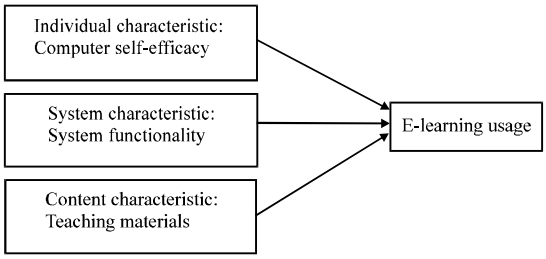

Fig. 2: The threee dimentions of e-learning

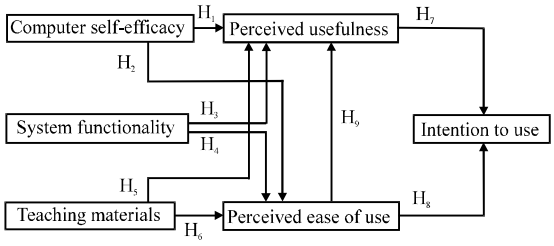

Fig. 3: Proposed research model

Research model and hypotheses: Based on the literature review, a comprehensive research is needed to understand the reasons why current users use it and what impact it may have on the selection process of future users. The model proposed in this study consists of three independent variables, two belief variables and one dependent variable.

The three independent variables are; computer self-efficacy, design of learning contents and system quality which represent the users' perception, the completeness and accuracy of the materials and the quality of the system adding to the comprehensiveness from different angles. The two belief variables are perceived usefulness and perceived ease of use. The independent variable is the intention to use e-learning. The conceptual research model is shown in Fig. 3.

Computer self-efficacy: Self-efficacy an important construct in social psychology is the belief in oneself to perform a specific task (Bandura, 1997). Computer self-efficacy has been defined by Compeau and Higgins (1995) as a person's perception in regards to using computers in an IT setting. This internal perception has an affect on the individual's expectations of using a computer to perform a job thereby affecting their expectation to use an information system (Lee, 2006). Computer self-efficacy has been studied extensively in e-learning settings such as Lee (2006), Lee and Hwang (2007), Simmering *et al*. (2009) and Saade and Kira (2009). In the context of e-learning computer self-efficacy can be defined as the students' perception in regards to the use of e-learning. This study therefore proposes the following hypotheses:

- H_1: Computer self-efficacy has a positive influence towards perceived usefulness
- H_2: Computer self-efficacy has a positive influence towards perceived ease of use

System functionality: System functionality refers to the perceived ability of an e-learning system to provide flexible access to instructional and assessment media (Pituch and Lee, 2006). This type of media should allow students to use the e-learning system to perform the following tasks; access course content, submit homework assignments and complete quizzes or exams online (Pituch and Lee, 2006). Seels and Glasgow believe that these tasks can be accomplished by integrating audio, video and text as the main types of media. This study therefore, proposes the following hypotheses:

- H_3: System functionality has a positive influence towards perceived usefulness

- H_4: System functionality has a positive influence towards perceived ease of use

Teaching materials: Teaching materials refers to the extent to which teaching materials are suitable for e-learning (Lee *et al*., 2009). The concept of using an e-learning system will be easy for learners if they feel that the e-learning services a re provided in such a way that it covers all the contents deigned to serve their needs in the context of e-learning if the learners are provided with accurate and consistent learning contents (Learner-centered service) then it will facilitate the ease of using the e-learning system (Lee *et al*., 2009). The ease of understanding and finding web contents easily also predicts ease of use (Lederer *et al*., 2000). This study therefore proposes the following hypotheses:

- H_5: Teaching materials has a positive influence towards perceived usefulness
- H_6: Teaching materials has a positive influence towards perceived ease of use

Perceived usefulness: Perceived usefulness is defined as the degree of which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). A significant number of studies have provided support that perceived usefulness has a positive effect on behavioral intention to use (Davis, 1989; Gefen and Straub, 1997; Gefen *et al*., 2000; Venkatesh, 2000; Venkatesh and Davis, 2000; Gefen, 2003; Lee *et al*., 2005; Van Raaij and Schepers, 2008; Lee *et al*., 2009). In the context of e-learning, PU refers to the degree to which the student believes that using e-learning can enhance their learning performance which means that PU will influence their intention to accept and adopt the e-learning system. This study therefore proposes the following hypotheses:

- H_7: Perceived usefulness has a positive influence towards behavioral intention to use

Perceived ease of use: Perceived ease of use is defined as the degree of which a person believes that using a particular system would be free of effort (Davis, 1989). Previous research has shown that perceived ease of use has a positive effect on behavioral intention to use (Davis, 1989; Gefen and Straub, 1997; Gefen *et al*., 2000; Venkatesh, 2000; Venkatesh and Davis, 2000; Gefen, 2003; Lee *et al*., 2005, 2009; Van Raaij and Schepers, 2008). In the context of e-learning, PEOU is defined as the degree to which students believe that using e-learning will be free of effort and easy to use which means that PEOU will influence their intention to accept and adopt the e-learning system. PEOU will also have a similar effect on students' intention to directly or indirectly through PU accept the e-learning system. This study therefore proposes the following hypotheses:

- H_8: Perceived ease of use has a positive influence towards behavioral intention to use
- H_9: Perceived ease of use has a positive influence towards perceived usefulness of an e-learning system

MATERIALS AND METHODS

Instrument construction: A questionnaire instrument consisting of scale items were developed based on existing literature and past studies on technology acceptance was developed for this study. The following shows the content of the questionnaire as demographic information. This section covered gender, age, internet access, residency, academic standing student type and experience with e-learning. Perception towards e-learning covered the six variables of the study; computer self-efficacy, system functionality, teaching materials, perceived usefulness perceived ease of use and intention to use e-learning. Participants were requested to indicate their perception towards e-learning. The variables were measured using the 7-point Likert scale, ranging from 1 which means strongly disagree to 7 which means strongly agree.

Data collection: Survey was conducted in a university in Thailand from September to December, 2010. Three faculty members were trained to administer the questionnaire to 229 undergraduate students who had at least attended one e-learning class and were from the five disciplines offered in the business administration; business economics, finance, information system, international business and marketing. Of the 229 questionnaires delivered, 207 were returned for a response rate of 90%. The classes selected for the study was an integration of traditional face-to-face learning methods and e-learning methods. Traditional face-to-face communication includes required attendance, textbook, lecture notes, quizzes, presentations, examinations and the presence of a teacher in the classroom. The e-learning method includes online lecture notes, online announcements, online assignments, student-instructor online communication and online discussions. A summary of the demographic profile of the participants is shown in Table 1.

Table 1: Demographic profile of respondents

Items	Frequency	Percent
Gender		
Male	85	41
Female	122	59
Age		
18-20	58	28
210-23	138	67
23+	11	5
Internet access		
Dial-up	5	2
High speed	199	96
Other	9	2
Type of students		
Full-time	204	99
Exchange	3	1
Visiting	0	0
Years in college		
1st	1	0
2nd	12	6
3rd	111	54
4th	73	35
Other	10	5
Experience (months)		
0-1	28	13
2-3	37	18
4-6	37	18
7-10	23	11
10+	82	40

Data analysis: Psychometric and model testing were examined using the AMOS framework, a widely used Structural Equation Modeling (SEM) technique in the field of technology acceptance. According to Gerbing and Anderson (1988), SEM allows for the answer of interrelated questions using a single, systematic and comprehensive analysis. This can be achieved by modeling the relationships among independent and multiple dependent constructs at the same time. The ability to simultaneously analyze constructs is where SEM differs and surpasses first generation regression models such as linear regression, LOGIT, ANOVA and MANOVA. First generation regression models can only analyze one layer of linkages between independent and dependent variables at a given time (Gefen *et al*., 2000).

RESULTS AND DISCUSSION

The two-step analytical procedure, Measurement and Structural model is examined in this study. The rationale is to ensure that conclusions on structural relationships can be drawn from measurement instruments that provide desirable psychometric properties (Lee *et al*., 2005).

The measurement model

Convergent validity: Convergent validity is used to indicate the level of correlation for the items of a scale. A Composite Reliability (CR) of ≥0.70 and Average Variance Extracted (AVE) of ≥0.50 are considered acceptable (Lee *et al*., 2005). A summary of factor loadings, CR, AVE and Cronbach's α of the measures of the research model are shown in Table 2.

The measures fulfilled the recommended levels for CR with values ranging from 0.81-1.00. The AVE extracted ranges from 0.38-0.61 with four out of the six measures meeting the recommended levels. Cronbach's α was used to test the internal consistencies amongst items of the same construct (Lee *et al*., 2009). Cuieford (1965) suggested that if Cronbach's α is >0.70, it indicates high reliability while Cronbach's α that is <0.35, it suggests unacceptable reliability. Fair and acceptable Cronbach's α is between 0.35 and 0.70. The Cronbach's α of the constructs in this study range from 0.634-0.874 suggesting acceptable reliability.

Discriminant validity: Discriminant validity is used to measure the extent to which the measure does not reflect some other variables (Lee *et al*., 2005). To achieve discriminant validity, the square root of the AVE of each construct should exceed the correlation shared between the constructs in the model (Van Raaij and Schepers, 2008). As shown in Table 3, the square root of the AVE (on the diagonal) for all the constructs (except between TM and PU and between CSE and PEOU) are greater than the correlations between the constructs and all other constructs. This suggests an acceptable discriminant validity of the measurements.

The structural model: The maximum likelihood method was used as an estimate for the model. Fit statistics, overall explanatory power, estimated path coefficients (significant paths are indicated with asterisks) are shown in Fig. 4. According to the fit statistics, the research model provides a good fit to the data: $\chi^2_{218} = 372$, $p = 0.00$; CFI = 0.92; RMSEA = 0.06.

The χ^2 is significant and fits the range as suggested by Browne and Cudeck (1993). The recommended value for CFI is ≥0.90 (Hair *et al*., 1995) while for RMSEA any value ≤0.60 should be eliminated (Hu and Bentler, 1999). The observed values in this study for CFI = 0.92 and for RMSEA = 0.60 are within the accepted range. In addition, the model accounts for 68% of the variance in PU, 67% of the variance in PEOU and 47% of the variance in ITU. The findings indicate that six out of the nine hypotheses posit a positive relationship. CSE posits a positive effect on PEOU ($\beta = 0.56$, $p<0.01$); SF posits a positive effect on PEOU ($\beta = 0.51$, $p<0.01$); TM posits a positive effect on PU ($\beta = 0.77$, $p<0.01$); TM posits a positive effect on PEOU ($\beta = 0.25$, $p<0.05$); PU posits a positive effect on

Table 2: Factor analysis and reliability

		Independent varibles						Belief variables				Dependent variables	
		CSE		SF		TM		PU		PEOU		ITU	
Category factors													
Items	Factor loading	CSE1	0.677	SF1	0.751	TM1	0.482	PU1	0.742	PEOU1	0.567	ITU1	0.574
		CSE2	0.549	SF2	0.465	TM2	0.666	PU2	0.758	PEOU2	0.702	ITU2	0.806
		CSE3	0.767	SF3	0.790	TM3	0.694	PU3	0.796	PEOU3	0.795	ITU3	0.822
		CSE4	0.455	SF4	0.758			PU4	0.838	PEOU4	0.845	ITU4	0.672
CR		0.970		0.810		0.990		0.990		1.000		0.990	
AVE		0.377		0.500		0.380		0.610		0.530		0.520	
Cronbach's α		0.634		0.670		0.632		0.874		0.826		0.790	

Table 3: Correlation matrix of the constructs

	CSE	SF	TM	PU	PEOU	ITU
CSE	0.61					
SF	0.52	0.71				
TM	0.37	0.63	0.62			
PU	0.32	0.60	0.78	0.78		
PEOU	0.73	0.64	0.28	0.42	0.73	
ITU	0.37	0.42	0.60	0.67	0.33	0.72

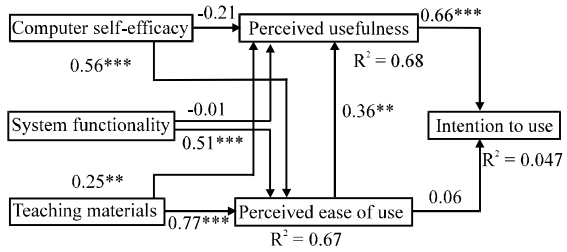

Fig. 4: Test of research model fit (χ^2_{218} = 372; p = 0.00; AGFI = 0.092; RMSEA = 0.06; **p<0.05; ***p<0.01

ITU (β = 0.66, p<0.01) and PEOU posits a positive effect on PU (β = 0.36, p<0.05). The result supported hypothesis 2-7 and 9, respectively. A summary of the results of the hypothesis test is shown in Table 4.

The motivation of this study was to develop a TAM model that integrates external variables that can be used as key determinants of the acceptance of e-learning and to investigate the relationship effects of these determinants on the acceptance of e-learning. CSE posits a positive effect on PEOU; SF posits a positive effect on PEOU; TM posits a positive effect on PU; TM posits a positive effect on PEOU; PU posits a positive effect on ITU and PEOU posits a positive effect on PU. The result supported hypothesis 2-7 and 9, respectively.

Surprisingly, CSE did not posit a significant impact on PEOU, SF did not posit a significant impact on PEOU and PEOU did not posit a significant impact on ITU. Acceptable convergent and discriminant validity in regards to the measurements of the constructs in the model were confirmed. According to the fit statistics the research model provides a good fit to the data. It is not surprising to see that PU surfaces as a positive predictor

Table 4: Summary of hypothesis tests

Hypothesis	Support
H_1: CSE → PU	No
H_2: CSE → PEOU	Yes
H_3: SF → PU	No
H_4: SF → PEOU	Yes
H_5: TM → PU	Yes
H_6: TM → PEOU	Yes
H_7: PU → ITU	Yes
H_8: PEOU → ITU	No
H_9: PEOU → PU	Yes

while PEOU does not (the nature of the system may explain why) (Agarwal and Prasad, 1997). Since, the study materials are part of the course, students are required to download them at least once a week ton keep up with the teaching schedule. Therefore, they are willing to learn to use the system and overcome all the usability obstacles in order to get better study results. Thus, they are triggered more by the PU than the PEOU. The findings of the study show that students are satisfied with the teaching materials provided through e-learning. Educators should continue to develop relevant materials, notes and online handouts and encourage students to see the benefits of using this medium as a channel for knowledge acquisition.

The materials should be up-to-date as a means of providing incentives for continued usage. Developers and designers of e-learning systems and educators should also look into understanding why students do not find the system to be useful if they believe that the system functionalities do not meet their needs. Improvements to the system could be made such as increasing its productivity and creating a useful system interface. Educators should interact with students and investigate how the functions of the system could be improved. This study is one a few if not the only one that has attempted to understand the level and acceptance of e-learning of students in Thailand.

CONCLUSION

Interaction in the form of online chat rooms or discussion boards (virtual community) between the students and the instructor should be encouraged, since

the present system is mainly used for downloading learning materials. This will help build a sense of community for the students as they will be able to collaborate their work with other students. The demographics in this study shows that majority of the students (40%) have >10 months experience in using e-learning. However, this number still needs improvement. This can be done by educating students on the benefits of using the system and how it can improve and enhance their educational value.

LIMITATIONS

Although, the methodology was carefully and meticulously designed, this study like many other studies has limitations. The first limitation of this study is that it was conducted in only one developing country, Thailand.

The technology environment and e-learning penetration may be very different from those of developing countries, thus making the model to general to be applied for a different context. A better understanding of the technology environment and e-learning penetration could be obtained by conducting similar studies across different developing countries. In order to do that the model should be refined and customized for the setting of that particular country. The second major limitation is the use of convenience sampling. A replication of this study could therefore be conducted whereby a more systematic, probability-based sampling method is used. The third limitation of this study is that data was gathered at a single point in time and not longitudinal which means that causality can only be inferred.

ACKNOWLEDGEMENT

This study was supported by the Mahidol University International College (MUIC) seed grant.

REFERENCES

Agarwal, R. and J. Prasad, 1997. The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. Decis. Sci., 28: 557-582.

Bandura, A., 1997. Self-Efficacy: The Exercise of Control. Freeman Press, New York, ISBN: 9780716726265, Pages: 604.

Bates, A.W., 2000. Managing Technology Change: Strategies for College and University Leaders. Jossey-Bass Publishers, San Francisco, Pages: 235.

Bouhnik, D. and T. Marcus, 2006. Interaction in distance-learning courses. J. Am. Soc. Inf. Sci. Technol., 57: 299-305.

Browne, M.W. and R. Cudeck, 1993. Alternate Ways of Assessing Model Fit. In: Testing Structural Models, Bollen, K.A. and J.S. Long (Eds.). Sage Publications, Newbury Park, CA., pp: 136-162.

Capper, J., 2001. E-learning growth and promise for the developing world. TechKnowLogia, May/June. http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/main.asp?IssueNumber=11&FileType=HTML&ArticleID=266.

Compeau, D.R. and C.A. Higgins, 1995. Computer self-efficacy: Development of a measure and initial test. Manage. Inform. Syst. Q., 19: 189-211.

Cuieford, J.P., 1965. Fundamental Statistics in Psychology and Education. 4th Edn., McGraw-Hill, New York.

Davis, F.D., R.P. Bagozzi and P.R. Warshaw, 1989. User acceptance of computer technology: A comparison of two theoretical models. Manage. Sci., 35: 982-1003.

Davis, F.D., 1989. Perceived usefulness, perceived ease of use and user acceptance of information technology. Manage. Inform. Syst. Q., 13: 319-340.

Davis, F.D., R.P. Bagozzi and P.R. Warshaw, 1992. Extrinsic and intrinsic motivation to use computers in the workplace. J. Applied Social Psychol., 22: 1111-1132.

Fishbein, M. and I. Ajzen, 1975. Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Addison-Wesley Publishers Company, London, ISBN: 9780201020892, Pages: 578.

Gefen, D. and D.W. Straub, 1997. Gender difference in the perception and use of e-mail: An extension to the technology acceptance model. Manage. Inform. Syst. Q., 21: 389-400.

Gefen, D., 2003. TAM or just plain habit: A look at experienced online shoppers. J. Organiz. End User Comput., 15: 1-13.

Gefen, D., D. Straub and M. Boudreau, 2000. Structural equation modeling and regression: Guidelines for research practice. Commun. Assoc. Inform. Syst., 7: 1-78.

Gerbing, D.W. and J.C. Anderson, 1988. An updated paradigm for scale development incorporating unidimensionality and its assessment. J. Market. Res., 25: 186-192.

Hair, J.F., R.E. Anderson, R.L. Tatham and W.C. Black, 1995. Multivariate Data Analysis with Readings. 4th Edn., Prentice-Hall Inc., Upper Saddle River, New Jersey, USA., ISBN: 0-02-349020-9.

Hsu, C.L. and H.P. Lu, 2004. Why do people play on-line games? An extended TAM with social influences and flow experience. Inform. Manage., 41: 853-868.

Hu, L.T. and P.M. Bentler, 1999. Cutoff criteria for fit indexes in covariance structural analysis: Conventional criteria versus new alternatives. Struct. Equation Model., 6: 1-55.

Kelly, T.M. and D.A. Bauer, 2004. Managing Intellectual Capital-Via E-Learning at Cisco. In: Handbook on Knowledge Management: Knowledge Matters, Holsapple, C.W. (Ed.). Springer, Berlin, Germany, pp: 511-532.

King, W.R. and J. He, 2006. A meta-analysis of the technology acceptance model. Inform. Manage., 43: 740-755.

Lederer, A.L., D.J. Maupin, M.P. Sena and Y. Zhuang, 2000. The technology acceptance model and the world wide web. Decision Support Syst., 29: 269-282.

Lee, B.C., J.O. Yoon and I. Lee, 2009. Learners acceptance of e-learning in South Korea: Theories and results. Comput. Educ., 53: 1320-1329.

Lee, J.K. and C.Y. Hwang, 2007. The effects of computer self-efficacy and learning management system quality on e-Learner's satisfaction. Proceedings of the 2007 European LAMS Conference: Designing the Future of Learning, July 5, 2007, LAMS Foundation, Greenwich, pp: 73-79.

Lee, M.K.O., C.M.K. Cheung and Z. Chen, 2005. Acceptance of internet-based learning medium: The role of extrinsic and intrinsic motivation. Inform. Manage., 43: 1095-1104.

Lee, Y.C., 2006. An empirical investigation into factors influencing the adoption of an e-learning system. Online Inform. Rev., 30: 517-541.

Liaw, S.S., 2008. Investigating students perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the blackboard system. Comput. Educ., 51: 864-873.

Pituch, K.A. and Y.K. Lee, 2006. The influence of system characteristics on e-learning use. Comput. Educ., 47: 222-244.

Puangthong, D. and S. Malisawan, 2005. A study of behavioral intention for 3G mobile internet technology: Preliminary research on mobile learning. Proceedings of the 2nd International Conference on eLearning for Knowledge-Based Society, Aug. 4-7, Bangkok,Thailand, pp: 1-7.

Saade, R.G. and D. Kira, 2009. Computer anxiety in e-learning: The effect of computer self-efficacy. J. Inform. Technol. Educ., 8: 177-191.

Simmering, M.J., C. Posey, and G. Piccoli, 2009. Computer self-efficacy and motivation to learn in a self-directed online course. J. Innovative Educ., 7: 99-121.

Siritongthaworn, S. and D. Krairit, 2006. Satisfaction in e-learning: The context of supplementary instruction. Campus-Wide Inform. Syst., 23: 76-91.

Van Raaij, E.M. and J.J.L. Schepers, 2008. The acceptance and use of a virtual learning environment in China. Comput. Educ., 50: 838-852.

Venkatesh, V. and F.D. Davis, 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. Manage. Sci., 46: 186-204.

Venkatesh, V., 2000. Determinants of perceived ease of use: Integrating control, intrinsic motivation and emotion into the technology acceptance model. Inform. Syst. Res., 11: 342-365.