A Model for the Uptake and Continued Use of E-learning in Thai Higher Education

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Abstract: In order to achieve long-term sustainability of E-learning projects in Thai Higher Education, the purpose of this research is to investigate the factors that affect a Thai student's decision to take up and continue using E-learning. To this end, a mathematical model has been constructed to explain the uptake and continued use of E-learning in Thai universities. At this stage, through review of related theories and literatures, a model was constructed by applying three grounded theories; these are: Unified Theory of Acceptance and Use of Technology (UTAUT), Keller's ARCS model, and Expectancy Disconfirm Theory (EDT). As the learning preference factor was included in the model and past literature confirmed that the difference in a student's learning preference between Thailand and each other country is caused by culture, Thai national culture will also be considered in this research.

Key words: E-learning, uptake, continued use, Thai national culture influenced learning preference

1. Introduction

Despite the high investment from the government of Thailand and university commitment, researchers have found a low uptake of E-learning amongst students, and those who do start to use the system opted out later (S. Boondao, Komlayut, & Punnakan, 2009). In order to achieve long-term sustainability of E-learning projects, the main purpose of this research is to construct a model of effective uptake and continued use of E-learning in Thai Higher Education. To realise this, three research questions have to be answered. They are as follows:

1. What factors affect the uptake and continued use of E-learning?
2. What is the model of uptake and continued use of E-learning?
3. How can the model be applied to Thai Higher Education Institutions?

2. The factors influencing the uptake of E-learning

Upon reviewing the literature on students' uptake of E-learning, almost all researchers unanimously view E-learning as an application of technology. That rationale led researchers to ground their research in the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Šumak, Heric̆ko, & Pušnik, 2011). As TAM highlights the importance of a user's attitude towards the system but lack of emphasis on social and resource factors, it seems to be better to adopt UTAUT as the theoretical framework for this investigation (Bourgonjon, Valcke, Soetaert, & Schellens, 2010).

2.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was constructed by Venkatesh and colleagues (2003). This group of researchers asserted that there are four factors which influence a user's decision to take up a new information system, including performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). PE, EE and SI significantly influence the intention towards the uptake of a system; while FC is a direct antecedent of uptake. Interestingly, the researchers also explored that the influence of all four elements on user's uptake can be moderated by individual's background. See Figure 1.

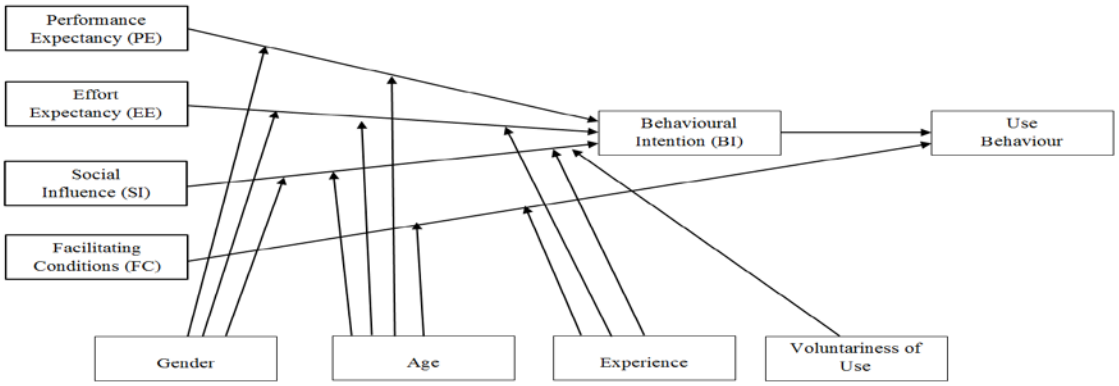

Figure 1: UTAUT model (Venkatesh, 2011)

2.2 Application of UTAUT in this investigation

Similar to UTAUT, behaviour intention (BI) will be included in the research model to capture a student's motivational level in order to predict his/her E-learning uptake. This idea is supported by Theory of Reasoned Action and many researches in this field; their findings confirmed that students will take up the system if they have high levels of intention (Maldonado et al., 2011; Park, 2009). While the UTAUT asserts that FC directly impact uptake, Theory of Planned Behaviour and related researches describe FC as having an indirect impact on uptake through BI (Ndubisi, 2004; Shih, 2008). In total, the proposed model will have the four key factors that influence student's intention to uptake E-learning, including PE, EE, SI, and FC. PE is defined as the degree to which an individual student believes in the ability of an E-learning system to support them in learning and teaching activities to achieve their intended learning outcome. EE is the degree to which an individual believes that the use of that system does not require an increase in effort. SI is the degree to which the influence of normative expectations of reference on student's motivation towards the uptake of E-learning. Finally, the degree to which an individual student believes that personal or organisational IT resource serves to support the use of a new system is the definition of FC. However, the moderating effect of an individual's background upon the influence of the four factors on student's intention will not be studied in this research. A model is a simplified view of a complex domain. To begin, our model focused on major variables. Additionally, there is low supported evidence that individual's background factors are the major variable of E-learning uptake (Ong & Lai, 2006).

2.3 Learning motivation factors on the uptake of E-learning

The factors from UTAUT model seem to be sufficient enough to explain the uptake of E-learning. However, these factors only emphasize on "technological motivation". "E-learning" has two aspects to its definition, 'learning' and 'E' (referred to technology); the former is overlooked by almost all researchers in the field, thus any existing model could not fully explain or predict the uptake of E-learning (Chen, 2011). This research will fill in the gap left by other researchers by adding "learning motivation" to the model. To find learning motivation factors, the ARCS model will be adopted in this investigation for two main reasons: 1) The model simplifies complicated human motivation theories in a learning and education context (Keller, 1999, 2008); 2) ARCS was widely validated and confirmed to have made instructional material motivationally more appealing (Winiecki, Fenner, & Yonnie Chyung, 1999).

2.4 Keller's ARCS model and the application of Keller's ARCS model in this investigation

The ARCS model asserts that four major factors influence a student's learning motivation, it includes 'attention' (A), 'relevance' (R), 'confidence' (C) and 'satisfaction' (S) (Keller, 1999). Two ARCS factors will be not included in the proposed model. According to Keller (2000), attention can be promoted by arousing the learner's curiosity in what is being taught at the beginning of the course. However, this research aims to increase E-learning uptake in general and assuming that students have never learned by using such systems before; thus their attention and curiosity about a particular course is not relevant. Therefore, attention will not be integrated in our uptake model. Similarly, learning satisfaction is not included as uptake factor. Learning satisfaction occurs when a learner achieves their desired outcome from a course (Keller, 2008). At initial stage (t_0), before a student takes up E-learning, their satisfaction with provided course in E-learning has not manifested at this stage. The use of remaining two ARCS factors (learning relevance and confidence) in this investigation is called 'learning preference', which is defined as the degree that an individual believes that instructional environment in E-learning (which includes the ILO, content, teaching and learning activities) is relevant to their goals, learning styles and has confidence in their past experiences about what being learn.

3. Factors influencing the continued use of E-learning

As mentioned before, a high opt-out rate with E-learning is also found in Thailand. Increasing motivation towards taking up E-learning will partially solve the problem; the study into how to attract students to continue using the system is the other half of the problem that must be addressed simultaneously.

In the continued use of E-learning research area, almost all the researchers utilise the Expectancy Disconfirms Theory (EDT), followed by Expectation Confirm Model (ECM) as grounded theory (Roca, Chiu, & Martı´nez, 2006). ECM emphasises the post-acceptance variables only (Bhattacherjee, 2001), whereas the main purpose of this research is to study both E-learning pre-acceptance (uptake) and post-acceptance (continued use) factors and also how post-acceptance factors relates to pre-acceptance in order to construct a model of E-learning uptake and use. Thus EDT seems more appropriate than ECM for this investigation. EDT asserts that repurchase intention is primary influenced by a customer's satisfaction with prior use of the product (Oliver, 1980). The principle seems to be consistent with Thorndike's law of effect, organisms are likely to continue exhibiting certain behaviours if the consequence of this behaviour satisfies them, (Thorndike, 1998). Furthermore, the consensus among researchers in continued use of E-learning research area is that satisfaction with the E-learning system is a key influential factor that leads the E-learner to continue using the system (Roca, Chiu & Martínez, 2006). It makes for a sound argument to use satisfaction as a key factor that influences a student's intention to continue using E-learning in this investigation. In addition, Oliver (1981) claims customer satisfaction with the product is directly influenced by confirmation of their level of expectancy; discrepancy between perceived product performance and the initial expectation. This principle is supported by many researchers in this field; they assert that E-Learners will be satisfied with the E-learning system if the actual outcome is better than their initial expectation (Chiu et al., 2005; Roca et al., 2006).

Thus, there are four factors that seem to influence a student's intention to continued use of E-learning, including satisfaction with E-learning, expectancy confirmation, perceived performance and E-learning expectation. See Figure 2

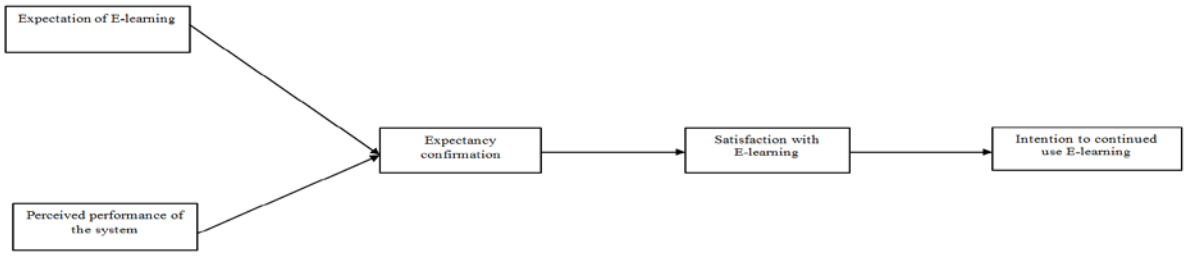

Figure 2: Factors influencing the continued use of E-learning

4. A model of E-learning uptake and continued use

By applying selected grounded theories such as the UTAUT model, Keller's ARCS model and EDT, a model for E-learning uptake and continued use was constructed. See Figure 3.

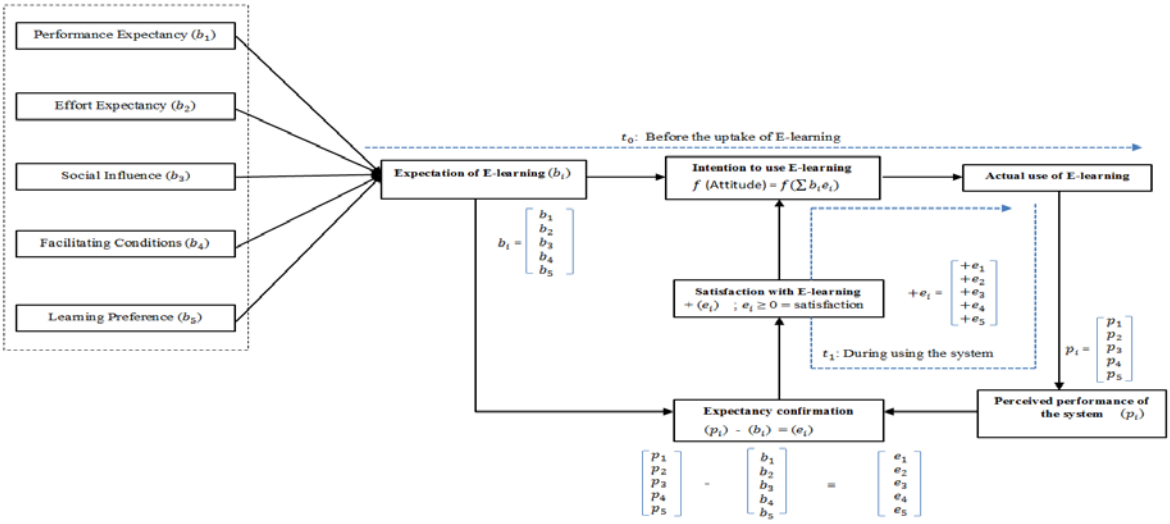

Figure 3: NLG's model of E-learning uptake and continued use of E-learning

As can be seen from Figure 3, before a student takes up E-learning (represented by the expression t_0), an initial expectation of E-learning is created (Oliver, 1980). According to the UTAUT model and Keller's ARCS model, an E-learner has five potential expectations (belief) toward E-learning; including performance expectancy (b_1), effort expectancy (b_2), social influence (b_3), facilitating condition (b_4) and learning preference (b_5). Thus, the expectation of E-learning construct (represented by the expression b_i) would be added into the model to capture levels of belief for each expectation (uptake) factor and can be expressed as:

$$b_i = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \end{bmatrix} \begin{bmatrix} \text{performance expectancy} \\ \text{effort expectancy} \\ \text{social influence} \\ \text{facilitating condition} \\ \text{learning preference} \end{bmatrix} \quad (1)$$

To explain the uptake of E-learning, as in (t_0) the E-learner has never used the system before, they do not perceive the performance of the system and the evaluation of outcome (e_i) does not occur at t_0. Thus, the intention is directly influenced by beliefs (the uptake factors in this research) and the E-learner will decide to take it up if their expectation is high; sum of beliefs is positive (Oliver, 1980).

$$\text{Intention to use at } t_0 = f\left(\sum b_i\right) = b_1 + b_2 + b_3 + b_4 + b_5 \quad (2)$$

During an initial consumption period (represented by the expression t_1), perceptions of the system performance will be formed, captured by the perceived performance of system factor (the expression p_i) in this model. Oliver (1981) asserted that initial expectation is formed for creating reference level that the customer uses to make a comparison with perceived product performance to determine their level of confirmation. Thus, in perceived performance of system factor, there are five sub-factors basing on each expectation factor and each of these can be measured independently from each other, which can be expressed as:

$$p_i = \begin{bmatrix} p_1 \\ p_2 \\ p_3 \\ p_4 \\ p_5 \end{bmatrix} \begin{bmatrix} \text{Perceived performance of } b_1 \\ \text{Perceived performance of } b_2 \\ \text{Perceived performance of } b_3 \\ \text{Perceived performance of } b_4 \\ \text{Perceived performance of } b_5 \end{bmatrix} \quad (3)$$

Then, the E-learner will compare his/her perceived performance with their initial expectation to determine the level of expectancy confirmation (the evaluation of outcome, or e_i). Therefore, the expectancy confirmation is expressed as follows:

$$\begin{bmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \\ e_5 \end{bmatrix} = \begin{bmatrix} p_1 \\ p_2 \\ p_3 \\ p_4 \\ p_5 \end{bmatrix} - \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \end{bmatrix} \quad (4)$$

An E-learner's satisfaction with E-learning is a function of expectancy confirmation; E-learners will be satisfied with the system if each actual performance is better than each anticipated performance. This can be expressed as:

$$\text{Satisfaction with E-learning} \equiv \text{positive expectancy confirmation} \equiv + e_i = \begin{bmatrix} +e_1 \\ +e_2 \\ +e_3 \\ +e_4 \\ +e_5 \end{bmatrix} \quad (5)$$

Fishbein and Ajzen (1975) assert that the most immediate precursor of intention towards specific behaviour is attitude, which is the function of personal belief and evaluation of outcome. Therefore, the general equation is:

$$\text{Intention to use} = f\ (\text{Attitude}) = f(\sum b_i e_i) \quad (6)$$

By putting (5) into (6) and assuming that a student who takes up E-learning will have a positive belief toward E-learning, thus:

$$\text{Intention to use } t_1 = f\ (+\text{Attitude}) = f(\sum(+b_i)(+e_i)) \quad = e_1 b_1 + e_2 b_2 + e_3 b_3 + e_4 b_4 + b_5 \quad (7)$$

As can be seen from equation (7), satisfaction $(+e_i)$ is a key factor for supporting E-learner to continue using the system; if E-learner does satisfy with the system $(-e_i)$, they will have nagative attitude towards system which lead them to dropt out from the system.

The use of mathematical equations helps to describe the model and understand how the model works. The mathematical description also allows predictions of uptake and use of E-learning in a given context. In the next section, the application of this model into Thai Higher Education will be explained

5. How the model can be applied to Thai Higher Education Institutions

As every proposed factor has been widely validated in both eastern and western countries, and has been accepted by many researchers of their influence on uptake and continued use of E-learning; the model should also be applicable to solving the problem of E-learning uptake in Thailand as well. However, one factor that may differ between Thailand and other countries is learning preference, which include learner's goal and style (Raktham, 2008; Tetiwat & Huff, 2003; Thongprasert & Burn, 2003). Additionally, past literature confirmed that the main cause for difference in learning preference between each country is culture (Boondao, Hurst, & Sheard, 2009). Therefore, Thai national culture will also be considered in this research to truly understand Thai student's learning preference.

In Thai education where teachers `know best', teachers are authoritative figures who commands high respect, and typically considered extremely knowledgeable (Raktham, 2008). As Thai national culture has high uncertainty avoidance (fear of failure), and the Thai's strict belief that teachers can help them achieve their intended learning outcome or goal; it is not surprising that Thai students relies heavily on structured lecture where experienced teachers reside over teaching process; preferring Reflective Observation regardless of other teaching methods (Raktham, 2008; Tetiwat & Huff, 2003). Furthermore, Thai culture are collectivist by nature, the national characteristics of Thais are interdependent and has tight social networks (Raktham, 2008). Their way of life is reflected in the classroom, where students normally give reciprocal and moral support to one another (in Thai called "Kam lang jai") during their times of need (Burn & Thongprasert, 2005; Komin, 1991). The evidence left no doubt that the highly collectivist nature of Thai culture shapes Thai student into a social learner; group learning and peer co-operation, are preferred ways of learning (Raktham, 2008; Thongprasert & Burn, 2003). Furthermore, Teowkul et al. (2009) who conducted research studying Thai students' educational value stated that students in Thailand seem to be exam-directed.

Thus, Thai students will uptake E-learning if the content can support them to achieve good grades and has functions that suits the way they learn; online lectures and synchronized learning system. However, only focusing on learning motivation is not enough. As E-learning is a piece of technology; students will not uptake this technology if they do not accept it. Technology motivation is also important and need to be considered (Davis, 1980). The literature review found four factors; 1) PE: E-learning have to support Thai student to achieve ILO with ways compatible with their learning style 2) EE: the system design suits the student's level of IT experience 3) SI: student will uptake the system if their significant others (e.g. parent, teacher and peers) recommend usage 4) FC: availability of necessary IT resource also cannot be looked over. By achieving the mentioned condition, Thai students will not only take up E-learning, they will also continue to use the system perpetually. This is because Expectancy Disconfirms Theory asserts that people will continue using the service if their expectations are achieved

6. Future work

In this paper three research questions have been answered through a desk-based study; the proposed model and the application of the model was constructed through review of related theories and literature. In order to complete the answer to these research questions, future work will focus on another validation triangulation of the model; including investigator and methodological triangulation.

7. Reference

Boondao, S., Komlayut, S., & Punnakan, W. (2009). *Factors in E-Learning in Universities in Thailand*. Paper presented at the International Conference on IT to Celebrate S. Charmonman's 72nd Birthday, Bankok, Thailand.

Bourgonjon, J., Valcke, M., Soetaert, R., & Schellens, T. (2010). Students' perceptions about the use of video games in the classroom. *Computers & Education, 54*.

Chen, J.-L. (2011). The effects of education compatibility and technological expectancy on e-learning acceptance. *Computers & Education, 57*(2), 1501–1511.

Chiu, C.-M., Hsu, M.-H., Sun, S.-Y., Lin, T.-C., & Sun, P.-C. (2005). Usability, quality, value and e-learning continuance decisions. *Computers & Education, 45*(4), 399-416.

Davis, F. D. (1980). *A Technology Acceptance Model For Empirically Testing New End-User Information System: Theory and Results*. Ph.D., Massachusetts Institute of Technology.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: an introduction to theory and research*: Addison-Wesley.

Keller, J. M. (1999). Motivation in Cyber Learning Environments. *International Journal of Educational Technology, 1*(1), 7-30.

Keller, J. M. (2008). First principles of motivation to learn and e3-learning. *Distance Education, 29*(2), 175-185.

Maldonado, U. P. T., Khan, G. F., Moon, J., & Rho, J. J. (2011). E-learning motivation and educational portal acceptance in developing countries. *Online Information Review, 35*(1), 66-85.

Ndubisi, N. O. (2004). *Factors influencing e-learning adoption intention: Examining the determinant structure of the decomposed theory of planned behaviour constructs*. Paper presented at the HERDSA 2004 Conference, Sarawak.

Oliver, R. L. (1980). A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research, 17*(4), 460-469.

Oliver, R. L. (1981). Measurement and evaluation of satisfaction processes in retail settings. *Journal of Retailing, 57*(3), 25-48.

Ong, C.-S., & Lai, J.-Y. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior, 22*, 816-829.

Raktham, C. (2008). *Cultures and Learner Behaviours: A Qualitative Investigation of a Thai Classroom*. Doctor of Education, University of Warwick.

Roca, J. C., Chiu, C.-M., & Martı´nez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*, 683-696.

Šumak, B., Hericˇko, M., & Pušnik, M. (2011). A meta-analysis of e-learning technology acceptance: The role of user types and e-learning technology types. *Computers in Human Behavior, 27*, 2067-2077.

Teowkul, K., Seributra, N. J., Sangkaworn, C., Jivasantikarn, C., Denvilai, S., & Mujtaba, B. G. (2009). Motivational Factors of Graduate Thai Students Pursuing Master and Doctoral Degrees in Business. *RU international Journal 3*(1), 25-56.

Tetiwat, O., & Huff, S. L. (2003). Factors influencing the acceptance of web-based online education for Thai educators: impact of Thai culture and values. In T. Thanasankit (Ed.), E-commerce and cultural values Hershey: IGI Publishing

Thorndike, E. L. (1998). Animal intelligence: An experimental study of the associate processes in animals. *American Psychologist, 53*(10), 1125-1127.

Thongprasert, N., & Burn, J. (2003). *Identifying Strategies For Effective Virtual Education Delivery In Thailand*. Paper presented at the 7th Pacific Asia Conference on Information Systems, Adelaide, South Australia.

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. (2011). Construct Definitions Retrieved 30th July 2012, from http://www.vvenkatesh.com/IT/organizations/Theoretical_Models.asp