ONLINE EDUCATION ADOPTION IN THAILAND: PILOT STUDY USING DTPB

Bussagorn Leejoeiwara & Thanawan Phongsatha
Assumption University of Thailand
khunbuss@gmail.com

ABSTRACT

Online education has become strategic means for internationalization to educational institutions worldwide. Attributable to the forces of globalization and Information and Communication Technology, the technological innovations such as Internet, mobility, and social media tools have facilitated student-centered learning, enabling lifelong learning, and extending access to education more widely in the current borderless network, social computing paradigm. Online education is believed, has the power to transform the educational industry landscape globally. However, there is a lack of consumer's insight and empirical evidence with regards to the perception towards online education adoption especially in developing countries such as Thailand. This study aims to explore determinants of online education adoption based upon integrated model of Diffusion of Innovation and the Decomposed Theory of Planned Behavior. Quantitative research method is employed for data collection from a sample of 428 students in Thailand. Data was analyzed using Multiple Regression, and results are then discussed with implications.

Keywords: Online education, Diffusion of Innovation (DOI), Decomposed Theory of Planned Behavior (DTPB)

Introduction

Academicians and educational industry domain experts have discussed on the growth potentials of online education in several aspects. Online education offers shortest means for internationalization of the courses or the whole institutions, thus extending market reach (Tierney & Findlay, 2009; ICDE, 2009). It also extends educational access to more mass, enabling the development of human capital and competitiveness of the country's, organizations', as well as the individual's, therefore, facilitating the transformation from production-based to knowledge-based economy (Gunasekaran, McNeil, & Shaul, 2002; van de Wende, 2002; Carnoy, 2005; Bhattacharya & Sharma, 2007; Tierney & Findlay, 2009). Due to these advantages, many developing countries have leveraged distance online learning as means to respond to globalization. For the developed economies, online education becomes strategic solution to address problems of aging population and decreasing demand in domestic market enforcing internationalization of educational institutes to capture growing demand worldwide especially in the developing economies and lifelong learning requirements (van de Wende, 2002; Vrasida & Zembylas, 2003; Carnoy, 2005; Tino, 2008; Tierney & Findlay, 2009). This movement presents competitive threats to developing countries, since they are disadvantaged in terms of limited capacities to address growing demand, with high competition for students to entrance into public universities, reduced public funding, Information Communication Technology as well as the language of instruction, which English is preferred internationally (ICDE, 2009). On one hand, the developing economies may face risks of losing market share to foreign providers, threats to cultural values, languages, national traditions, control over educational systems and quality standards, as well as protection to local providers. On the other hands, consumers in these developing countries can benefit from more choices, improved quality, international experiences, and lower costs of education (Tiene, 2002; van de Wende, 2002; ICDE, 2009). Driven by globalization, economic motivation, access and availability of Information Communication Technology, along with higher competition, many new forms of distance online education services have been offered such as hybrid or fully online courses, mobile learning, personalized online learning, virtual classroom, educational games, and social software tools (van de Wende, 2002; Economist Intelligence, 2008; ICDE, 2009). The education industry is said to gradually

transform from highly regulated industry to be deregulated, liberalized industry as education has become tradable commodity with increasing competition as globalization process continues (Hiltz & Turoff, 2005). ICT-based higher education is believed to become the most significant driver of cross-border provision with virtual universities, e-learning, online education, therefore, increasing challenges and concerns for educational institutions and governments in terms of accreditation and quality standards, while also globalizing their educational accreditation systems (ICDE, 2009).

Number of distance online courses has been growing rapidly, along with growing number of students. According to eLearner.com, there are 203 accredited universities offering online courses with mostly US nationalities (www.elearners.com/colleges/colleges.asp, 2011). In Europe, efforts have been made to gain market share as it lags behind the US counterparts (Osborne & Oberski, 2004). Despite promising growth rate predicted, exact number of students enrolling in online degree programs world-wide has been unknown (Osborne & Oberski, 2004; Economist Intelligence, 2008; Henshaw, 2008; Sloan-C, 2010).

In Thailand, there have been initiatives announced by Ministry of Education to respond to the forces of globalization and internationalization of education industry, ASEAN Economic Community in 2015, as well as aiming to capture growing demand of education worldwide by focusing on reputable specializations in medical, nursing, tourism, service and hospitality, food, and agriculture (www.nationmultimedia.com). Online education was mentioned as one strategy for internationalization. However, several barriers that Thailand has to overcome are English language and overall quality standards of international programs (www.nationmultimedia.com).

The Thai government has been promoting the use of ICT in education system with several mega projects launched including SchoolNet, UniNet, and National Education Network to connect all educational institutes country-wide with linkages to partnering countries providing network infrastructure. Thai Cyber University was established to promote e-learning (www.thaicyberu.or.th). Though e-learning is not new and many have adopted e-learning in Thailand, but mostly as supplementary to traditional education. Among 79 public and 71 private higher education institutes, there are four universities announce availability of online education programs i.e. Assumption University of Thailand

(www.elearning.au.edu), University of Thai Chambers of Commerce (www.utcc.ac.th), Rangsit University (www.rsu-cyberu.com), and Ramkhamhang University (www.ru.ac.th, www.ramtangdaen.com). Assumption seems to lead the way to provide fully online courses with accredited post-graduate degree levels in greater number of disciplines with current student enrollments of 900 students (Personal Communication, College of Internet Distance Education, May 25, 2012).

Statement of the Problems

Based on the available information, the development of online education in Thailand and worldwide, therefore, can be considered at very early stage. Similar to any other new products and services, the risk of failure is costly. Product Development and Management Association (PDMA) concluded that that the number one reason for failure is lack of consumers' insight (Frost & Sullivan, 2011). Secondly, there is a lack of research in the area of e-Learning especially on the aspect of online education adoption in Thailand (Bhatiasevi, 2011; Teo, Wong, Thammetar, & Chattiwat, 2011). Therefore, this study aims to investigate factors contributing to consumers' intentions to adopt online education, thus providing both research contribution as well as managerial implications for institutions to compete in this global economy.

Research Questions

1. Which factor influence Thai students' intention to adopt online education?
2. What is the most influencing factor towards Thai students' intention to adopt online education?

Research Objectives

1. To measure whether Attitude, Subjective Norms, and Perceived Behavioral Control influences Thai students' intention to adopt online education
2. To determine the influence of the factors (Attitude, Subjective Norms, and Perceived Behavioral Control) influence Thai students' intention to adopt online education

3. To determine whether Attitude sub-constructs (Perceived Relative Advantage, Perceived Simplicity, and Perceived Compatibility) influences Thai students' intention to adopt online education
5. To determine whether Subjective Norms sub-constructs (Peers, Family, Superior, and Community) influences Thai students' intention to adopt online education
6. To determine whether Perceived Behavioral Control sub-constructs (Self-efficacy, Resource Facilitation, and Technology Facilitation) influences Thai students' intention to adopt online education

Significance of the Study

Practical Implications:Findings of the study will provide insight on factors influencing online education adoption decision and guidelines for educational institutes to further develop competitive capabilities in educational services. As a result, students can benefit from better online educational service.

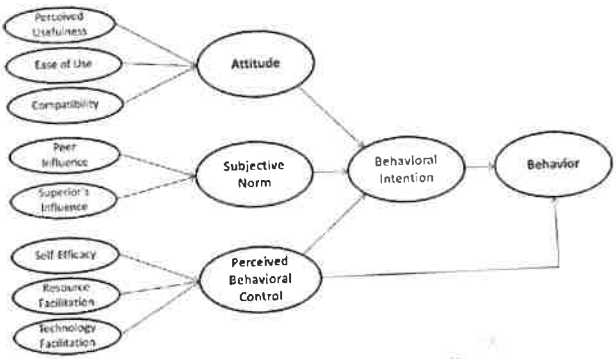
For research and academicians:The study adds on to the existing worldwide knowledge and research in the area of e-Learning and online education in the context of Thailand, which has been scarce. By applying the Decomposed Theory of Planned Behavior (DTPB) to test the technological innovation adoption in education, taking into account the social influences, and testing the model in consumer-oriented environment, the study also can fill the gap that TAM has been criticized as lacking. This is an important contribution since information system applications are mostly network-based or groupware applications and the social factors have been found to be key factor influencing consumers' decision. Therefore, the study contributes by validating the existing theories, and applying them in the current social and behavioral setting, in the context of Developing country such as Thailand at this particular period of time.

Literature Review

Several acceptance theories are employed to study the consumers' behavioral response toward the technology and innovations, and integration with the diffusion of innovation theory has been common and often recommended (Lu et al., 2003). Rogers (2003) refers to innovation as an idea, practice, or object that is perceived as new by the adopting unit.

Vishwanath and Goldhaber (2003) pointed out that this is broad since the unit of adoption ranges from individuals within a social system to groups and organizations. Consequently, beliefs or perceptions about the innovation varies according to what the particular innovation is, which makes the beliefs idiosyncratic to the innovation and the adopting unit, therefore, integrating DOI and acceptance theories in the research model is considered useful (Vishwanath & Goldhaber, 2003).

Key advantages and rationales for using the DTPB in the study of innovative online education adoption are: Firstly, DTPB not only allows for in-depth understanding of the antecedents, but also allows for determining specific factors that impact the adoption intention of the new technology by decomposing variables into sub-variables (Ajjan & Hartshorned, 2008; Taylor & Todd, 1995). Secondly, the DTPB adds value by proving higher explanatory power than the TPB as demonstrated in the study by Taylor & Todd (1995). Thirdly, the social influences construct or subjective norms construct, which is found to be significant factor influencing the adoption in the age of networked applications and social computing (Vannoy & Palvia, 2010) is also included in the DTPB model. Moreover, online education adoption behavior as being the context of this study is voluntary in nature, DTPB includes the perceived behavioral control construct to address this perspective, positing that people are motivated in performing certain behaviors if they perceive that they have a greater chance of success, which depends upon their self-efficacy, resources and technology facilitating conditions (Ajzen, 1991; Taylor & Todd, 1995). Fig. 1 presents the DTPB model.



Source: Taylor & Todd (1995)

FIGURE1: The Decomposed Theory of Planned Behavior (DTPB)

Research Framework

Originated from the Theory of Planned Behavior (TPB), the decomposed version of TPB or DTPB postulates that behavioral intention is an antecedent of behavior and that behavioral intention is a function of attitude, subjective norm, and perceived behavioral control. Fig. 2 presents the proposed conceptual framework for this study.

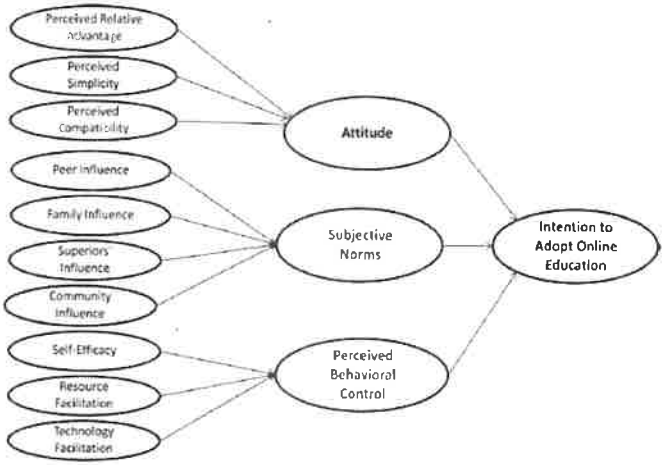


FIGURE 2: The Proposed Conceptual Framework

Attitude is defined as an individual's beliefs about the consequences of performing the behavior (behavioral beliefs), weighted by his or her evaluation of those consequences (outcome evaluations). An individual will intend to perform a certain behavior when he or she evaluates it positively, and vice versa (Ajzen & Fishbein, 1980). In this study, it implies that an individual's attitude toward online education will be related to intention to adopt online education. If an individual's beliefs about the consequences of studying online, weighted by his or her evaluation of the consequences of taking online education are positive, an individual will be more likely to adopt online education. In other words, attitude toward online education is an antecedent to adoption intention of online education.

As applicable to this context, attitude is decomposed into three perceived characteristics: Perceived Relative Advantage; Perceived Simplicity (reverse form of complexity); and the Perceived Compatibility, commonly found to be most influential in the decision to adopt an

innovation in general (Tornatzky & Klien, 1982 cited in Taylor & Todd, 1995), in computer information technology (Moore & Benbasat, 1991; Taylor & Todd, 1995), and particularly in educational sector (Jebeile & Reeve, 2003; Lu et al., 2005; Ajjan & Hartshorne, 2008; Jebeile & Abeysekera, 2010; Rath & Sekhar, 2010).

Perceived Relative Advantage refers to the degree to which an innovation is perceived as better than the idea it supersedes (Rogers, 2003). It reflects the consumer perceptions about the innovation's attributes to be superior or more valuable as compared to the existing alternatives (Flight, D'Souza & Allaway, 2011). Advantages can be both tangible and intangible. In other words, it can be economic or non-economic advantages (Rogers, 2003). Common relative advantages include cost savings or efficiency, lower costs of traveling expense, flexibility of time and places, 24 hours 7 days accessibility, ability to review course contents anytime, advancing student-centered learning, encouraging communication and interactivity among students and instructors, and supporting lifelong learning (Gunasekaran et al., 2002; Tiene, 2002; Bray, 2004; Osborne & Oberski, 2004; Hilts & Turoff, 2005; Bhattacharya & Sharma, 2007; Economist Intelligence, 2008; Henshaw, 2008; Flight et al., 2011).

Perceived Simplicity is a reversed form of "complexity", reflecting whether an individual perceives an innovation to be easy (not difficult) to understand and use (Rogers, 2003). In the innovation-decision making process, the potential adopters evaluate subjectively whether an innovation presents any risk due to complexity, which will lead to difficulties or failure to satisfy their needs and wants (Flight et al., 2011). Therefore, an innovation which is perceived to be simple (not difficult) to understand and use, requires minimum efforts to learn and understand, would lead to more positive evaluation and attitude formed in the potential adopter's decision process. Online education is highly dependent on ICT tools and therefore, it implies that technical attributes of online education may require prior familiarity with web-based technology or an effort to learn, thus affecting the adoption decision (Henshaw, 2008; Parsons, 2010).

Perceived Compatibility refers to the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters (Rogers, 2003). The innovation is considered personally compatible if it fits with existing habit, routines, and lifestyle without requirements for one to break or change much of their existing way of life (Flight et al., 2011). Such innovation is considered socially

compatible if it is congruent with the adopter's social expectation or reference groups and allows the person to be part of the group or the community (Flight et al., 2011). In the context of online education, it allows flexibility of time and places for people to obtain access to education anytime and anywhere, without other commitments. However, additional workload may require extra efforts and commitment of time as well as efforts in learning online may present some challenges in self-management. In addition to this personal compatibility issue, social issue such as expectations from workplace in terms of time management and perceived inferior credibility of online degree by employers and the society can influence the adoption decision (Osborne & Oberski, 2004; Crossman, 2005; Ashraf, 2009).

Based on the above discussion, this study proposes that if people perceive that online education is relatively more advantageous, simple to understand and use, and compatible with their learning habits and lifestyle, they will form positive attitude towards studying online, which will then lead to intention to adopt online education. The following hypotheses are therefore derived:

Ha1: Attitude positively affects to intention towards online education adoption.

Ha1.1: Perceived relative advantage positively affects attitude towards online education adoption.

Ha1.2: Perceived simplicity positively affects attitude towards online education adoption.

Ha1.3: Perceived compatibility positively affects attitude towards online education adoption.

The DTPB model posits that opinions of relevant people can influence the decision of an individual to perform certain behavior. According to Taylor and Todd (1995), decomposition of normative belief structures into relevant referent groups as suggested by several researchers might be related to the possible divergence of opinion among the referent groups. As such, a monolithic normative structure may not show influence on subjective norm or behavioral intention because the effects of the referent groups may cancel each other out. As applicable to this context and included in the model, relevant people include peers, family and loved ones, significant others (such as teachers, superiors, employer), and the

community that the decision maker belongs to. Each of these referent groups may differ in their views toward online education, which subsequently affect the intention of the students to adopt online education. The referent groups' therefore, through subjective norm as the mediator, is related to the intention to adopt online education. The following hypotheses are therefore proposed:

Ha2: Subjective norms positively affect intention towards online education adoption.
Ha2.1: Peer Influence positively affects subjective norms.
Ha2.2: Family Influence positively affects subjective norms.
Ha2.3: Superiors' Influence positively affects subjective norms.
Ha2.4: Community influence positively affects subjective norms.

Following the discussion on the perceived behavioral control construct by Ajzen (1985; 1991) comprised of internal factor of individual's "self-efficacy" (Bandura, 1977) and external resource constraints namely "facilitating conditions" (Triandis, 1979), Taylor & Todd (1995) decomposed the perceived behavioral control construct in relation to information technology acceptance and usage into three sub-construct, which are self-efficacy, resource facilitation, and technology facilitation. The DTPB postulates that the higher level of self-efficacy will lead to higher level of behavioral intention and usage. Additionally, facilitating conditions of information technology system can be divided into two dimensions; resources such as time and money, and technology such as availability and compatibility of the system. Resources constraints may discourage intention to adopt and usage of the system (Taylor & Todd, 1995). Therefore, if people perceive themselves as having the ability to accomplish the study using online education system, possess the necessary resources such as time, money, and technology to facilitate their learning using online educational system, they would be motivated to study online as they see more chances of success. Positive motivation will then lead to intention to adopt online education. In other words, self-efficacy, resources and technology facilitations can affect the individual's intention to adopt online education through the mediating effect of perceived behavioral control. The following hypotheses are therefore derived:

Ha3: *Perceived behavioral control positively affects intention towards online learning adoption.*
Ha3.1: *Self-efficacy positively affects perceived behavioral control.*
Ha3.2: *Resource facilitation positively affects perceived behavioral control.*
Ha3.3: *Technology facilitation positively affects perceived behavioral control.*

Research Methodology

This was a descriptive research, which described the respondents' levels of perceptions towards adoption of innovation—eLearning. The population of the research was students, who currently pursue final year undergraduate degree and those who have already earned the undergraduate degree in one of the Northeastern provinces of Thailand. The sample group was selected from people with the same characteristics as the population. The convenience sampling technique was applied to select respondents of the research. The self-administered questionnaire with 5 levels Likert scale was selected as a research instrument. Data collection process was conducted at the institutions using a face-to-face self-administered process. The researcher distributed a total of 500 sets of questionnaire to respondents and 428 sets were returned and valid. Therefore, the data analysis was based on the 428 valid sets of questionnaire (n = 428).

Research Results

Demographic Information:
The majority of the respondents were female 272 (63.6%). There were 206 respondents (48%) earned the monthly income of 10,000-20,000 Baht. Most of them worked as government employees 175 (41%). The majority of them (249 or 58%) reported that they were married. Most of them do not have children (231 or 54%).

Inferential Statistics:
The multiple regression analysis was conducted to evaluate how well the independent variables predicted intention to adopt online education. The predictors, which were Attitude, Perceived Relative Advantage, Perceived Simplicity, Perceived Compatibility, Subjective Norms, PeerInfluence,

Family Influence, Superiors' influence, Community influence, Perceived behavioral control, Self-efficacy, Resource facilitation, and Technology facilitation while the criterion variable was intention to adopt online education. The linear combination of independent variables was significantly influenced intention to adopt online education, F (13, 414) = 16.473, p = .000. The sample multiple correlation coefficients was .584, indicating that approximately 34% of variance of independent variables in the sample can be accounted for by the linear combination of dependent variable.

Answers to Research Questions

RQ1: Which factor influence Thai students' intention to adopt online education?

Answer: The regression equation with all 13 predictors was statistically significant influenced the intention to adopt online education, R2 = .34, adjusted R2 = .32, F (3, 414) = 16.473, p = .000. Therefore, the null hypothesis was rejected. It can be concluded that Attitude, Perceived Relative Advantage, Perceived Simplicity, Perceived Compatibility, Subjective Norms, PeerInfluence, Family Influence, Superiors' influence, Community influence, Perceived behavioral control, Self-efficacy, Resource facilitation, and Technology facilitation influence Thai students' intention to adopt online education.

The Beta values were the weights associated with the regression equation. According to the Beta weights, the regression equation was as follows:

Intention to adopt online education = $(.117_{\text{Attitude}}) + (-.049_{\text{Perceived Relative Advantage}}) + (-.015_{\text{Perceived Simplicity}}) + (.177_{\text{Perceived Compatibility}}) + (-.035_{\text{Subjective Norms}}) + (.321_{\text{Peer Influence}}) + (.096_{\text{Family Influence}}) + (-.031_{\text{Superiors' Influence}}) + (-.077_{\text{Community Influence}}) + (-.036_{\text{Perceived Behavioral Control}}) + (.060_{\text{Self-efficacy}}) + (.220_{\text{Resource facilitation}}) + (.393_{\text{Technology facilitation}}) + (-.811)$

RQ2: What is the most influencing factor towards Thai students' intention to adopt online education?

Answer: When considering Beta value of each factor from the multiple regression analysis, it was found that the Technology facilitation carries the most weight to contribute to the intention to adopt online education (ß =

.393), followed by Peer Influence (ß = .321), and the third factor was Resource Facilitation (ß = .220). These three individual variables revealed the statistically significant influence towards intention to adopt online education.

Conclusion and Discussion

Based on the results, it can be concluded that important factors contributing to online education adoption for the Thai consumers are subjective norms or social influence and perceived behavioral control. The findings indicated that Thai consumers are likely to adopt online education provided that people important to them approve the decision, as well as provided that they have confidence in their capability to take online education. Further analysis revealed that the three most contributing factors toward Thai students' intention to adopt online education were the technology facilitation, peer influence and resources facilitation respectively. Two out of the three factors are part of the perceived behavioral control construct. Thus, this might be interpreted that Thai students may perceive the enrollment of online courses will need the technological readiness as a critical factor. Thus, the Thai students felt that they need to be ready in terms of technology and the resources prior to taking the online program. Another notable finding regards the peer influence factor that Thai students reported as the second most important factor toward their intention to adopt online learning. It is possible that the Thai students might feel more confidence in enrolling in online courses if they have a friend to enroll with them or have their peers approve their decision.

In conclusion, the results confirmed importance of social factor as well as the control beliefs in consumers' decision making, therefore indicating the contribution of Decomposed Theory of Planned Behavior as the suitable model to understand and obtain consumers' insight in the technological innovation adoption behavior.

References

Ajjan, H. & Hartshorne, R. (2008). Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests. *Internet and Higher Education*, 11, 71-80.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*,50, 179-211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewoods Cliffs, NJ: Prentice-Hall.

Allen, E., & Seaman, J. (2007, October). *Online nation: Five years of growth in online learning*. Babson Survey Research Group, The Sloan Consortium.

Ashraf, B. (2009). Teaching the Google-eyed YouTube generation. *Education + Training*,51(5/6), 343-352.

Assumption University (2011). *Assumption University of Thailand: College of Internet Distance Education*. Retrieved on October 10, 2011, from: www.elearning.au.edu

Bandura, A. (1977). *Social Learning Theory*, Prentice Hall, Englewood Cliffs, N.J.

Bhatiasevi, V. (2011). Acceptance of e-Learning for users in higher education: An extension of the technology acceptance model. *The Social Science*, 6(6), 513-520.

Bhattacharya, I., & Sharma, K. (2007). India in the knowledge economy – an electronic paradigm. *International Journal of Educational Management*,21(6), 543-568.

Bray, E. (2004). *Current issues in online distance education*. Retrieved on March 5, 2011, from: http://www.ericbray.com/Braydistanceedpaper.pdf

Carnoy, M. (2005). Education and open society: A critical look at new perspectives and demands, Globalization, Educational Trends, and Open Society. *Education Support Program*. Open Society Institute.

Crossman, J. (2005). Work and learning: The implications for Thai transnational distance learners. *International Education Journal*,6(1), 18-29.

Economist Intelligence Unit (2008). *The future of higher education: How technology will shape learning*. The Economist, New Media Consortium.

Elearners.com (2011). www.elearners.com/colleges/colleges.asp

Flight, R. L., D'Souza, G., & Allaway, A.W. (2011). Characteristics-based innovation adoption: Scale and model validation. *Journal of Product & Brand Management*, 20(5), 343-355.

Frost, & Sullivan (2011, August 16). *How to increase the success rate of new product launches*. Retrieved on July 12, 2012, from: http://www.slideshare.net/FrostandSullivan/how-to-increase-the-success-rate-of-new-product-launches

Gunasekaran, A., McNeil, R. D., & Shaul, D. (2002). E-Learning: Research and applications. *Industrial and Commercial Training*, 34(2), 44-53.

Henshaw, R. (2008). A singular vision for a disparate future: Technology adoption patterns in higher learning through 2035. *Innovate* 4(5).

Hiltz, S. R., & Turoff, M. (2005). Education goes digital: The evolution of online learning and the revolution of higher education. *Communication of the ACM*, 48(10), 59-64.

Jebeile, S., & Abeysekera, I. (2010). The spread of ICT innovation in accounting education. *International Journal of Teaching and Learning in Higher Education*,22(2), 158-168.

Jebeile, S. & Reeve, R. (2003). The diffusion of e-Learning innovations in an Australian secondary college: Strategies and tactics for educational leaders. *The Innovation Journal*,8(4), 1-18.

Khaopa W. (2011, December 20), *Focus on Thai educational strengths, government told, The Nation*, Retrieved on January 10, 2012, from: http://www.nationmultimedia.com/national/Focus-on-Thai-educational-strengths-govt-told-30172241.html

Lu, H-P., Liu, S-H., & Liao, H-L. (2005). *Factors influencing the adoption of e-Learning websites*: An empirical study. Issues in Information Systems,5(1), 190-196.

Lu, J., Yu, C-S., Liu, C., & Yao, J. E. (2003). Technology Acceptance Model for Wireless Internet. *Internet Research: Electronic Networking Applications and Policy*, 13(3), 206-222.

Office of the Higher Education Commission. (2011). *Office of the Higher Education Commission: Facts and figures*. Retrieved on October 10, 2011, from: www.inter.mua.go.th

Osborne, M. & Oberski, I. (2004). University continuing education: The role of communications and information technology. *Journal of European Industrial Training*,28(5), 414-428.

Ramkhamhaeng University (2011). *Ramkhamhaeng University*. Retrieved on October 10, 2011, from: http://www.ru.ac.th, http://www.ramtangdaen.com

Rangsit University (2011). *RSU Cyber University*. Retrieved on October 10, 2011, from: http://www.rsu-cyberu.com

Rath, S. & Sekhar, S. F. C. (2010). *E-Learning innovations at a B-School: An assessment of their diffusion*. Retrieved 10 January, 2012 from http://www.mainstayin.com/e-learning.pdf

Rogers, E. M. (2003). *The Diffusion of Innovations* (5thed.). New York: The Free Press.

Taylor, S., & Todd, P. A. (1995). Understanding Information Technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-173.

Teo, T., Wong, S.L., Thammetar, T., & Chattiwat, W. (2011). Assessing e-Learning acceptance by university students in Thailand. In Hong, K. S., & Lai, K. W. (Eds), ICT for accessible, effective, and efficient higher education: Experiences of Sountheast Asia. *Australian Journal of Educational Technology*, 27(Special Issue, 8), 1356-1368. http://www.ascilite.org.au/ajet27/teo.html

Tiene, D. (2002). Addressing the global digital divide and its impact on educational opportunity [Electronic version]. *International Council for Education Media*, 211-222.

Tierney, W. G., & Findlay, C. C. (2009). *The Globalization of Education: The Next Wave, The Pacific Economic Cooperation Council (PECC) and the Association of Pacific Rim Universities (ARPU)*. Retrieved on November 10, 2011, from www.pecc.org/resources/cat_view/96-education-market

Tino, V. L. (2008). *ICT in Education*, United Nations Development Programme, Bureau for Development Policy, www.eprimers.org and www.apdip.net.

Thailand Cyber University (2011). *TCU: Thailand Cyber University*. Retrieved on October 10, from: http://www.thaicyberu.or.th

The Organisation for Economic Co-operation and Development. (2011). *OECD: Statistics*. Retrieved on October 10, from http://www.oecd.org

Tornatzky, L. G., & Klien, K. J. (1982). Innovation characteristics and innovation adoption implementation: A meta-analysis of findings. *IEEE Transaction on Engineering Management*, 29(11), 28-45.

Triandis, H.C. (1979). Values, Attitudes, and Interpersonal behavior. *Nebraska Symposium on Motivation: Beliefs, Attitude, and Values*. University of Nabraska Press, pp.195-259.

University of Thai Chamber of Commerce (2011). *University of the Thai Chamber of Commerce*. Retrieved on October, 10, 2011, from: http://www.utcc.ac.th

Van der Wende, M. (2002). *The Role of US higher education in the global e-Learning market*. Research and Occasional Paper Series: CSHE.1.02, Center for Studies in Higher Education, University of California, Berkeley.

Vannoy, S. A., & Palvia, P. (2010). *The social influence model of technology adoption. Communications of the ACM*,53(6), 149-153.

Vishwanath, A., & Goldhaber, G.M. (2003). *An examination of the factors contributing to adoption decisions among late-diffused technology products. New Media & Society*, 5, 4, 547-572.

Vrasidas, C. & Zembylas, M. (2003). The nature of technology-mediated interaction in globalized distance education. *International Journal of Training and Development*, 7(4), 271-286.