

ICT for Self-paced Learning: Mediating Role of Perceived Ease of Use and Perceived Usefulness

Priscilla MOSES^{a*}, Phaik Kin CHEAH^b, & Jian Heng TAN^c

^a Faculty of Creative Industries, Universiti Tunku Abdul Rahman, Malaysia

^{b, c} Faculty of Arts and Social Science, Universiti Tunku Abdul Rahman, Malaysia

* priscilla@utar.edu.my/ prismo6@yahoo.com

Abstract: By utilizing the Technology Acceptance Model, this investigation was carried out to find and establish the mediator role that influences students' attitude towards using ICT for self-paced learning. The mediators studied in this study were perceived ease of use and perceived usefulness. This study adopted the Structural Equation Modelling approach to analyse the data gathered. Based on the responses from 366 Malaysian Arts stream undergraduates, the empirical examination of the research hypotheses indicated that there is statistical evidence that perceived usefulness and perceived ease of use impose a statistically significant mediation role. Both mediators are in association with exogenous factors namely; mastery and motivation and the endogenous factor; attitude towards using ICT for self-paced learning among the undergraduates.

Keywords: Mediation, perceived ease of use, perceived usefulness, motivation, mastery, attitude towards using ICT

1. Introduction

In the past few decades, Information and Communication Technologies (ICT) usage in education have opened up new opportunities for students to enhance their academic success further. ICT is a cost-efficient tool to search for information, organise or reorganise sources of information, and assist in numerous tasks that involve interpreting, analysing, and retrieving necessary information in the students' learning process. This allows the students to be independent and learn at their own pace without being too dependent on lectures. They utilize the readily available online sources, which is part of ICT; that can assist them in understanding the content of their courses. This method is referred to as self-paced learning as the students are empowered with autonomy in pursuing their subject of interest with greater personalization (Ministry of Education, 2012). According to Wilson, Tete-Mensah and Boeteng (2014), self-paced learning allow students to have higher achievements in their learning.

Studies have investigated the factors that leads students utilizing ICT for learning. Although studies have identified the factors that are said to influence students' behavioural intention to use ICT, however, to the best of knowledge no studies have been done on the mediating factors or of perceived ease of use and perceived usefulness for self-paced learning. Thus, perceived ease of use and perceived usefulness are identified as the mediating factors that formulate students' attitude that in favour to the use of ICT for self-paced learning. This investigation attempts to find statistical significance to establish the mediating role of perceived ease of use and perceived usefulness between the exogenous (mastery, motivation) and endogenous (attitude towards using ICT for self-paced learning) factors. This study will fill the gap for ICT usage in education literature on the mediating role of perceived ease of use and perceived usefulness. The results offer insights to the factors namely; perceived ease of use and perceived usefulness as previous studies has attributed both of the factors as contributing factors but this study attribute it as mediating factors with mastery

and motivation variables. Apart from this, it allows curriculum designers to understand better the role of the mediating factors; perceived ease of use and perceived usefulness, of students in relation with use of ICT for self-paced learning. The findings are also useful to administrators and policy makers in institutions of learning in designing courses using ICT such as for e-learning, blackboard, and distance education programs to enhance learner autonomy

1.1 Purpose of Study

This study aims to investigate and establish the mediating role of perceived ease of use and perceived usefulness between mastery, motivation and attitude based on the students' self-paced learning experience. Thus, the following hypotheses were formulated based on the literature review:

H1: Perceived usefulness mediates the influence of motivation on attitude towards using ICT for self-paced learning.

H2: Perceived usefulness mediates the influence of mastery on attitude towards using ICT for self-paced learning.

H3: Perceived ease of use mediates the influence of mastery on attitude towards using ICT for self-paced learning.

1.2 Conceptual Framework

The model of this study is shown in Figure 1, was designed based on the Technology Acceptance Model (TAM). The TAM provides the basis for this investigation and other external variables were included to build on the premise that when users are presented with a technology. Thus, five factors were investigated in this study to establish the mediating role of perceived ease of use and perceived usefulness that influence attitude towards using of ICT among undergraduate students. All of the variables in Figure 1 are latent variables measured with indicators and measuring items.

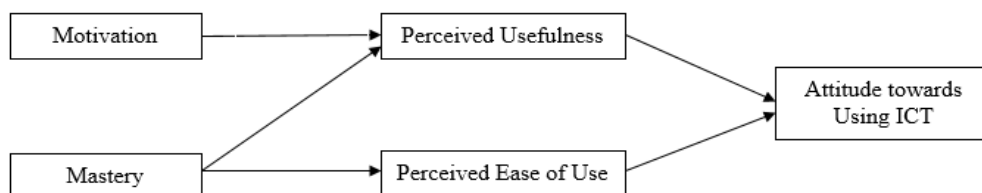


Figure 1. Conceptual Framework.

2. Literature Review

2.1.1 Theory

There has been a handful of theoretical perspectives that have been developed to understand a person's decision to accept and use ICT. These theories act as a tool to understand success or failure in the implementation of new ICT usage in a field of choice. Common theories applied in studies on ICT in education are Theory of Planned Behaviour (Ajzen & Fishbein, 1975), the Technology Acceptance Model (Davis 1989; Davis, Bagozzi, Warshaw, 1989), and the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh, Thong, & Xu, 2012). The TAM is widely used in studies concerning educational technology research area similar to this investigation (Abdullah & Ward, 2016; Asare, Yun-Fei, Boadi, & Aboagye, 2016; Al-Gahtani, 2016). The TAM model measures behaviour-relevant components of attitudes, distinguishes between beliefs and attitudes and specifies how external stimuli are causally linked to beliefs, attitudes and ones' behaviour. Hence, the theoretical insight of TAM were suitable to be used in this study to gauge the purpose of this study as it is an acknowledged base.

2.1.2 Factors Studied

2.1.3 Motivation

Motivation is defined as the fuelling force or internal strength behind one's action by one's aspiration for something (Adeyemi, 2014). In this present study, motivation refers to a goal-directed activity initiated and sustained by undergraduate students to use ICT for self-paced learning. Motivated learners are likely to achieve higher levels of success, and motivation is considered one of the important predictors in learning (Hu, 2008). Bousbahi and Alrazgan (2015) reported motivation to influence perceived usefulness of technology among the participants of their study.

2.1.4 Mastery

Mastery can be inferred from observable performance on a set of items or tasks related to a particular concept, skill, or subject (Thomas & Eric, 2014). Figueiredo and Ipiranga (2015) defined that mastery is practical knowledge which consist of compressive practical knowledge to execute some skills using bodily activities. In this present study, mastery refers to the students' practical knowledge and operating skills to use ICT for self-paced learning. In past studies conducted, competence which is equivalent to mastery have influenced perceived usefulness of an individual to use technology (Boe, 2016; Oluwatobi & Yemisi, 2014). Apart from that, Oluwatobi and Yemisi (2014) established that competence have an influence on perceived ease of use.

2.1.5 Perceived Ease of Use

Perceived ease of use is the degree to which a person believes that using a specific system is effortless (Davis, 1989). In this study's context, perceived ease of use refers to the extent that the undergraduates believe that utilizing ICT for self-paced learning would be free from effort. Past studies by Fathema, Shannon, and Ross (2015), Juniwati (2014), and Al-Adwan, Al-Adwan, and Smedley (2013) concluded that perceived ease of use has a significant influence on students' attitude towards using technology.

2.1.6 Perceived Usefulness

Perceived usefulness is defined as the degree to which an individual believes that using a particular system will enhance the task performance (Abu-Dalbouh, 2013; Punnoose, 2012). Perceived usefulness in this study refers to the degree of undergraduates' feeling of worthiness with the associated use of ICT for self-paced learning. In several studies done by Al-Mushasha (2013), Lai, Wang, and Lei (2012), Wong and Teo (2009), and Albirini (2006) concluded that perceived usefulness was found to have significant influence on students' attitude towards using technology.

2.2.5 Attitude towards Using ICT

Attitude towards using ICT refers to the individual learner's positive or negative response about performing the target behavior using a particular system, and object (Eagly, & Chaiken, 1993; McLeod, 2014; Venkatesh et al., 2003). In this study, attitude refers to the mixture of students' beliefs, thoughts, and feelings in using ICT for self-paced learning.

3. Research Methodology

3.1.1 Participants

A total of 366 participants were involved in this quantitative study. The respondents were chosen using cluster-sampling method. The population were divided into several groups and a simple random sampling was used to select the groups used for this study. Respondents participated in this

study were 103 male and 263 female undergraduates. Thus, there were majority of female (71.9%) undergraduates compared to males (28.1%) undergraduates who participated in this research study. The age of the respondents varied from 19 to 24 years old. The mean age of the participants is 20.97 with a standard deviation of 1.23.

3.1.2 Measures

The questionnaire used for this study was reviewed by a panel of experienced experts in education technology field for content and face validity to ensure that the questionnaires' items covers the full domain of the different educational constructs in this study. The experts gave feedback that necessitated the modification of the questionnaire. The questionnaire was pilot tested with 60 undergraduates after the necessary amendments done. All the 38 items were pilot-tested for reliability. The coefficient for this pilot study ranges from .853 to .903, whereas for the actual study, it ranged from .811 to .879 (Table 1). According to Hair, Black, Babin, Anderson, and Tatham (2014), the Cronbach's alpha with a reading higher than 0.70 is generally agreed upon for reliability coefficient. The findings of the pilot study and for the actual study administered, the questionnaire had achieved internal consistency, as every alpha level of the scale was higher than .70.

Table 1

Instrument Reliability

Scales	Number of Items	Cronbach's Alpha of Pilot Study (n=60)	Cronbach's Alpha of Actual Study (n= 366)
Perceived Usefulness (PU)	7	.872	.847
Perceived Ease of Use (PEOU)	6	.822	.819
Attitude Towards Using ICT (A)	6	.878	.823
Motivation (Mo)	7	.853	.811
Mastery (Ms)	12	.903	.879

4. Empirical Results

All of the 38 items were subjected to a confirmatory analysis where the scores exceeded the minimum required level of factor loading (0.5). Apart from that, all of the fitness indexes of this model namely Chi-square/ df = 2.406; GFI = .904; TLI= .905; CFI= .918; RMSEA < .062 have achieved the required levels which are Chi-square/ df must be lower than 3; GFI, TLI, CFI must be more than .9; RMSEA value must be below .08, thus confirming the construct validity and convergent validity. Based on Figure 2, the size of the indirect effect for moderation was calculated by multiplying the estimated path coefficients.

- H1: The indirect effect of Mo on A through PU was .263 (Mo to PU (.614) x PU to A (.428)).
H2: The indirect effect of Ma on A through PU was .083 (Ma to PU (.195) x PU to A (.428)).
H3: The indirect effect of Ma on A through PEOU was .186 (Ma to PEOU (.326) x PEOU to A (.571)).

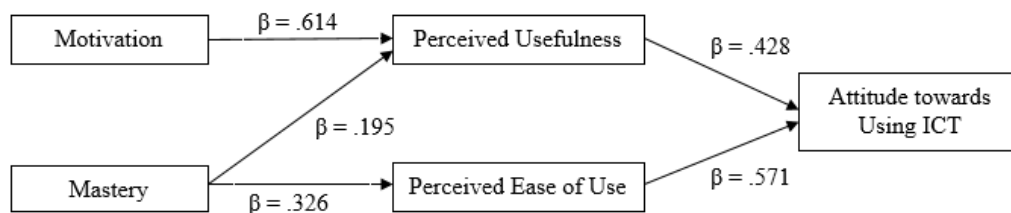


Figure 2. Final Model

Based on the hypotheses formulated for this study, the mediators of ICT for self-paced learning among undergraduates are displayed in Table 2. The three research hypotheses were supported by the data. It shows that PU acts as a total mediator between Mo, Ms and A.

Table 2

The Summary Table

Hypothesis			Path			Results
H1	Mo	→	PU	→	A	Supported
H2	Ms	→	PU	→	A	Supported
H3	Ms	→	PEOU	→	A	Supported

5. Discussion and Conclusion

This research explored and uncovered the mediation role of perceived ease of use and perceived usefulness that was not established in previous studies. Contemporaneously, motivation (Bousbahi & Alrazgan, 2015) and mastery (Boe, 2016) were found to have influenced perceived usefulness; and perceived usefulness was found to have an influence on attitude towards using ICT (Al-Mushasha, 2013). Moreover, mastery was found to have influenced perceived ease of use (Oluwatobi & Yemisi, 2014); and perceived ease of use influenced attitude towards using ICT (Fathema et al., 2015). However, this study offers statistical evidence on the mediating role of perceived ease of use and perceived usefulness as a total mediator between mastery, motivation and attitude towards ICT use for self-paced learning among undergraduates. Hence, it fills the literature gap on the mediating role of perceived ease of use and perceived usefulness in ICT usage for education. These two mediators can be used as means to resolve disputes between mastery, motivation and attitude towards ICT use for self-paced learning. Emphasizing perceived ease of use and perceived usefulness can help to find new ways to resolve the dispute among undergraduates on self-paced learning. Moreover, statistical evidence on the mediating role of perceived ease of use and perceived usefulness obtained in this study will allow institutions to have additional insights to understand the students' point of view when it comes to implementing ICT in their learning process. Therefore, the institution or curriculum designers can make better decisions on designing good education programs for self-paced learning courses.

Acknowledgements

We are grateful to Universiti Tunku Abdul Rahman, Malaysia for funding this project.

References

- Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for e-learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior*, 56, 238-256.
- Abu-Dalbouh, H.M. (2013). A questionnaire approach based on the technology acceptance model for mobile tracking on patient progress applications. *Journal of Computer Science*, 9, 763-770.
- Adeyemi, B. A. (2014). Self Concept and Motivation Variables as Correlates of Acquisition of ICT Competence among Social Studies Students of Obafemi Awolowo University, Ile-Ife, Nigeria. *Journal of Education*, 4 (2), 76-82.
- Ajzen, I., & Fishbein, M. (1975). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

- Al-Adwan, A., Al-Adwan, A., & Smedley, J. (2013). Exploring student's acceptance of e-learning using Technology Acceptance Model in Jordanian universities. *International Journal of Education and Development using Information and Communication Technology*, 9 (2), 4-18.
- Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers and Education*, 47(4), 373-398.
- Al-Gahtani, S. S. (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. *Applied Computing and Informatics*, 12(1), 27-50.
- Al-Mushasha, N. F. (2013). Determiners of e-learning acceptance in higher education environment based on extended technology acceptance model. *Fourth International Conference on e-learning "Best practices in management, design and development of e-courses: standards of excellence and creativity"*, 261-266.
- Asare, A. O., Yun-Fei, S., Boadi, E., & Aboagye, M. O. (2016). Factors influencing the adoption of electronic banking: Expansion of technology acceptance model (TAM). *International Journal of Innovation and Scientific Research*, 23 (1), 113-123.
- Boe, T. (2016). The interaction effect of perceived competence and goal harmony on perceived usefulness. *Creative Education*, 7, 1136-1146.
- Bousbahi, F., & Alrazgan, M. S. (2015). Investigating IT faculty resistance to learning management system adoption using latent variables in an acceptance technology model. *The Scientific World Journal*, 1-11.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, 13, 319-339.
- Davis, F. D., Bagozzi, R.P., & Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1002.
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt.
- Fathema, N., Shannon, D., & Ross, M. (2015). Expanding the technology acceptance model (TAM) to examine faculty use of learning management systems (LMSS) in higher education institutions. *MERLOT Journal of Online Learning and Teaching*, 11 (2), 210-232.
- Figueiredo, M. D., & Ipiranga, A. S. R. (2015). How can we define mastery? Reflections on learning, embodiment and professional identity. *Brazilian Administration Review*, 12(4), 348-364.
- Hair, J. F. Jr., Black, W.C., Babin, B. J., Anderson, R., & Tatham, R. (2014). *Multivariate data analysis* (7th ed.). Upper Saddle River, New Jersey: Pearson Education.
- Hu, Y. (2008). *Motivation, usability and their interrelationships in a self-paced online learning environment* (Unpublished Doctoral dissertation). State University, Virginia.
- Juniwati. (2014). Influence of perceived usefulness, ease of use, risk on attitude and intention to shop online. *European Journal of Business and Management*, 6 (27), 218-228.
- Lai, C., Wang, Q., & Lei, J. (2012). What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. *Computers & Education*, 59, 569-579.
- McLeod, S. A. (2014). *Attitudes and Behavior*. Retrieved from www.simplypsychology.org/attitudes.html
- Ministry of Education. (2012). *Preliminary report: Malaysia Education Blueprint (2013-2025)*. Kuala Lumpur, Malaysia: The Government Press.
- Oluwatobi, O., & Yemisi, B. (2014). Influence of information technology competence and demographic characteristics on undergraduate student's perception of e-portal. *International Journal of Scientific and Research Publications*, 4(6), 1-8.
- Punnoose, A. C. (2012). Determiners of intention to use eLearning based on the technology acceptance model. *Journal of Information Technology Education: Research*, 11, 302-337.
- Thomas, R. G., & Eric, M. A. (2014). In search of a useful definition of mastery. *Getting Students to Mastery*, 71(4), 18-23.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.
- Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS quarterly*, 36(1), 157-178.
- Wilson, K. B. Tete-Mensah, I. & Boeteng, K.A. (2014). Information and communication technology use in higher education: Perspectives from students. *European Scientific Journal*, 10 (19), 161-171.
- Wong, S. L., & Teo, T. (2009). Investigating the technology acceptance among student teachers in Malaysia: An application of the technology acceptance model (TAM). *The Asia-Pacific Education Researcher*, 18(2), 261-272.