Proceedings of the Inaugural Malaysian Postgraduate Conference (MPC) on Advancing State-of-the-Art Research: Exploring New Ideas, University of South Australia, Australia, 25-27 November 2011.

AN ANALYSIS OF THE TECHNOLOGY ACCEPTANCE MODEL IN UNDERSTANDING STUDENT TEACHERS' BEHAVIOURAL INTENTION

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Abstract

For many years, researchers have been interested in identifying the conditions that facilitate technology acceptance in various organisations. Despite advocates noted the values of technology in teaching and learning, few have intended to validate the Technology Acceptance Model (TAM) for its predictive ability of technology adoption in various organisations. In this study, the four constructs, perceived usefulness, perceived ease of use, attitude toward computer use and behavioural intention to use technology were used to validate the TAM and to statistically explain technology behavioural intention in the context of Malaysian student teachers. Confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used for testing factorial validity, model comparison and hypotheses testing. Self-reported data were gathered from student teachers at the Sultan Idris Education University. Results revealed a good model fit and of the five hypotheses formulated, four were supported. The findings of this research contribute to the literature by validating the TAM in Malaysian context and provide several prominent implications for Malaysian student teachers' technology acceptance, in terms of both research and practice.

Keywords: *Technology Acceptance Model, computer use, student teachers, behavioural intention*

1. INTRODUCTION

For many years, Malaysian schools and colleges have included computer technology as an integral part of students learning experiences. Many ministers have expressed strong desire to use technology in creating classroom-to-classroom connections via the internet as a way to build cultural awareness and foster studying habits. The push to incorporate and integrate technology in classroom teaching from all levels became much stronger and vital in Malaysian education system after the introduction of Smart School. The Smart School is one of the seven flagships applications underlying Multimedia Super Corridor (MSC) which began its operations in 1997. The objectives of the Smart School are to develop technology savvy individuals and eradicate computer illiteracy. Such strategies began with RM150 million allocated for 1340 schools to develop their multimedia facilities and computer laboratories, thus paving the way for a revised school curriculum.

Moreover, the Malaysian government has established various institutions, such as the National Information Technology Council (NITC), the Malaysian Institute of Microelectronics Systems (MIMOS), the Communications and Multimedia Commission (CMC) and the Multimedia Development Corporation (MDC) to encourage the use of computer related technologies in the Malaysian society. Many technology acceptance models such as Technology Acceptance Model (TAM) (Davis, 1989), Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980) and Theory of Planned Behavior (TPB) (Ajzen, 1985) have been developed in attempting to explore and understand individual's attitude and intention to adopt a specific technology. Among those models, the TAM is considered an influential technology acceptance model for explaining BI (fig. 1). There is a growing corpus of researches have adopted and expanded this model which was empirically proven to have high validity across a broad range of end-user (Venkatesh, 2000; Venkatesh & Davis et al., 2000). Unfortunately, the TAM has not been extensively tested outside of developed countries, particularly with Asian countries (Teo, et al., 2008).

Consequently, there is a need to scrutinize the applicability of the TAM in Malaysian student teachers context. At the present moment in Malaysia, there is a limited study that have utilised the TAM in exploring Malaysian student teachers' intention of technology integration in teaching and learning based on the TAM (Teo, et al. 2008). Therefore, the researchers believe that the time has come to conduct additional testing which able provide the evidence to determine the applicability and robustness of the TAM in Malaysian context. The results of this study may provide insights into the factors that influence the technology acceptance among Malaysian student teachers.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

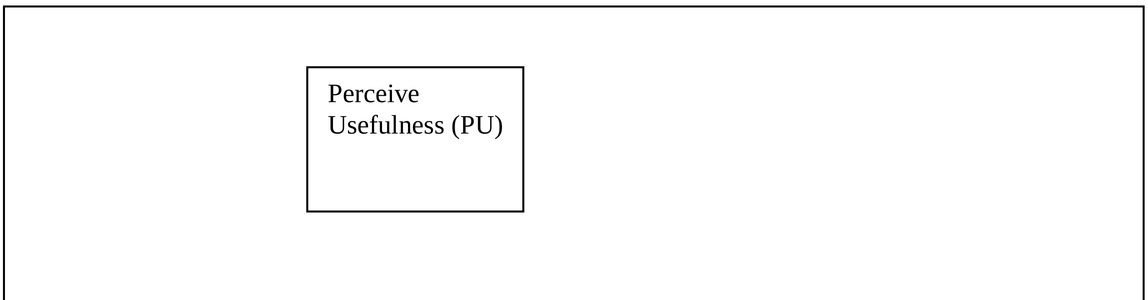
2.1 Determinants of Technology Acceptance Model (TAM)

Davis et al. (1989) introduced and developed the Technology Acceptance Model (TAM), and provided a theoretical context that explained the relationship of attitudes-intention-behavior (fig 1). The TAM has received empirical support for being robust and parsimonious in predicting technology acceptance and adoption. The TAM explained that a person's performance of specified behaviour is determined by his or her BI to perform certain tasks. There are two specific variables, PU and PEU, which are hypothesized to be fundamental determinants of user acceptance. PU is defined as the degree to which a person believes that using a particular technology will enhance his or her job performance (Davis et al., 1989). PEU is considered the extent to which a person believes that using the system will be free of effort (Davis, 1989). It is possible that people who believe the technology useful, they could, at the same time, too difficult to use and that the performance benefits of usage are outweighed by the effort of using entire application or technology (Davis, 1989). PU and PEU attitudes have direct and indirect effects towards BI. PU and PEU jointly affect attitude toward usage, with PEU having a direct effect on PU. Thus, researchers put forward the following hypotheses:

H1 PU use will significantly influence student teachers' ATCU.
H2 PU use will significantly influence student teachers' BI.
H3 PEU will significantly influence student teachers' PU.
H4 PEU will significantly influence student teachers' ATCU.
H5 ATCU will significantly influence student teachers' BI to use computer.

3.0 RESEARCH METHOD

Participants in this study were student teachers from in Malaysia. Data were gathered with a survey questionnaire. The survey questions composed of four constructs on PU, PEU, ATCU and BI. Participation was wholly voluntary and no course credits were given. All items were presented in English. Structural equation modeling (SEM) has been used to assess the validity of the TAM model in the use of computer among student teachers.



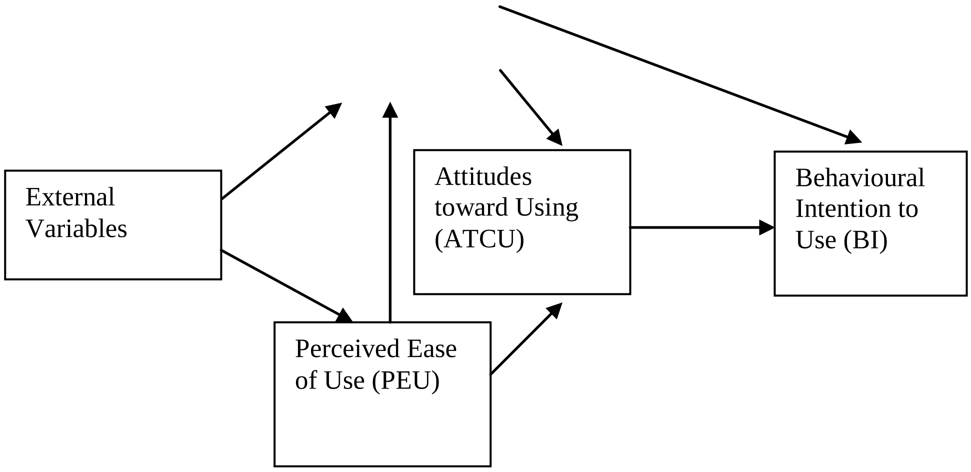


Fig 1 Technology Acceptance Model (TAM)

3.1 Measurement model validation

A confirmatory factor analysis (CFA) was conducted to test the measurement model. Table 1 shows the result of the measurement model. Test of convergent validity were conducted using average variance extracted (AVE). The composite reliability (CR) of each construct was assessed using Cronbach's alpha.

Table 1. Results of the measurement model

Latent Variable	Item	SE	Average Variance Extracted (≥.50)*	Composite Reliability (≥.50)*
BI	BI1	.85	.65	.82
	BI2	.94		
	BI3	.58		
PU	PU1	.78	.71	.87
	PU2	.94		
	PU3	.80		
PEU	PEU1	.94	.90	.97
	PEU2	.94		
	PEU3	.97		
ATCU	ATCU1	.78	.75	.85
	ATCU2	.94		

[a] AVE: Average Variance Extracted = (∑λ2) / (∑λ2) + (∑(1 – λ2)).
[b] Composite Reliability = (∑λ2) / (∑λ2) + (∑ (1 – λ2)).
[c] This value was fixed at 1.00 in the model for identification purposes.
*Indicates an acceptance level or validity.
SE: Standard Estimate

The five absolute fit indices: ratio of χ^2 to its degree of freedom (χ^2/df), Goodness of Fit (GFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardised Root Mean Square Error of Approximation (RMSEA) were employed in order to obtain a comprehensive model fit. Absolute fit indices measure how well the proposed model reproduces the observed data. Table 2 shows the level of acceptable fit and the fit indices for the proposed research model in this study. From the table, there is evidence to suggest that the measurement has a good fit.

Table 2. Good-of-fit indices for the measurement model

Fit indices	Revised Model	Criteria[a]
χ^2 Statistic	97.969**	Insignificant but significant *p*-value can be expected.
χ^2/df	2.578	<3
RMSEA	0.072	<0.08
GFI	0.944	≥0.90
CFI	0.978	≥0.90
TLI	0.967	≥0.90

[a] References were taken from: Hair (2010), Kline (2005) and McDonald and Ho (2002)

4.0 STRUCTURAL MODEL VALIDATION

As part of testing of the structural model, several models were computed. Firstly, assessment on the null hypothesis model (M0). The null hypothesis model (M0) indicated that all the determinants to be uncorrelated. Second, tested the direct effect model (M1); PU→BI, PEU→BI, ATCU→BI and all other paths were set to zero. Next testing was fully correlated model (M2); PU→BI, PU→ATCU, PEU→BI, PEU→ATCU, PEU→PU and ATCU→BI.

Table 3 shows that some statistics shown in M0, M1 and M2 did not reach the minimum thresholds typically requested for an acceptable fit. Testing for partial correlated model (M3) has been carried out. Estimation of this modified model showed much better fit statistics, which reached minimum thresholds for acceptable model.

Table 3. Good-of-fit indices and comparison of alternative models

Model	χ^2	*df*	GFI	CFI	TLI	RMSEA	χ^2/df	$\Delta\chi^2(df)$sig	Comparison
Null model									
M0	2721.552**	55	.00	.00	.00	.401	49.483		
Direct model									
M1	360.779**	41	.833	.880	.839	.161	8.79		
Fully correlated model									
M2	97.969**	38	.944	.978	.767	.072	2.578	(3), 262.81**	M2 vs M1
Partial correlated model									
M3	99.883**	39	.944	.977	.968	.072	2.561	(1),1.914(ns)	M3 vs M2

*p<.05; **p<.01; ns= not significant

5.0 HYPOTHESES TESTING

Hypothesis H1, H2, H3 and H5 were supported by the data. PU was a significant influence on ATCU (β=.65, p<.00) and BI (β=.48, p<.00). PEU was a significant influence on PU (β=.69, p<.00). Finally, BI was found to be influenced by ATCU (β=.19, p<.01). ATCU was found to be significantly determined by PU, resulting in an R^2 of 0.358. That is, PEU and PU explained 35.8% of the variance in ATCU. PU was significantly determined by PEU and the percent of variance explained was 47.8% (R^2 = 0.478). Altogether, the model accounted for 37.3% of the variance in BI. A summary of the hypotheses testing results is shown in Table 4.

Table 4. Hypothesis testing results

Hypotheses	Path	Hypothesis	Results
H1	PU→ATCU	Positive	Supported
H2	PU→BI	Positive	Supported
H3	PEU→PU	Positive	Supported
H4	PEU→ATCU	Negative	Not Supported
H5	ATCU→BI	Positive	Supported

6.0 DISCUSSION AND IMPLICATIONS

This study empirically validated the TAM model by going a step further to explore its applicability in student teachers setting. The findings of this research offer several important implications for the research and practice of educational technology development. Overall, the results show that the model accounted for 37.3% of the variance in behavioural intention to use computer use among student teachers. According to the result of goodness-of-fit test, the findings of this study led to the conclusion that the model well represented the collected data.

PU and ATCU were found to have a significant positive influence on student teachers' BI to use computer in teaching and learning. This findings support current research that suggests the positive and strong relationship among PU and ATCU to BI (Šumak et al. 2011; Teo, 2011; Moran, et al. 2011; Lin, 2011; Pynoo, et al. 2011). From the effect sizes, the most dominant determinant of BI is PU (β=.65, p<.00). Due to the importance of perceive usefulness in simulating higher use of computer among student teachers, the teacher educators or curriculum designers should pay extra attentions to increase student teachers' belief on the importance of using computers in teaching and learning in their future practices. Having student teachers who are competent in using and believe its usefulness are extremely important as they are expected to be on the frontline of this reform. This can be achieved by including or redesigning curriculum in teacher educational programme which might foster a feeling of positive towards computer usefulness. In addition, by using buddy systems approach where computer novice student teachers worked together with the expert student teachers in encouraging the engagement of computer use among themselves.

Contrary to researchers' expectation, PEU did not have a significant influence on student teachers' ATCU, and this is not in accordance with the findings of prior studies (Davis et al., 1989; Teo, et al., 2008; Park, 2009; Teo, 2011). This may be due to the fact that student teachers prefer to encounter challenges when using computer for planning teaching and learning activities. This early indication and realization will help policymakers and teacher educators to develop a better and more comprehensive approach for technology implementation such as introduce more sophisticated and interesting software. Updating the National Educational Technology Standards in teacher educational programs from time to time is vital as technology continues to grow and develop rapidly, especially in this Information Age. It serves as guidelines to prepare and update courses for pre-service and in-service teachers for appropriate knowledge and effective use of computer in teaching and learning.

7.0 LIMITATIONS AND DIRECTION FOR FUTURE RESEARCH

Several limitations narrow the scope of the above conclusions. Self-report items were employed to measure the variables for the present study. Thus, suggesting the possibility of bias in the findings due to the fact that participants might give socially desirable responses, especially when one of the researchers is the course coordinator. The population of this study was only student teachers. Therefore, the findings derived from the analyses might not adequately reflect the perceptions of practicing teachers as given that practicing teachers are tending to be relatively exposed to the demands of technology use and their engagements with technology as practicing teachers differs from student teachers. Since technology will continue to grow and develop rapidly, a replication of this study might be conducted periodically in order to examine education technology trends. Thus, teacher educational programs would be able to update courses and provide appropriate knowledge and skills for the pre-service or in-service teachers.

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