Establishing Gender Structural Invariance of Technology Acceptance Model (TAM)

Timothy TEO
Nanyang Technological University, Singapore
timothy.teo.@nie.edu.sg

This study examined pre-service teachers' self-reported intention to use technology. Two hundred and seven-four participants completed a survey questionnaire measuring their responses to four constructs from the Technology Acceptance Model (TAM): perceived usefulness, perceived ease of use, attitude towards use, and behavioural intention to use. Structural Equation Modelling (SEM) was used as the main technique for data analysis. The results of this study showed that the four TAM constructs were significant in explaining pre-service teachers' intention to use technology. Overall, this study indicated that the TAM has the predictive ability to explain the intention to use technology among a sample of educational users. In addition, the results of this study showed that the TAM is structurally invariant by gender. Further research is recommended to gain deeper insights into the structural invariance of the TAM by using different subgroups such as culture, age-groups, and technologies.

Keywords: pre-service teachers, technology acceptance model, factorial invariance, structural equation modelling

In technology acceptance research, the technology acceptance model (TAM) Davis (1989) has been found to be a parsimonious model of explaining user behaviour across a broad range of end-user computing technologies and user populations (Teo, 2009; Teo, 2010; Teo, Lee, & Chai, 2008; Teo, Wong, & Chai, 2008; Teo & Van Schaik, 2009). In the TAM, behavioural intention is posited to be influenced by attitude towards usage, as well as the direct and indirect effects of perceived usefulness and perceived ease of use. Both perceived usefulness and perceived ease of use jointly affect attitudes towards usage, and perceived ease of use has a direct impact on perceived usefulness.

Perceived usefulness refers to the extent to which a person believes that using technology will enhance his/her productivity. In contrast, perceived ease of use has to do with the extent to which a person thinks that using a system will be relatively free of effort. Perceived ease of use was hypothesized to have a significant direct effect on perceived usefulness but perceived usefulness was not hypothesized to have an impact on perceived ease of use (Davis et al., 1989). Perceived usefulness is concerned with the expected overall impact of technology use on job performance (outcome), whereas perceived ease of use pertains only to those performance impacts related to the process of using the technology

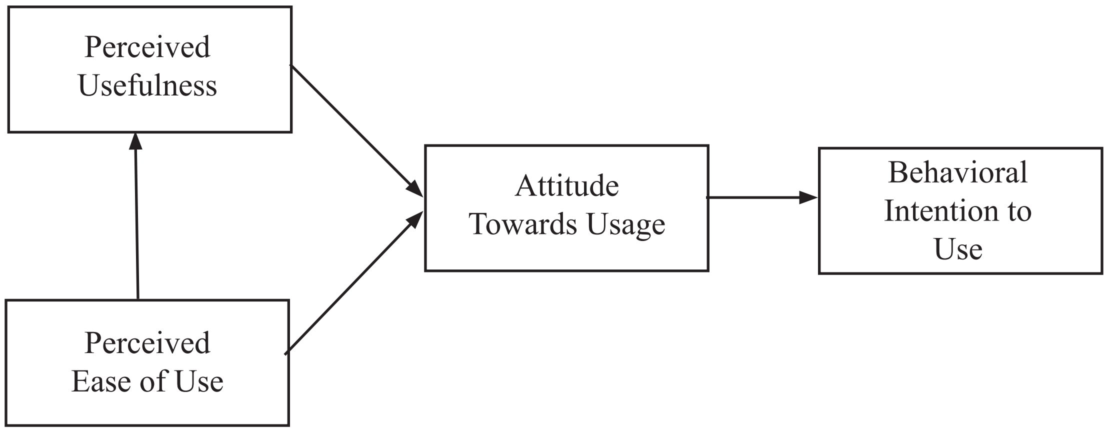

Figure 1. *Technology Acceptance Model (Davis et al., 1989)*

per se (process). Figure 1 shows the Technology Acceptance Model.

However, despite the accolades given to the TAM for its predictive ability of behavioural intention to use technology for several decades, researchers felt that the TAM lacks external validity and that it is necessary to further explore the nature and specific influences of technological and usage-context factors that may alter the TAM's ability to explain user's acceptance, a view corroborated by a recent meta-analysis of the TAM literature which identified a shortcoming of TAM to be non inclusive of external variables (Legris, Ingham, & Collerette, 2003). Although several studies have extended the TAM by adding variables such as subjective norm, facilitating conditions, technological complexity, and self-efficacy (Teo, 2009; Teo, 2010), few have attempted to test for the factorial equivalence of the TAM (Teo, Lee, Chai, & Wong, 2009). Establishing the measurement invariance goes beyond merely adding variables to a model. It provides greater support for its validity and ability to explain technology acceptance across different levels of a user population (e.g., ethnic groups, cultures, gender, age groups).

Gender Differences in Technology Acceptance

Among the themes in technology acceptance research is the issue of gender differences. This is reflected in the ways males and females react to and use computers. For example, many studies indicate that male and female students hold significant differences in attitude towards computers. Older studies expressed concern over this issue because increasingly so, a large number of people will be involved in activities that require the use of computers either as part of their job or training (Vale & Leder, 2004). However, the use of technology, specifically computers is still portrayed to be more appropriate for males than females (Broos, 2005). It has been observed that factors within and outside the schools may have perpetuated such perception and belief. Some include how computer games and software were designed (Kiesler, Sproull, & Eccles, 1985), and the link between computers and 'masculine' subjects such as science and mathematics (Hawkins, 1985).

Recent studies also found that females respond to technology in ways that are different from males (e.g., Broos, 2005; Liaw, 2002). For example, Suri (2003) reported that female teachers expressed less interest in technology and placed lesser importance on computers in the teaching and learning process. Conversely, their male counterparts demonstrated greater interest in computers and a higher level of confidence in their ability to use technology. This situation was the same when applied to advanced technology skills wherein females perceive themselves as being less able and interested (Zarrett & Malanchuk, 2005).

For this reason, it became a possibility that females may not choose a career related to technology despite the availability of opportunities for both genders in the computing industry (Anderson, Lankhear, Timms, & Courtney, 2008). The gender disparity continues to exist with the advent of new technologies. Broos (2005) found that males react more enthusiastically and tend to develop a more positive attitude towards technology. On the other hand, females are more cautious and take a longer time to interact with a new technology thus requiring more time to develop positive attitudes towards new technology.

Given that there is a demonstrated need to further validate the TAM and that gender is a continuing concern in technology acceptance research, this study contributes to the literature by demonstrating the parsimony of the TAM on a sample of student teachers and its ability to operate equivalently across gender (factorial invariance). At first, the invariant factorial structure of the psychometric instruments was tested. The first hypothesis is that the items comprising a particular instrument operate equivalently across the different genders in terms of (a) factor loadings and (b) covariances. It is hypothesized that the TAM will operate equivalently across the gender. The gender hypothesis is indicated by invariant hypothesized paths in the specified structure in the TAM across male and female respondents.

METHOD

Research Participants and Data Collection

Participants in this study were 274 student teachers who were enrolled at the National Institute of Education (NIE) in Singapore. An invitation to participate in this study was made to students enrolled in the 4-year Bachelor of Arts (with Education) and the Postgraduate Diploma in Education programmes. Among the participants were 54.7% (150) females and 45.3% (124) males. The mean age of all participants was 22.5 years (SD=4.43). Participants were informed of the purpose of this study and advised that they could withdraw their participation before or after they had completed the questionnaire. Thereafter, each participant was given the website address of the online questionnaire for this study. On average, each participant took less than 20 minutes to complete the questionnaire.

Measures

The survey questionnaire comprised of previously validated items. Participants were asked to provide their demographic information and respond to 11 statements on the four constructs in this study, namely: perceived usefulness (PU) (three items), perceived ease of use (PEU) (three items), attitudes towards usage (ATU) (three items), and behavioural intention to use (BIU) (two items). Each statement was measured on a five-point Likert scale with 1=strongly disagree to 5=strongly agree. These items and the sources where the items were adapted are listed in Appendix.

Statistical Analyses

Structural equation modelling was estimated using maximum likelihood techniques to estimate the model fit of the TAM. The overall fit of the resultant models was assessed using a number of goodness of fit indices representing absolute, comparative, and parsimonious aspects of fit, namely: $\chi2/df$, Tucker-Lewis index (TLI), Comparative Fit Index (CFI), and Root Mean Squared Error of Approximation (RMSEA). A $\chi2/df$ ratio less than 3.0 indicate good overall model fit (Marsh, Balla, & McDonald, 1988). To achieve acceptable fit, the TLI and CFI should be greater than .95 and the RMSEA should be equal or smaller than .06 (Hu & Bentler, 1999).

When the theory such as the TAM suggests that a moderating relationship among predictors may vary by specific population subgroups (e.g. gender, age, ethnicity), the use of multi-sample structural equation modelling is appropriate. This involves comparing two sub-groups to assess for measurements invariance. When measurement invariance is established, we have confidence that the factor loadings of indicator variables on their respective latent factors do not differ significantly across groups or remain constant across groups or over time. Otherwise, the meanings of the factors in the subgroups may differ substantially although the researcher may retain the same factor label. Measurement invariance often proceeds with varying degrees of stringency, for example, invariance may be tested on a number of factors, as well as testing for invariant factor loadings, and for invariant structural relations among the latent variables.

Multi-sample invariance testing begins by computing the model fit for the pooled sample of all groups. Then, constraints are added to various model parameters to be equal across groups and the model is fitted, yielding a chi-square value for the constrained model. This is followed by a chi-square difference test to see if the difference between the constrained-equal and unconstrained models is significant. If it is not significant, it is concluded that the constrained-equal model is the same as the unconstrained multi-group model, leading to the conclusion that the model does apply across groups and does display measurement invariance. Based on an extensive review of the literature, Vandenberg and Lance (2000) proposed that configural (equal pattern), metric (equal factor loadings) and scalar invariance (equal intercepts) should be established before comparisons across groups can be meaningful.

Table 1
Mean, standard deviation, skewness and kurtosis of the scale items

	Overall (n=274)			Females (n=150)			Males (n=124)		
	Mean (SD)	Skewness	Kurtosis	Mean (SD)	Skewness	Kurtosis	Mean (SD)	Skewness	Kurtosis
PU1	4.27 (.63)	-.55	.62	4.21 (.64)	-.52	.81	4.34 (.62)	-.59	.49
PU2	4.16 (.72)	-.61	.30	4.10 (.74)	-.77	.87	4.23 (.69)	-.34	-.86
PU3	4.19 (.72)	-.84	1.43	4.14 (.74)	-1.03	2.24	4.26 (.69)	-.54	-.14
PEU1	3.99 (.76)	-.86	1.61	3.95 (.67)	-.61	1.05	4.05 (.84)	-1.08	1.86
PEU2	3.93 (.73)	-.47	.63	3.84 (.71)	-.42	.30	4.04 (.73)	-.58	1.25
PEU3	3.85 (.79)	-.49	.03	3.81 (.75)	-.53	.29	3.89 (.83)	-.48	-.17
ATU1	4.28 (.69)	-1.11	3.08	4.25 (.73)	-1.46	4.49	4.32 (.63)	-.38	-.66
ATU2	4.14 (.70)	-.85	1.85	4.05 (.75)	-1.06	2.28	4.25 (.62)	-.22	-.58
ATU3	4.13 (.71)	-.99	2.50	4.08 (.75)	-1.31	3.65	4.19 (.67)	-.41	-.08
BIU1	4.63 (.62)	-2.19	7.52	4.65 (.59)	-2.26	8.75	4.60 (.66)	-2.12	6.58
BIU2	4.34 (.78)	-1.42	3.23	4.30 (.84)	-1.44	2.90	4.39 (.70)	-1.28	3.31

PU= Perceived Usefulness; PEU= Perceived Ease of Use; ATU= Attitude Towards Usage; BIU=Behavioural Intention to Use

Table 2
Results of the test of the measurement model

Item	UFL	SFL	SE	CR	R2	AVE	Alpha
Perceived Usefulness						.85	.95
PU1	.885	.87	.033	27.053	.76		
PU2	.978	.94	.029	34.319	.88		
PU3	1.000	.95	--	--	.89		
Perceived Ease of Use						.73	.95
PEU1	.992	.92	.037	27.044	.85		.
PEU2	.996	.88	.025	39.207	.78		
PEU3	1.000	.90	--	--	.81		
Attitude Towards Usage						.82	.93
ATU1	1.045	.88	.038	27.402	.78		
ATU2	1.070	.94	.034	31.803	.89		
ATU3	1.000	.90	--	--	.81		
Behavioural Intention						.81	.95
BIU1	1.134	1.00	.031	36.630	1.00		
BIU2	.793	.77	.033	23.952	.59		

Note: UFL=Unstandardised Factor Loading; SFL= Standardised factor Loading; SE= Standard Error; CR= Critical Ratio; AVE= Average Variance Extracted

RESULTS

The descriptive statistics of the constructs are shown in Table 1. All mean scores are above the midpoint of 3.00. The standard deviations range from .66 to .75 and this indicates a narrow spread around the mean. The skew and kurtosis indices meet the recommendation by Kline's (2005) for univariate normality.

Test of measurement model

Before testing for model fit, the measurement model was examined. This purpose of examining the model is to ensure that there is convergent and discriminant validities. Fornell and Larcker (1981) proposed three procedures to assess for convergent validity of the measurement items: (1) item reliability of each measure, (2) composite reliability of each construct, and (3) the average variance extracted. Table 2 shows the above information required by Fornell and Larcker. All parameter estimates were significant at $p < .05$, with a critical ratio of 1.96 and greater. The R2, which explained the variance accounted for the latent factors by each of their items, and the average variance extracted, were above .50 (Hair, Black, Babin, Anderson, & Tatham, 2006). The high cronbach alphas indicated that the item scores in this study were highly consistent internally. Finally, the measurement model revealed an acceptable model fit ($\chi 2$=98.065; $\chi 2/df$=2.581; TLI=.95; CFI=.96; RMSEA=.076).

Test of Model Fit and Measurement Invariance

The structural equation model was separately tested in males and females. In both groups the hypothesized model is a good representation of the data (Table 3). For the pooled, female, and male samples, all fit indices indicated an acceptable model fit, although the $\chi 2$ were significant and the RMSEA departed slightly from the recommended values. Various multi-group analyses were performed using AMOS 7.0

(Arbuckle, 2006). Estimation for each analysis was performed using maximum likelihood and was based on a covariance matrix. Tests for the measurement (configural, metric, and scalar) and structural invariance were performed separately. The measurement invariance tests were performed using the following hierarchical ordering of nested models: configural invariance, metric invariance, and scalar invariance, using several model fit indices. The results for each invariance test are explained by the change in the $\chi 2$ value ($\Delta \chi 2$) as the index of difference in fit. However, the use of $\Delta \chi 2$ has been criticized because of its sensitivity to sample size (Cheung & Rensvold, 2002). Recently, Cheung and Rensvold provided evidence that ΔCFI was not prone to these problems. On the basis of extensive simulations they also determined that a ΔCFI value higher than .01 was indicative of a significant drop in fit.

The results revealed evidence of a good fit of the model to the data (Table 4). No significant differences were found for males and females for each of the increasingly stringent test. As such, configural (model 1), metric (model 2) and scalar (model 3) invariance were supported, providing evidence that there was measurement equivalence in TAM across gender and that meaningful comparisons could be made. Following on, a multi-sample analysis to study which parameters could be considered invariant across groups.

Table 3
Goodness of fit indices for the pooled and sub-samples

Fit Index	Recommended guidelines*	Pooled Sample	Females (n=150)	Males (n=124)
$\chi 2$	n.s.	104.252, p < .01	72.842, p < .01	62.846, p <.01
$\chi 2$ /df (deg. of freedom)	< 3	2.606	1.821	1.571
TLI	=> .95	.96	.96	.97
CFI	=> .95	.95	.95	.96
RMSEA	< .06	.077	.074	.068

* Hu & Bentler (1999); n.s. : not significant

Table 4
Results of the measurement invariance tests

Model	$\chi 2$	df	TLI	CFI	RMSEA	$\Delta\chi 2$	Δdf	p	ΔCFI
Overall	104.252	40	.947	.961	.077				
1. Configural Invariance (Equal form and pattern)	135.691	80	.954	.966	.051	31.439	40	.831	.005
2. Metric Invariance (Equal factor loadings)	141.885	87	.958	.967	.048	6.194	17	.517	.001
3. Scalar Invariance (Equal indicator intercepts)	156.369	98	.960	.965	.047	14.484	11	.207	.002

Table 5
Multi-sample analysis of paths for males and females

	$\chi2$	df	$\Delta\chi2$ from base model
Unconstrained base model[a]	135.691	80	
Constrained paths[b]			
ATU → BIU	136.119		0.428[ns]
PU → ATU	141.118		0.001*
PEU → ATU	135.814		0.726[ns]
PEU → PU	135.715		0.877[ns]

[a]Paths for the two gender groups were allowed to be freely estimated.
[b]The path specified was constrained to be equal across the two gender groups.
[ns]: Not significant.
*p < 0.05.

Multi-sample Structural Analysis

To examine the gender differences in terms of their path differences, two multi-sample analyses were performed. In each of the two analyses, one path coefficient was constrained to be equal across the two gender groups. Using a $\chi2$ difference test, the resulting model fit was then compared to a base model, in which all path coefficients were freely estimated. If no significant difference was found between the two models, then they are considered as equivalent. Table 5 showed that, except for PU → ATU, all paths were not significant. An examination of the path (PU → ATU) revealed that the path coefficient for females (β = .617) is stronger than that of the males (β = .335), suggesting that the influence of perceived usefulness on attitude towards computer use was greater for females than for males.

DISCUSSION

This study investigated the appropriateness of the Technology Acceptance Model (TAM) across males and females. All measurement models were of acceptable fit, with only minor differences across gender. Measurement equivalence was established through configural, metric, and scalar invariances. This finding indicates that the male and female sample in this study did not treat the items in the scale differently, an important aspect of score comparison. The results also showed that there were no significant differences in three paths: attitude → behavioural intention, perceived ease of use → attitude towards use, and perceived ease of use → perceived usefulness.

The findings of this study revealed that the influence of perceived usefulness on attitude towards computer use was greater for females than for males. It is possible that the attitudinal developmental trajectories for females are different from that of males. Consistent with the literature, the differences found in this study was influenced by the by males' exposure to and amount of time they spent on using technology. As such, their attitudes towards computer use may not be so dependent on the extent to which computer are perceived to be useful to other variables such as perceived enjoyment or fun (Suri, 2003). In addition, males tend to be more confident than females in the use of computers and this may have an impact on male users' attitude toward computer use (Zarrett & Malanchuk, 2005). On the hand, females tend to perceive themselves as being less able and interested in computers and it is possible that females may require a higher level of perceived usefulness in order for positive attitudes towards computer use to be developed. In order to arrive at more valid conclusions and make useful inferences, more invariance studies between genders should be conducted to ensure that any gender differences detected in the research model are not due to chance or measurement error. This study was designed to provide an example on the use of structural equation modelling procedures to establish invariance.

Implications for Educational Research in Asian Societies

In recent years, educational technology has been a focus of attention in Asian educational systems. Apart from equipping schools with ICT infrastructures, teachers are trained to integrate technology in teaching and learning. This has motivated researchers to turn their attention to examine the factors that influence technology acceptance among educational users. In recent years, many studies in technology acceptance that employed educational users have included the TAM as the research framework. Among those that were conducted in the Asia-Pacific region, few have investigated the measurement and structural invariance of the TAM (Teo et al., 2009). This study contributes to the existing research on TAM by demonstrating its applicability and factorial invariance by gender on education users in an Asian context. This provided insights into the predictive ability of the TAM beyond its original application in the business context on mostly single group samples.

Further research on gender differences in technology acceptance has the potential to generate insights into issues that are pertinent in the Asian societies. Some of these include females' reluctance to interact with computers in the same ways as males do (Mumtaz, 2001), lower exposure to technology among females (Gunn, 2003), lower level of confidence or self-efficacy in computer use (Lee, 2003), and low level of interest in computers (Gurer & Camp, 2002).

Limitations and Further Research

Some limitations to be considered when interpreting the results are the compliance rate and the self-report nature. This was a cross-sectional study where the data from this study were collected through self-reports and a single method of data collection was employed. It is possible that common method variance may arise, a situation where the associations between variables tend to become inflated.

Future research could consider examining the TAM across other sub-groups such as age, type of technologies, and culture, with a view to examine its potential predictive abilities as a model to explain the behavioral intention to use technology among users in education. In addition, it would be useful to examine the effects arising from the interactions of the TAM constructs on the predictability of its efficiency as a model to explain various sub-populations of technology users. In so doing, the explanatory powers of the TAM may be expanded for greater applicability by technology acceptance researchers. Longitudinal studies may be conducted to trace the stages of changes in the keys variable that affect intentions to use technology across time.

REFERENCES

Anderson, N., Lankhear, C., Timms, C., & Courtney, L. (2008). Because it's boring, irrelevant and I don't like computers: Why high school girls avoid professionally-oriented ICT subjects. *Computers & Education, 50*, 1304-1318.

Arbuckle, J. L. (2006). *AMOS (version 7.0) [Computer software]*. Chicago: SmallWaters.

Broos, A. (2005). Gender and information and communication technologies (IT) anxiety: Male self assurance and female hesitation. *CyberPsychology & Behaviour, 8* (1), 21-31.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

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), 982-1003.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 48*, 39-50.

Gunn, Cathy. (2003). Dominant or different? Gender issues in computer supported learning. *Journal of Asynchronous Learning Networks, 7*(1), 14-30.

Gurer, D. & Camp, T. (2002). An ACM-W literature review on women in computing. *ACM SIGCSE Bulletin, 34*(2), 121-127.

Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle, NJ: Prentice-Hall International.

Hawkins, J. (1985). Computers and girls: Rethinking the issues. *Sex Roles, 13* (3/4), 165-180.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.

Kiesler, S., Sproull, L. & Eccles, J. S. (1985). Pool balls, chips, and war games: Women in the culture of computing. *Psychology of Women Quarterly, 9*, 451-462.

Kline, R. B. (2005). *Principles and practice of structural equation modeling (2nd ed.)*. New York: Guilford Press.

Lee, A.C.K. (2003). Undergraduate students' gender differences in IT skills and attitudes. *Journal of Computer Assisted Learning, 19*(4), 488-500.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information and Management, 40*(3), 1–14.

Liaw, S. S. (2002). An Internet survey for perceptions of computers and the world wide web: Relationship, prediction, and difference. *Computers in Human Behaviour, 18*, 17-35.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*, 391-410.

Mumtaz, S. (2001). Children's enjoyment and perception of computer use in the home and the school. *Computers & Education, 36*, 347-362.

Suri, S. (2003). *Attitudinal barriers amongst teachers in distance teaching institutions of India*. Paper presented at the Forum on ICTs & Gender: Optimizing Opportunities, Kuala Lumpur, Malaysia.

Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. *Computers & Education, 52*(1), 302-312.

Teo, T. (2010). A path analysis of pre-service teachers' attitudes to computer use: Applying and extending the Technology Acceptance Model in an educational context. *Interactive Learning Environments, 18*(1), 65-79.

Teo, T., Lee, C. B., & Chai, C. S. (2008). Understanding pre-service teachers' computer attitudes: Applying and extending the Technology Acceptance Model (TAM). *Journal of Computer Assisted Learning, 24*(2), 128-143.

Teo, T., & Van Schaik, P. (2009). Understanding technology acceptance among pre-service teachers: A structural-equation modeling approach. *The Asia-Pacific Education Researcher, 18*(1), 47-66.

Teo, T., Wong, S. L., & Chai, C. S. (2008). A cross-cultural examination of the intention to use technology between Singaporean and Malaysian pre-service teachers: an application of the Technology Acceptance Model (TAM). *Journal of Educational Technology and Society, 11*(4), 265-280.

Teo, T., Lee, C. B., Chai, C. S., & Wong, S. L. (2009). *Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multigroup invariance analysis* *of the Technology Acceptance Model (TAM)*. Computers and Education, 53, 1000-1009.

Vale, C. M., & Leder, G. C. (2004). Students' views of computer-based Mathematics in the middle years: Does gender make a difference? *Education Studies in Mathematics, 56*(3), 287-312.

Vandenberg, R. J., & Lance, C. E. (2000). *A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research*. Organizational Research Methods, 3, 4–69.

Zarrett, N. R. & Malanchuk, O. (2005). Who's computing? Gender and race differences in young adults' decisions to pursue an information technology career. *New Directions for Child & Adolescent Development, 110*, 65-84.

Appendix

List of Constructs and Corresponding Items

Construct	Item	
Perceived Usefulness (Alpha = .95)	PU1	Using computers will improve my work.
	PU2	Using computers will enhance my effectiveness.
	PU3	Using computers will increase my productivity.
Perceived Ease of Use (Alpha = .95)	PEU1	My interaction with computers is clear and understandable.
	PEU2	I find it easy to get computers to do what I want it to do.
	PEU3	I find computers easy to use.
Attitudes Toward Usage (Alpha = .93)	ATU1	Computers make work more interesting.
	ATU2	Working with computers is fun.
	ATU3	I like using the computer.
Behavioural Intention to Use (Alpha = .95)	BIU1	I will use computers in future.
	BIU2	I plan to use the computer often.

Note: The above items were adapted from Compeau and Higgins (1995), Davies (1989), and Davis et al. (1989). These items have also been validated in Teo and Van Schaik (2009).