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Measure for Assesing Religious Teacher's Perception of Intention to Adopt Virtual Learning Environment (VLE)

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ABSTRACT

This study was conducted to produce empirical evidence of validity and reliability of a set of questionnaire. Questionnaire drawn from the results of previous studies and the validity of the tests will determine whether all aspects of the construct domain were represented, thus ensuring the high objectivity level of the questionnaire. In addition, an alternative approach was used to assess the discriminant validity, using heterotrait-monotrait ratio of correlations. The study empirically proves that the questionnaire used is unchanged by culture. This is important because if not, its use will be restricted to a population in which the questionnaire was developed.

Keywords: Religious Teacher's Perception, Virtual Learning Environment (VLE)

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Introduction

Virtual learning system (VLS) is an information system that facilitates e-learning have been widely implemented by education institutions to support face-to-face teaching and self managed learning in the virtual learning and education environment (Lin, 2012). Classrooms in Malaysia practise 21st century learning with the emphasis on an active student-centred learning. This method will show that the high order thinking skill (HOTS) is applied in the curiculum, assessments and co-curicular activity as well as the application of information technology and communication in preparing the students for the new landscape of higher learning and future opportunities (Ministry of Education Malaysia, 2016). Surveys conducted by the Ministry of Education in 2010 found that the use of ICT in school is limited. Approximately 80% of teachers use ICT less than one hour per week. Only a third of students stated their teachers regularly use ICT (Ministry of Education Malaysia, 2012). According to the analysis by the national audit on the use of VLE based on the number of schools who logged in to VLE from 1st march till 31 march 2014, they found that the use of VLE in schools in malaysia is low which is between 19.5% to 33.5% schools only. The audit also found that the use of VLE among teachers in Malaysia is very low, between (19.5%) to (33.5%) (Ministry of Finance Malaysia, 2013). Despite the emerging trend of using various types of e-learning systems to facilitate teaching and learning activities, the number of e-learning users is not increasing as fast as predicted such as the use of web based learning (Motaghian, et al., 2013).

There are several models and theories which previously constructed for the purpose of explaining the behavior of computer use in humans (Davis, 1989). Technology acceptance model (TAM) and (Unified Theory and Acceptance Use of Technology (UTAUT) for example, have been used repeatedly in a number of contexts (e.g. business and commercial and organizational environment), nevertheless, a similar scenario cannot be in the context of education (Venkatesh et al., 2003). Empirical studies of cultural settings and their influence on processes or outcomes of teacher's perception of intention to adopt VLE require reliable and valid measurement instruments. Such instruments would also provide practitioners with an analysis and benchmarking tool that could be used to examine the extent to which their organizational culture, which would in turn aid educational efforts in improving teacher intention and thereby encourage better performance towards VLE usage. Based on the literature, there are many instruments that are found in the business and IT systems. At the same time, the use of a specific questionnaire used in the field of education in schools is different from the innovation of information technology systems that are more practical. Researchers like Teo (2010) claimed that the instrumentation is necessary to ensure that the questionnaire remains valid, if used in a different culture from which it was developed. Hence this study was conducted to assess the validity of the tests in education to get an estimate of the extent of which the specification model can be used to verify the reliability and validity testing using PLS-SEM.

Measures of teacher's perception

To assess the psychometric properties of the measurement, the researchers analyzed the validity and reliability of the scale according to the recommendation by (Bagozzi & Yi, 1988; Fornell & Larcker, 1981) and (Hulland, 1999) namely evaluating (1) reliability, (2) the validity converges and (3) the validity of the discriminant. Thus, the analysis model used in this study involves checking the reliability, validity converge and the validity of the discriminant (Fornell & Larcker, 1981). The discriminant validity was tested to determine whether a construct measures what should be measured by checking the square root of the AVE. Each construct exceeds the correlation of

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each other, thus confirming that the instrument met the criteria for the validity of the discriminant (Fornell & Larcker, 1981). The study also used comparative table of cross-loading items to test discriminant validity to see the AVE (Chin 1998).

Although Fornell-Larcker were used in assessing discriminant validity before, there is almost no systematic examination of its effectiveness in assessing discriminant validity (Henseler, Ringle & Sarstedt 2015). This would make the Fornell-Larcker criteria (1981) having the problem of uncertainty in detecting the discriminant validity of a normal research situation. This is important because failure to disclose the discriminant validity problem can lead to biased estimates discriminating criteria of the structural parameters and formulations that do not fit the hypothesis of the relationship between constructs (Henseler, Ringle & Sarstedt 2015). Therefore, the methods commonly used in the Fornell-Larcker criteria and Cross-Loadings have problem in revealing problems of discriminant validity of the VB-SEM. This study uses recommendations by Henseler, Ringle & Sarstedt (2015) to give more attention to the discriminant validity confirmation to empirically prove measuring item.

Research Methodology

Measurement model in Structural Equation Modeling (SEM) is often referred to as the Outer model. It shows how variables manifest represents the latent constructs to be measured and to test the validity and reliability of latent constructs. Researchers developed a measurement model, before proceeding to examine the structure of the proposed model (Hair, 2010). The study was conducted by collecting data on teachers who teach Islamic education in primary and secondary schools in the state of Terengganu. Pre-test was administered on 212 teachers from primary dan secondary school to look at the teachers' understanding of the questionnaire. No specific signs exist when the questionnaire was administered, thus giving the assurance the questionnaire could be used. The original questionnaire in this study is in English. Then back-translation method and pre-test method were used. However the use of back-translation method did not eliminate the problems that might arise from differences in language or culture. Therefore, according to Brislin et al., 1973; Bullinger et al., 1993; Sechrest et al., 1972) a pre-test is necessary even after careful translation. This study used questionnaires as the data collection for the survey. Response from survey questions are collected by cross sectional time dimension. The proposed variables in the model study was analyzed to verify the research model. Questionnaire using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5) and consists of 25 items related to seven constructs of the model. Some items that did not have good face validity or did not conform to the cultural background were replaced or revised. Although face validity is often criticized as a less rigorous approach than others to assessing validity, it can provide useful information about the entire instrument and the degree to which it is meeting its intended purpose (Colton & Covert, 2007). Finally, all items were tested to meet the requirements of reliability and validity. This process ensured that each item was suitable and could be used for the corresponding concept in Malay/Education. Model studies were analyzed using SmartPLS 3.0 which is part of the structural equation modeling (SEM). PLS was selected for the analysis of data over the approach based on covariance because the study was quite complex and had a number of great items, and unstable measurement. It was also good because the relationship between the items and the variables of latent (latent variables) needed to be modeled in different modes (eg formative and reflective) (Fornell & Bookstein, 1982; Motaghian, Hassanzadeh and Moghadam, 2013). The researcher used structural equation modeling (SEM) for the purpose of fulfilling the objectives of the study which included estimation of measurement

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error for all variables specified. Reliability test was assessed using a composite reliability and Cronbach's alpha. High alpha value indicates that items in specific constructs have the same meaning and value in explaining a construct (Cronbach, 1951). To assess the internal consistency reliability, researcher selected composite reliability and Cronbach alpha because evaluation using composite reliability is equal to Cronbach alpha (Esposito Vinza, Chin, Henseler, & Wang, 2010). The composite reliability was used to address some of the shortcomings in the measurement using Cronbach alpha as suggested (Bagozzi & Yi, 1988; Hair, Sarstedt, Ringle, and Mena, 2012). Raykov (2007) describes the Cronbach alpha is limited by the assumption that the indicator has the same reliability (tau-equivalence) and efforts to maximize it may affect reliability. On the other hand, the reliability of composite is not considered to have tau-equivalence. This makes it more suitable for PLS-SEM, the priority indicator according to the respective reliability (Hair et al., 2012).

Table 1 Results of Reliability Test

Contructs	Composite Reliability	Cronbachs Alpha	AVE
Compatibility	0.944	0.921	0.809
Ease of Use	0.943	0.909	0.847
Facilitating Condition	0.905	0.843	0.762
Intention	0.948	0.927	0.820
Personel Innovation	0.892	0.819	0.735
Usefulness	0.966	0.953	0.875
Social Influence	0.928	0.885	0.812

In this study (Table 1), all of the items meet the guidelines to construct composite reliability greater than 0.70 (Hair et al., 2006) and the reported Cronbach alpha surpassed the minimum level of 0.60 (Nunnally, Bernstein, & Berge, 1967), or 0.70 (Nunnally and Bernstein, 1994). The validity of the construct was tested through two methods, namely convergent validity and discriminant validity (Hung, Chang, & Hwang, 2011) by examining the AVE (average variance extracted) of each construct.

For convergent validity (Table 2), it refers to the convergence of an item to construct represented. The method used to test the convergent validity is by measuring the AVE using the AVE guidelines which is equal to or greater than 0.50 (Bagozzi & Yi, 1988). Apart from that the terms convergent validity can be referred to construct loading which is equal or more than 0.7 (Fornell & Larcker, 1981).

Discriminant validity is the extent to which the construct is truly distinct from other constructs, providing the evident that the construct is unique and capture some phenomena that others constructs do not (Hair et al., 2010). Through literature review, there's an alternative approach, based on the matrix multitrait-multimethod, to assess the discriminant validity of heterotrait-monotrait ratio of correlations (HTMT). There are two ways to use HTMT to assess discriminant validity: (1) as a criteria or (2) as a statistical test. For the test criteria, if the HTMT is greater than the value of 0.85 (Kline, 2011), or the value of 0.90 (Gold et al., 2001), it shows the existence of discriminant validity issues. The second test criteria according to Henseler et al. (2015) is to test the null hypothesis (H0: HTMT ≥ 1) against the alternative hypothesis (H1: HTMT <1) and if the confidence interval contains the value of one, this indicates discriminant validity issues.

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Table 2: Convergent validity

Konstruk	COM	EOU	FC	IT	PITT	PU	SI
com1	0.895						
com2	0.866						
com3	0.915						
com4	0.920						
eou1		0.937					
eou2		0.943					
eou3		0.880					
fc1			0.808				
fc2			0.896				
fc3			0.910				
it1				0.913			
it2				0.925			
it3				0.907			
it4				0.877			
pit1					0.890		
pit2					0.851		
pit3					0.829		
pu1						0.929	
pu2						0.932	
pu3						0.949	
pu4						0.933	
si1							0.909
si2							0.922
si3							0.870

Table 3: Discriminant validity (Fornell-Larcker Criterium)

	COM	**EOU**	**FC**	**IT**	**PITT**	**PU**	**SI**
COM	**0.899**						
EOU	0.757	**0.920**					
FC	0.699	0.663	**0.873**				
IT	0.738	0.772	0.608	**0.906**			
PIT	0.710	0.703	0.781	0.670	**0.857**		
PU	0.778	0.805	0.619	0.771	0.656	**0.936**	
SI	0.742	0.637	0.659	0.632	0.588	0.719	**0.901**

Note: Values on the diagonal (bolded) are square root of the AVE while the off-diagonals are correlations

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Table 4: Discriminant validity (Cross loading)

	COM	EOU	FC	IT	PIT	PU	SI
com1	**0.895**	0.693	0.593	0.684	0.624	0.695	0.680
com2	**0.866**	0.629	0.612	0.627	0.647	0.685	0.638
com3	**0.915**	0.707	0.627	0.667	0.620	0.727	0.660
com4	**0.920**	0.691	0.684	0.675	0.664	0.692	0.688
eou1	0.712	**0.937**	0.589	0.716	0.634	0.740	0.612
eou2	0.732	**0.943**	0.659	0.734	0.682	0.732	0.595
eou3	0.643	**0.880**	0.582	0.681	0.624	0.752	0.552
fc1	0.520	0.490	**0.808**	0.455	0.579	0.449	0.497
fc2	0.598	0.579	**0.896**	0.524	0.705	0.512	0.526
fc3	0.696	0.652	**0.910**	0.600	0.746	0.639	0.683
it1	0.669	0.694	0.580	**0.913**	0.609	0.708	0.586
it2	0.681	0.717	0.550	**0.925**	0.610	0.712	0.565
it3	0.664	0.685	0.516	**0.907**	0.591	0.727	0.555
it4	0.660	0.702	0.557	**0.877**	0.617	0.643	0.583
pit1	0.614	0.649	0.666	0.601	**0.890**	0.622	0.538
pit2	0.600	0.557	0.684	0.528	**0.851**	0.491	0.488
pit3	0.612	0.596	0.660	0.589	**0.829**	0.566	0.483
pu1	0.721	0.754	0.573	0.736	0.610	**0.929**	0.687
pu2	0.710	0.740	0.575	0.721	0.589	**0.932**	0.662
pu3	0.739	0.770	0.577	0.725	0.611	**0.949**	0.671
pu4	0.743	0.747	0.591	0.701	0.646	**0.933**	0.670
si1	0.617	0.540	0.585	0.513	0.490	0.582	**0.909**
si2	0.640	0.537	0.603	0.535	0.524	0.618	**0.922**
si3	0.729	0.629	0.589	0.639	0.563	0.722	**0.870**

If the HTMT value is greater than HTMT.85 value of 0.85 or HTMT.90 value of 0.90, there is a problem of discriminant validity. Table 4 shows the results of HTMT is greater than the value of 0.85 (Kline, 2011) while the one problem regarding the HTMT.90 criterion is shaded grey or the value of 0.90 (Gold et al., 2001). As shown in Table 4 all the values passed the HTMT.85 (Kline, 2011) and also the HTMT inference does not indicate discriminant validity problems. Comparing the approaches shows that HTMT.85 always exhibits higher or equal sensitivity, but lower or equal specificity values compared to HTMT.90. That is,HTMT.85 is more likely to indicate a lack of discriminant validity, an expected finding considering the criterion's lower threshold value.

Discussion and Conclusions

This article reports the development and validation studies of a self-report measure for assessing teachers' perceptions of intention to adopt VLE. Based on the analysis, all items fulfill the guidelines of the confidence test that is based on composite reliability greater than 0.70 (Bagozzi and Yi, 1988, Hair et al., 2006) and Cronbach's alpha greater than 0.70 (Nunally and Bernstein, 1994). The results of the

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analysis of convergent validity was assessed using the average variance extracted (AVE). It showed all item fulfilled the guidelines of AVE which is greater than 0.5 (Bagozzi & Yi, 1988) and all loading items is significant with latent variables, (p <0.05) and above the minimum level of 0.4 by Hulland (1999).The discriminant validity tests (Fornell & Larcker) fulfill the conditions, when the square root of the average value of the extracted (AVE) for each construct is greater than any of the other constructs. Similarly the value of the cross-loading item is higher than the other constructs. Heterotrait-monotrait ratio of correlations (HTMT) analysis using the test criteria according to Henseler et al (2015) also showed no problems of discriminant validity. From the table shown, all discriminant validity tests have fulfilled the conditions and support the discriminant validity analysis that exist between the two reflective constructs. Measurement model in PLS analysis involves checking the reliability, convergent validity and discriminant validity (Fornell & Larcker, 1981).

Table 4: Discriminant validity of Heterotrait-Monotrait Ratio of Correlations (HTMT)

EC	FC	ITT	PEOU	PIIT	PU
.78 (0.731)(0.853)					
.79 (0.723)(0.867)	.68 (0.584)(0.771)				
.82 (0.763)(0.885)	.75 (0.658)(0.823)	.84 (0.767)(0.904)			
.81 (0.754)(0.880)	.93 (0.870)(0.979)	.76 (0.688)(0.845)	.81 (0.734)(0.871)		
.83 (0.763)(0.881)	.68 (0.600)(0.758)	.82 (0.739)(0.871)	.86 (0.805)(0.913)	.73 (0.654)(0.813)	
.81 (0.744)(0.870)	.75 (0.668)(0.830)	.68 (0.566)(0.783)	.70 (0.608)(0.797)	.68 (0.570)(0.782)	.77 (0.693)(0.836)

Measurements model is evaluated in terms of loading items, reliability, convergent validity and discriminant validity. All loading items are significant with latent variables (p <0.05) and above the minimum level of 0.4 by (Hulland, 1999). Reliability was assessed using Cronbach's alpha and composite reliability. All construct items meet the guidelines of composite reliability greater than 0.70 (Hair, Tatham, Anderson & Black, 2006) and Cronbach's alpha greater than 0.70 (Nunally and Bernstein, 1994). Convergent validity was assessed using the average variance extracted (AVE). All items meet the guidelines of average

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variance extracted (AVE) which is greater than 0.50 (Hair et al., 2006). The study also confirmed that the instrument meets the discriminant validity using the HTMT test criteria. Previously the Fornell-Larcker test and cross loading test were a pre-requisite generally accepted to analyze the relationship between latent for Structural Equation Modeling based on variance (VB-SEM). Therefore, the results of the analysis in the measurement model indicated that the questionnaire meets the standards of reliability and construct validity. Verification of measurement model is needed to evaluate the structural model that will be carried out later. If the model does not have the minimum acceptable measurement reliability and validity, then the structural model is not expected to contribute anything (Henseler, Hubona, & Ray, 2016). The purpose of this study was to validate a questionnaire using a culture sample which is different from of the original sample used in the development of the instrument. In this study, a sample of 212 teachers of Islamic Education in Malaysia were chosen to facilitate a better understanding of how they could respond to the use of virtual technology. From the results of the tests carried out, the items can be used in a variety of different cultural contexts, thus providing legal proof that the items in the questionnaire have the ability to measure the acceptance of Islamic Education teachers in Malaysia.

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