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The Approaches to Teaching Inventory: A Preliminary Validation of the Malaysian Translation

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Abstract: The purpose of this study was to evaluate a Malaysian translation of the 22-item Approaches to Teaching Inventory for application in higher education. The Approaches to Teaching Inventory was a quantitative measure used by teachers of higher education to gauge their own teaching approaches that had been psychometrically assessed and widely used in western universities. Data in the present study came from 172 teachers in two institutions of higher learning. Principal factor analyses with varimax rotation and confirmatory factor analyses support a model with 17 items categorized into five sub-factors that were subsumed within two main factors. The alpha values of both the sub-factors and main factors were good. While broadly supporting the use of the Malaysian version in providing insights into the teaching approaches, the findings of the present study suggested the need to examine other factors that may contribute towards the inventory's future improvement for application in the Malaysian higher education context.

The evaluation of teaching in higher education has long been established in the Western countries. The importance of gaining some form of measurement of teaching effectiveness reflects the growing importance of the quality of teaching and also the increasing competition between higher institutions. Malaysia, a developing country, is not different. There has been an upsurge of interest in the area of quality assurances from a range of different perspectives of which teaching quality ranks high (Goh & Wong, 2013). Malaysia has embarked on a new Malaysian Economic Transformation Programme (METP) of which the provision of high quality education features prominently. Teachers are under pressure to meet the METP's expectations to perform effectively in classrooms (Economic Planning Unit, 2010). In fact, "improving teacher quality in the education system is a top priority" within the METP blueprint (Jala 2010).

One effective method to address the issue of teaching quality would be to develop appropriate quantitative measures to provide empirical data on aspects of teaching approaches or methods (Leckey & Neill, 2001). However, Lonka, Olkinuora and Mäkinen (2004) caution that the development of a psychometrically strong measure takes a long time and encompass rigorous processes. The other option would be to use an existing measure that has been developed and validated in various contexts and have it modified, adapted or translated for use in a new context (Richardson, 2004). Nevertheless, Richardson (2004) also cautions that a validated measure needs to have its psychometric properties tested in the new context before it can be used for decision making in any educational endeavors.

While there are many possible sources of evaluative data on teaching quality, one form of input to evaluating teaching is the feedback from the teachers themselves about their own

teaching approaches. Teachers know the ways in which learning takes place, and they know the appropriate teaching approaches to make learning happen. The changing landscape of student learning and the role teachers play in this learning require that teachers are continuously developing themselves professionally. One way is through a self-evaluation of their teaching. The practice of obtaining feedback from individual teachers is widespread and one of the most frequently used in the Western countries has been the Approaches to Teaching Inventory created by Trigwell and Prosser (2004). Although used extensively in Western universities, its use is still lacking in Malaysian higher education. In fact, to the authors' knowledge, currently there is no evidence of a translated version for use in Malaysia in *Bahasa Malaysia* (Malaysian language) although there have been a few studies that have used the Approaches to Teaching Inventory in the English version (e.g. Kek, 2006; Lew, Gooi, Wong & Lee, 2011). This article reports the first attempt to evaluate a *Bahasa Malaysia* version of the Approaches to Teaching Inventory for use with Malaysian teachers of higher education.

The Approaches to Teaching Inventory

A preliminary version of the Approaches to Teaching Inventory using a qualitative approach known as phenomenography was developed by Trigwell, Prosser and Taylor (1994) in 1996 with a group of 24 science teachers. Phenomenography is a qualitative research approach in which the interview is the main research method. The outcome of phenomenographic research is therefore a description, of the qualitative variation in the ways the participants experience, understand, perceive or conceptualize a concept (Marton, 1994). This preliminary version showed that it was feasible to collect data on teachers' approaches to teaching as a measure of teaching quality. Trigwell and Prosser (1996) explained that it was possible to match the teachers' intentions (concept development, conceptual change, information transmission, concept acquisition) towards teaching with their teaching strategies (student focused, teacher-focused, teacher-student interaction) through the Approaches to Teaching Inventory. For example, those teachers who geared themselves towards developing and changing their students' conceptions approached their teaching in a student oriented manner while a teacher with the intention of transmitting information to students had a more teacher oriented approach. The preliminary version of the Approaches to Teaching Inventory had 16 items and focused on two distinct approaches: a student-oriented approach (conceptual change/student focus) with the intention towards student learning. The other approach was a more teacher-oriented approach with the intention towards information transmission (information transmission/teacher focus). A re-analysis of the 16-item Approaches to Teaching Inventory with 650 respondents indicated a structure with two main factors. Cronbach alpha values were 0.75 for the conceptual change/student focus factor and 0.73 for the information transmission/teacher focus factor (Trigwell & Prosser, 2004). When the Approaches to Teaching Inventory was correlated with student learning, it was found that there was a positive relation between teaching approaches and students' learning outcomes (Trigwell & Prosser, 2004; Gibbs & Coffey, 2004). A student-focused approach to teaching showed a positive correlation with students' desire to understand what they are studying, while a teacher-focused approach to teaching exhibited a positive correlation towards a superficial approach to learning (memorizing or copying) on the part of the students.

When the factor structure of the 16-item Approaches to Teaching Inventory was examined using a confirmatory factor analyses from 1000 respondents from mostly Western universities (United Kingdom, United States, Scandinavia) for various disciplines, the results

supported a two-factor structure (CFI = .931, TLI = .916, RMSEA = .040, SRMR = .043) (Prosser & Trigwell, 2006). Prosser and Trigwell (2006) also found that a four-factor model (conceptual change/student focus and information transmission/teacher focus were divided into 'intention' and 'strategy' subscales) also had good model fit (CFI = .934, TLI = .915, RMSEA = .041, SRMR = .043). Nevertheless, as the correlation between the intention and strategy subscales were high (CCSF = 0.96; ITTF = 0.97), the authors recommended the two-factor model.

At about the same time, Trigwell, Prosser and Ginns (2005) expanded the 16-item ATI to 22 items to better reflect the changing needs to monitor approaches to teaching. Trigwell, *et.al.* (2005) maintained the now 22-item Approaches to Teaching Inventory's original focus of two key approaches to teaching (a conceptual change/student-focused approach and an information transfer/teacher-focused approach), however the inventory now had 11 items in each of the scales. A strong two factor model was found for the 22-item Approaches to Teaching Inventory (CFI = 0.95, NNFI = 0.94, RMSEA = 0.06 (90% confidence interval 0.057–0.072), SRMR = 0.08). Cronbach alpha values were robust with 0.86 for the conceptual change/student-focused factor and 0.83 for the information transfer/teacher-focused factor. It was concluded that the 22-item Approaches to Teaching Inventory was a useful tool to provide a comprehensive framework of the variation in approaches to teaching for teachers in higher education (Trigwell, Prosser & Ginns, 2005; Prosser & Trigwell, 2006).

The purpose of this investigation was to evaluate whether the analyses found in the 22-item English version (Trigwell & Prosser, 2004; Trigwell, Prosser & Ginns, 2005) would also apply to a Malaysian version which had the 22-item scale translated into *Bahasa Malaysia*. The Approaches to Teaching Inventory has been criticized by Meyer and Eley (2006) as they found that the two types of approaches to teaching were actually on the same dimension.

Method

Participants

Teachers in this study came from two private higher educational institutions of the Indigenous People's Trust Council of Malaysia (or MARA in the Malaysian language). Teachers in these two institutions taught various programs at the diploma and degree levels. Precise number of teachers in the two institutions was not collected, but the total number of teachers for the two institutions was estimated to be 213, based on the number of copies of the ATI requested by the institutions for use in the study. Valid responses were obtained from 172 teachers (36 males and 136 females), representing a response rate of 80.7 percent. Ethnicities comprised of 167 Malay teachers (97%), 3 Chinese teachers (2%) and 1 Indian teacher (1%). Those teachers who worked from 1-6 years made up 82%, 7-10 years at 14.5%, and greater than 10 years were 3.5% of the participants.

Measures

The measure used in this study was the 22-item Approaches to Teaching Inventory (Trigwell, Prosser & Ginns, 2005) designed to identify the different conceptions of, and approaches to teaching as experienced by higher education teachers. The 22-item Approaches to Teaching Inventory consisted of eleven items on the conceptual change/student-focused scale and another eleven items on the information transmission/teacher-focused scale. Each item was rated on a five-point Likert scale ranging from 1 (only rarely true) to 5 (almost always true); all items were scored positively. The 22-item Approaches to Teaching Inventory was translated following an independent translation (through a professional certified translator) and back translation (through the authors' colleague who was also a trained translator) (Brislin, 1980). Minor corrections were made to the final Bahasa Malaysia-Approaches to Teaching Inventory by the first author. The original English version and the back-translated version were very similar. It is noteworthy to say that like all other rigorously developed measures, the Approaches to Teaching Inventory items are written in an unambiguous and straightforward language. The translation processes were considered sufficient for the purposes of the present study which was exploratory in nature. Nevertheless, it is acknowledged that further refinement of the *Bahasa Malaysia* translation may additionally benefit from the International Test Commission (ITC) guidelines (Hambleton, Merenda, & Spielberge, 2005).

Analysis

When the translated 22-item Bahasa Malaysia-Approaches to Teaching Inventory was analyzed through a two-factor structure confirmatory factor analyses similar to what was conducted by Trigwell, Prosser and Ginns (2005), it did not fit into a two-factor structure as reported by the original authors. A decision was made to apply exploratory factor analyses at the item level to investigate the internal structure of the translated version. A confirmatory factor analysis was subsequently used to analyze the model that was hypothesized through the exploratory factor analyses.

A combination of the scree plot test and the acceptance of eigenvalues that had a value greater than one were used to identify the number of factors likely to be extracted in the exploratory factor analysis. A factor loading of 0.50 was used as the cut off point for variable acceptance. The goodness-of-fit index (GFI), the adjusted goodness-of-fit (AGFI), the comparative fit index (CFI) values of equal to or greater than 0.90, and the Root Mean Square Error of Approximation (RMSEA) value equal to or smaller than 0.05 were used to determine good model fit in the confirmatory factor analysis (Schumacker & Lomax, 2004). However, the RMSEA value of less than 0.08 (90% confidence level) could also be used as indicators of a relatively good fit (Spector, 2001).

Results

The Bahasa Malaysia-Approaches to Teaching Inventory was examined through a confirmatory factor analysis similar to that conducted by Trigwell, Prosser and Ginns (2005). However, the fit indices (Table 1) did not fit the data well: GFI=0.78, AGFI=0.73, CFI=0.78, and RMSEA=0.08. Although Trigwell, Prosser and Ginns (2005) did not use any error covariances in their analysis, the present study included six error covariances to try to obtain a

better model fit. The items that were constrained were items referred to as: teacher transmission of information, emphasis on tests and examinations, teacher lead discussions, student lead discussion, and student note taking. Although the overall model did not achieve an acceptable fit, the indices improved with the CFI attaining a value of 0.90 and RMSEA at an improved value of 0.07. However, the inclusion of six error covariances indicated that the model cannot be supported.

Model	χ^2	df	p	GFI	AGFI	CFI	RMSEA
2-Factor Model	477	208	0.00	0.80	0.78	0.85	0.08
2-Factor Model with 6 error covariances	408	200	0.00	0.84	0.81	0.90	0.07

Table 1: Fit indices of the present study similar to that shown by Trigwell, Prosser and Ginns (2005)

The next step entailed a principal factor analysis with varimax rotation. Two indicators were tested for sample appropriateness for such an analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy index was 0.88, and Bartlett's test of Sphericity was significant, $\chi^2 = 1382.63$, $p < 0.0001$, indicating that the sample and correlation matrix were within an acceptable range for the analysis. The principal factor analysis with varimax rotation resulted in five underlying factors being identified which explained 59.46 percent of the total variance (Table 2). Each of the factors were interpreted as: Factor 1- Making meaning, where students independently develop new meanings on their own; Factor 2 – Information transmission, where students receive knowledge from the teachers; Factor 3 – Note focus, where note making were important amongst students; Factor 4 – Examination oriented, where teaching were geared towards examinations; and Factor 5 – Student lead discussion, where teachers encouraged student to initiate discussion.

Sample indicative items	Factors				
	1	2	3	4	5
<i>Making Meaning</i>					
I encourage students to restructure their existing knowledge	0.58				
I see teaching as helping students develop new ways of thinking in this subject.	0.69				
<i>Information transmission</i>					
In this subject students should focus their study on what I provide them.		0.72			
In this subject my teaching focuses on the good presentation of information to students		0.74			
<i>Note Focus</i>					
In this subject I concentrate on covering the information that might be available from key texts and readings.			0.56		
It is important to present a lot of facts to students so that they know what they have to learn for this subject.			0.62		
<i>Examination Oriented</i>					
In this subject, I provide the students with the information they will need to pass the formal assessments.				0.74	
I should know the answers to any questions that students may put to me during this subject				0.74	
<i>Student Lead Discussion</i>					
I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.					0.74
In teaching sessions for this subject, I deliberately provoke debate and discussion					0.57
Eigenvalue	7.11	2.13	1.34	1.31	1.19
% Explained variance	16.41	12.20	10.96	10.95	8.93
Cumulative % explained variance	16.42	28.61	39.57	50.53	59.46

Table 2: Sample items showing loadings, eigenvalue and percentage of explained variance for the dimensions of the Bahasa Malaysia Approaches to Teaching Inventory

Altogether, two factors could explain 28.61 percent of the item variances after the principal factor analysis. A decision was made to conduct a second principal factor analysis with varimax rotation but this time restricted to two factors. All the items loaded accordingly to two factors and together they accounted for 44 percent of the item variance. The first factor was interpreted as a student focus approach, while the second factor showed a teacher focus approach. However, five items (items 6, 10, 15, 18 and 20) were omitted in subsequent analysis because they either had low loadings or had high loadings on both factors. The model that was hypothesized based on the principal factor analyses was that there were five sub-factors which could be subsumed under two main factors as shown in Figure 1. The five sub-factors were labeled as Making Meaning (4 items), Student Lead Discussion (3 items), Information Transmission (3 items), Examination Oriented (4 items), and Note Focus (3 items). The two factors that emerged from the forced solution of the principal factor analysis were named the Student-Focus Approach and the Teacher-Focus Approach. The Student-Focus Approach contained the sub-scales: Making Meaning and Student Lead Discussion. The Teacher-Focus Approach contained the sub-scales: Information Transmission, Examination Oriented, and Note

Focus. When the hypothesized model was compared to the model postulated by Trigwell and Prosser (2004) and Trigwell, Prosser and Ginns (2005), the items in the Student-Focus Approach belonged to the conceptual change/student-focused scale while the items in the Teacher-Focus Approach belonged to the information transmission/teacher-focused scale. However, item 3 (“In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying”) from the original conceptual change/student-focused scale loaded onto to the Teacher-Focus Approach factor in the present study and it was decided to retain its use in the Teacher-Focus Approach factor.

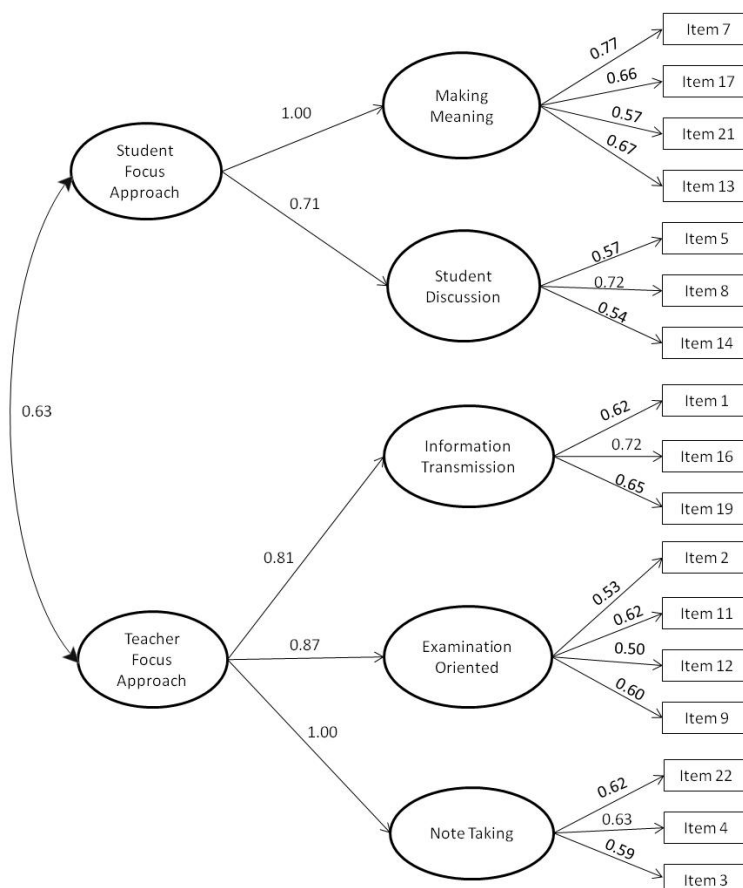


Figure 1: Hypothesized 2-factor model of the Bahasa Malaysia Approaches to Teaching Inventory following principal component analyses

A confirmatory factor analysis of the hypothesized model indicated that the model seemed to fit the data with acceptable indices (Table 3), GFI = 0.90, AGFI=0.87, CFI=0.90 and RMSEA=0.06. No constraints were needed.

Model	χ^2	df	p	GFI	AGFI	CFI	RMSEA
2-Factor Model	219.3	113	0.00	0.90	0.87	0.90	0.06

Table 3: Goodness-of-fit indices for CFA of the Bahasa Malaysia Approaches to Teaching Inventory

The alpha values ranged from 0.60 to 0.76 for the five sub-factors (Making Meaning, =0.76; Student Lead Discussion, =0.64; Information Transmission, =0.70; Examination oriented, =0.63; and Note Focus, =0.60) with a median of 0.67 as being acceptable reliability (Schmidt, 1996). The internal consistency of the two main factors was high where the Student-Focus Approach had alpha of 0.82 and the Teacher-Focus Approach factor had alpha of 0.83.

Concluding Discussion

This study constitutes the first investigation in which a *Bahasa Malaysia* Approaches to Teaching is used with higher education teachers in Malaysia to validate its model structures. This study has shown that it is best not to readily fit the Approaches to Teaching Inventory into the two-factor or four-factor models as posited by its original authors. It is probable that future studies need to take into consideration the differing structure of the Approaches to Teaching Inventory when it is used in a different context and culture.

The results of the confirmatory factor analysis in this study showed that the two factor structure that underlie the original 22-item Approaches to Teaching Inventory was not automatically replicated with the *Bahasa Malaysia* translation, even with constraints included. The postulated structure of the measure was not found when the translated version was used in the Malaysian higher education context. It would seem that the Approaches to Teaching Inventory was context dependent and therefore, something to be aware of when using the questionnaire. Prosser and Trigwell (2006) have recommended that the use of the Approaches to Teaching Inventory must be seen as “contextual or relational, and the approach adopted by a teacher in one context may not be the same as the approach the same teacher would adopt in a different context’ (p. 416). The context-dependency of the questionnaire could have played a role as teachers in Malaysia might be operating in a different higher education system, thus the Approaches to Teaching inventory does require adaptation of the items to the context in which the measures are to be used since meanings to sentences and concepts may differ.

Based on the initial unacceptable model-fit, a decision was made to analyze the data with two principal factor analyses with varimax rotation, freely at first, which showed that the majority of the variances pointed to two factors. Thus, a second principal factor analysis was conducted but this time the solution was forced to two factors. A confirmatory factor analysis revealed an acceptable model (Table 3). The final result indicated that the two main factors as identified by Prosser and Trigwell (2006) were revealed in the present study, although items had to be removed or moved to a different scale. The present study supported Meyer and Eley’s (2006) claim of uni-dimensionality as the current model showed that there were two factors, Student Focus Approach and Teacher Focus Approach, which were positively connected (0.63) (Figure 1). The result also indicated that there were five sub-factors incorporated into the two main factors (Figure 1). Besides investigating whether such occurrences were due to context-dependency issues, additional study to examine the effects of other potentially confounding factors such as student responsiveness and attitudes towards teachers’ teaching approaches, study load, and the semesters the students were in is needed in future study.

Items 6, 10, 15, 18 and 20 had to be dropped in the final model. Apparently, these five items could not be subsumed in any of the two factors and could not be automatically classified as a student-focus approach aimed at conceptual change or a teacher-focus approach aimed at information transmission. Teachers might have interpreted that “covering the information that might be available from key texts and readings” (item 6) and “to give students a good set of notes” (item 10) were expected of the teachers rather than a teaching approach. These could be due to the fact that teachers in Malaysia have been accustomed to a ‘spoon feeding’ type of teaching that embraced photocopying notes for students and a drill and practice approach for examination (Raja Musa & Nik Yusoff, 2000; “UPSR and PMR may be abolished”, 2010; Goh, 2012). Item 15 (a lot of teaching time in this subject should be used to question students’ ideas), item 18 (it is important for me to monitor students’ changed understanding of the subject matter) and item 20 (teaching in this subject should help students question their own understanding of the subject matter) represented teaching approaches that geared towards students’ concept development, conceptual change, and concept acquisition. It may therefore be a cause for concern that, for teachers in Malaysian higher education, scores on these items cannot be classified under a student-focus approach or a teacher-focus approach. It would appear that whether students were able to learn at the conceptual level or not was perhaps seen as not very important. Such interpretation needs further examination through a wider use of the translated version in different higher education context and in other states of Malaysia.

In this study, only 172 teachers voluntarily participated. These teachers might be the ones who were motivated to improve their teaching and therefore might have influenced the range of participants’ scores. However, this study was a first attempt to study the usability of the questionnaire and did not set out to give a representative picture of the approaches of teaching of the teachers in Malaysian higher education. This would not be possible as the Approaches to Teaching Inventory is relational and does not assess general orientations but specific responses to a particular context (Prosser & Trigwell, 2006)

From this preliminary validation study of the 17-item Bahasa Malaysia Approaches to Teaching Inventory, it appears that the translated version has dimensions that can discriminate between the approaches to teaching and thus can be used when the aim is to assist Malaysian higher education teachers improve their approaches to teaching within their own educational practices. It can also be used to analyse educational outcomes following a change in teaching innovations or endeavors in professional development (such as a teacher’s perceptions of the teaching innovations or motivation for teaching). However, it must be noted that the questionnaire cannot possibly represent the complete perceptions or actions of a teacher (Meyer and Eley, 2006). Prosser and Trigwell (2006) have repeatedly cautioned that the data obtained from the questionnaire is very context-bound. Therefore, in using the questionnaire, other important information such as subject taught, semester taught, and policy of the institution should also be taken into account.

A wider group of higher education teachers especially a better spread of ethnicity and some form of relationship study between the approaches of teaching and approaches to studying of teachers’ students, such as those as conducted by Gibbs and Coffey (2004), could supplement the data obtained in this study. The data derived in the present study is quantitative; perhaps interviews with teachers about their teaching behaviors could offer a qualitatively different understanding of their teaching approaches in greater depth, but importantly, to shed some light as to why some of the items caused confusion. Interviewing students about their perceptions of their teachers’ approaches to teaching and observation of a teacher during class could provide the triangulation needed to further support the validity of the Bahasa Malaysia Approaches to

Teaching Inventory and to better ascertain the approaches of teachers in higher education in Malaysia

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