

PEDAGOGY IN ENHANCING STUDENTS' INTELLECTUAL QUALITY (PEIQ): CONCEPTUALIZATION, DEVELOPMENT AND VALIDATION

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ABSTRACT

The purpose of this study was to build the questionnaire of Pre-university Teachers' Pedagogy In Enhancing Students' Intellectual Quality. The questionnaire was divided into three dimensions; (i) Teaching Plan; (ii) Teaching Strategy; and (iii) Teaching Assessment. The items were deductively constructed through reading from literature review and inductively constructed through interview with five pre-university teachers and five matriculation college lecturers. For the purpose of pilot study to obtain the validation and reliability, the items in the questionnaire were distributed to 502 teachers from 38 pre-university schools in Penang, Malaysia. Furthermore, the items were validated through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) using SPSS 22.0 and AMOS to obtain the reliability of the questionnaire. The conclusions from the EFA and CFA found that the items constructed for each dimension showed a high degree of authenticity and reliability. The findings of the final analysis showed that for Teaching Plan dimension, seven items are retained while for the Teaching Strategy dimension, 16 items are retained and the last dimension which is the Teaching Assessment Dimension, six items are retained. Hence, with the EFA and CFA results, 29 items remained for the questionnaire of Pre-university Teachers' Pedagogy In Enhancing Students' Intellectual Quality from a total of 90 items that can be used on actual samples. The construction of items in the questionnaire of Pre-university Teachers' Pedagogy In Enhancing Students' Intellectual Quality contributed to the enhancement of knowledge on the best pedagogical practices used by pre-university teachers in improving intellectual quality among students. It is hoped that this questionnaire will help the teachers and educational curriculum planners to plan and design suitable teaching and learning strategies toward enhancing the students' intellectual quality.

Keywords: Pedagogy, Intellectual Quality, Exploratory Factor Analysis, Confirmatory Factor Analysis

INTRODUCTION

It is essential for a student particularly at pre-university level to have high intellectual level. Intellectual may be defined as thinking in a complex manner, rational and abstract, adapting oneself in effective problem solving and the ability to acquire new knowledge (Osuna, 2008; Gunarsa et al., 1991; Saifuddin Azwar, 1996). Students need intellectual ability to become more successful and excellent in academic, work and life (Falk & Millar 2002; Hambur, Rowe & Luc, 2002; Lublin, 2003). Newmann et al., (1996) suggested, when students from various background implement an assignment that involves a high intellectual level, overall students' academic achievement shall also increase and will reduce conventional teaching and learning. QSRLS study in Australia (2001) has made a generalization that focussing on the intellectual quality of students is necessary to show an excellent academic achievement.

This study adapted the concept of intellectual quality as one of the dimensions contained within the framework of productive pedagogy concept. Productive pedagogy concept was submitted by a group of researchers in Queensland, Australia, who has conducted a study 'Queensland School Reform Longitudinal Study' (QSRLS) (Lingard et al., 2001). This study (QSRLS) proposed the concept of pedagogy that can increase variety of student learning outcomes is termed as 'productive pedagogy' (Lingard et al., 2001).

Among the important dimensions which need to be emphasized in productive pedagogy in order to increase student learning outcomes is the intellectual qualities (Lingard et al., 2001). Intellectual quality is placed as the main focus to determine how far teachers ensure their students able to modify the information and ideas learnt to a more meaningful shape and apply them through an in-depth discussion.

The studies related to the concept of productive pedagogy emphasize on dimensions of intellectual quality aimed to produce students who are more critical thinker, creative and analytical (Sorin & Klein, 2002; Lingard et al., 2001; Gore et al., 2001; Wilson & Klein, 2000). This study aims to develop teachers' pedagogical constructs to improve the intellectual quality of students based on quality of the intellectual dimension on the productive pedagogy (Lingard et al., 2001). Quality measurement for each construct is looking at the intellectual level of pre-university students.

PEDAGOGY IN ENHANCING INTELLECTUAL QUALITY

The intellectual ability is often applied or integrated into teaching and learning based on the subjects taught (Kearns, 2001). Maznah Ismail and Farouk Abdul Majid (2004), describes teacher's teaching practice is a significant factor in influencing the increase of students intellectual level. Lingard and Ladwig (2001) study found that elements of the intellectual qualities can be applied in teaching in order to help students master the concept and content of the lesson more effectively. The ability to think effectively is important to help students be more knowledgeable, competent and able to think critically and creatively, and make decisions and solve problems more efficiently (Sukiman Saad Noor Shah Saad and Mohd Uzi Dollah, 2012).

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Among the important dimensions which need to be emphasized in productive pedagogy in increasing student learning outcomes are the intellectual qualities (Lingard et al., 2001). Intellectual quality is placed as the main focus to determine the extent to which teachers able to make students modify the information and ideas learnt to a more meaningful shape and able to apply them through an in-depth discussion. Description along with a checklist of every dimension and sub-dimension of the intellectual qualities contained within the framework of productive pedagogy is shown in Table 1. (Lingard et al.,2001).

Table 1
Dimensions and Sub dimensions of Intellectual Quality Based on Learning Outcomes in the Productive Pedagogy Framework

Main Dimension	Sub Dimension	Explanation
1. Intellectual Quality	1.1 Higher Order Thinking	Involve adaptation of information and ideas. This adaptation happened when students integrate facts and ideas and able to synthesize, make generalization, explain, hypothesize or make conclusions and translation.
	1.2 In-depth Knowledge	In-depth knowledge emphasized on ideas that focused on topic or discipline that is considered important.
	1.3 In-depth understanding	In-depth understanding will form when students gained a complex relationship of the concept that focussed on a topic or discipline. Students can form new information by finding the relationship, solve problems, form explanation and draw conclusions.
	1.4 Constructive Discussion	There is good interaction between teachers and students on the topics discussed. The interaction that exists is cross patterned and create a shared understanding.
	1.5 Problem Solving	Involves in-depth understanding that not only remain as an information but rather the construction and also involve subjects such as political, social and cultural influence and implications.
	1.6 Metalanguage	Involves instruction that combines frequent discussions on the talk about how talking and writing process is done. It also involve vocabulary and specific technical word.

(Source: Lingard and Ladwig, 2001)

The studies related to the concept of productive pedagogy emphasize on dimensions of intellectual quality aims to produce a more critically, creatively and analytically thinking students (Sorin & Klein, 2002; Lingard et al., 2001; Gore et al., 2001; Wilson & Klein, 2000). In the context of this study, the intellectual quality is divided into six constructs based on intellectual quality dimensions in the productive pedagogy (Lingard et al., 2001): (i) higher-order thinking; (ii) in-depth knowledge; (iii) in-depth understanding; (iv) constructive discussion (v) problem solving and (vi) metalanguage. This study aims to identify pre-university teachers' pedagogical practices in enhancing the students' intellectual quality. Thus, the dimensions of intellectual quality in productive pedagogy that have been discussed are used for the construction of the teachers' pedagogy questionnaire items in enhancing the student' intellectual quality.

SCALE DEVELOPMENT AND VALIDATION

Instruments of questionnaire on Pre-University Teachers' Pedagogy Practice In Enhancing Students' Intellectual Quality was built and modified by adapting to the questionnaire that was constructed by Lingard et al., (2001), Fields (2002), Esah Sulaiman (2004), Mills and Goos (2007), Rodiah Ahmad (2008) and Halizah Awang (2010) and through information obtained from interviews of pre-university teachers on teachers' pedagogy practices. Researchers have rebuilt the questions to get feedbacks on pre-university teacher pedagogy practices in enhancing students' intellectual quality. All questionnaire items are divided into three dimensions, namely; (i) Teaching plan; (ii) Teaching Strategies; and (iii) Teaching Evaluation. Determination of the three-dimensional pedagogy practice is based on a literature review related to pedagogy practices. Figure 1 shows the questionnaires instrument construction procedure of Pre-University Teachers Pedagogy Practices in Enhancing Students' Intellectual Quality.

The items in the questionnaire were constructed deductively, through literature review involving study variables that were operationalized in this study. Apart from the construction of items deductively, information through initial interviews on pedagogy practices in enhancing students' intellectual quality with five pre-university teacher and five lecturers from matriculation college were conducted. The information obtained is used for the construction of items inductively. All participants involved in the construction of the items are not involved as a sample in this study. Items that are built were submitted to the experts and pre-university teachers for item validation purposes. Researchers then reviewed the items and modified them based on comments provided by experts and pre-university teachers involved.

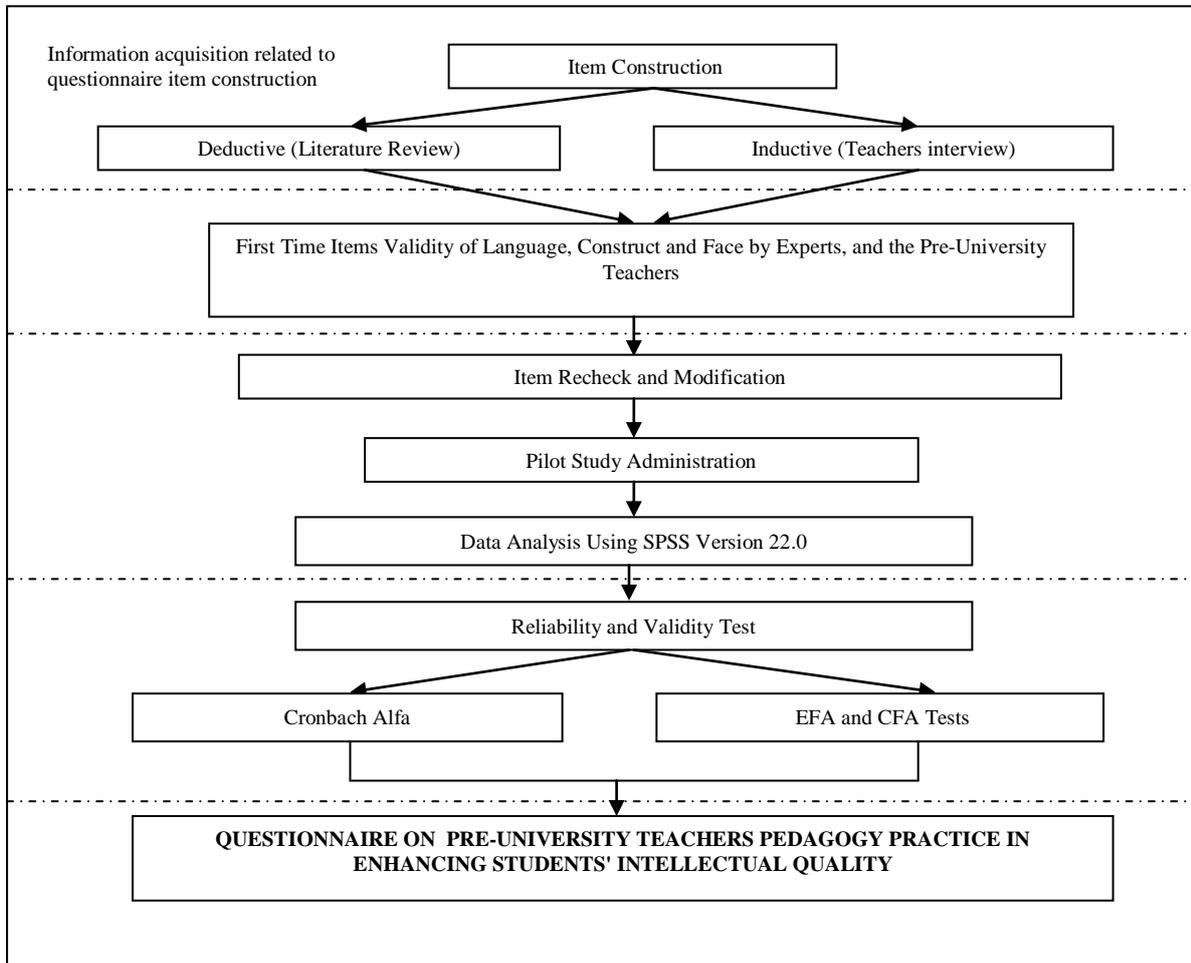


Figure 1: Item Construction Procedure for Questionnaire on Pre-University Teachers Pedagogy Practices in Enhancing Students' Intellectual Quality

A pilot study was then administered to 502 pre-university teachers which will not be involved as a sample in this study. Data were analyzed using SPSS version 22.0 to obtain reliability through Cronbach Alpha test. For the purpose of obtaining better reliability related to the items built, items validity test through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis tests (CFA) using AMOS were conducted to obtain the reliability of the questionnaire of Pre-university Teachers Pedagogy Practice in Enhancing Students' Intellectual Quality.

RELIABILITY AND VALIDITY ASSESSMENT USING EXPLORATORY FACTOR ANALYSIS

The questionnaire for the pilot study completed by the respondents are keyed-in in the computerized *Statistical Package for the Social Sciences (SPSS) version 22.0* software for Exploratory Factor Analysis (EFA) and the AMOS software for Confirmatory Factor analysis (CFA). Effective EFA test provided the necessary information on the number of factors needed and appropriate to represent data by statistic (Hair et al., 2010). *Bartlett's test of Sphericity* test was first conducted to determine the correlation between the items. Results of the study showed the significant value $p < 0.05$ indicating that the correlation between the items is suitable for factor analysis (Chua Yan Piaw, 2009). Items with a loading factor of less than 0.30 (Sellin & Keeves, 1997) will be removed. Items with item - correlation value that exceeds the overall score of 0.30 are maintained because these items contribute to the construct built (Lai, 2007). Meanwhile, the removal of items that are less than 0.30 was done to improve the reliability of the construct being measured. The correlation test results among items showed the value of 0.712. This shows this result is significant because it exceeds the value of 0.5. This means that the correlation value between the items is adequate for factor analysis. Summary of the factor analysis of the pre-university teachers pedagogy practices instruments in enhancing students intellectual quality using pilot test samples is described in Table 2, Table 3 and Table 4.

Table 2
Summary of Pre-University Teachers Pedagogy Practices (Teaching Plan) in Enhancing Student Intellectual Quality Exploratory Dimension Factor Analysis Instruments

Factor	Item	Loading Factor	Item Description	Correlation value, r	α value
Teaching and Learning Planning	PP 1a	0.74	To plan TnL that involves higher order thinking skills of students, I deliver learning outcomes by focusing on higher-order thinking skills	0.69	0.77
	PP 1b	0.83	To plan TnL that involves higher order thinking skills of students, I organize suitable lesson contents to enhance students' higher-order thinking skills	0.68	0.78
	PP 1f	0.75	To plan TnL that involves higher order thinking skills of students, I carry out continuous assessment activities during the TnL to identify the level of students' higher-order thinking ability	0.63	0.80
	PP 1g	0.73	To plan TnL that involves higher order thinking skills of students, I construct questions that can access the capacity / mastery of students' higher-order thinking ability	0.61	0.80
	PP 2b	0.53	To enhance the in-depth knowledge of students, I plan, the content delivery that is related to the students' real situation.	0.51	0.82
Student Intellectual Quality Enhancement Activities	PP 3a	0.64	To ensure students gained in-depth understanding towards topics taught, I plan activities that make students correlate subject taught with other subjects	0.53	0.74

Factor	Item	Loading Factor	Item Description	Correlation value, r	α value
Planning					
	PP 4b	0.85	To enhance students skills in performing constructive and effective discussion, I plan activities in the form of discussion forum on certain issues related to lesson content	0.65	0.69
	PP 4c	0.81	To enhance students skills in performing constructive and effective discussion, I plan, assess individual involvement and contribution in discussion and presentation	0.68	0.67
	PP 5b	0.62	To enhance students problem solving skills, I plan project/ assignment preparation for students solving an issue/scenario based on lesson content	0.48	0.77

Table 3
Summary of Pre-University Teachers Pedagogy Practices (Teaching Strategies) in Enhancing Student Intellectual Quality Exploratory Dimension Factor Analysis Instruments

Factor	Item	Loading factor	Item Description	Correlation value, r	α value
Problem Solving Activity Implementation	SP 1c	0.51	To deliver lesson content that emphasize students' higher-order thinking , I encourage students to ask questions in the form of higher-order thinking level	0.54	0.86
	SP 5a	0.81	To implement and deliver lesson content that emphasize on problem solving skills among students, I give chance to students to carry out problem solving activities based on real situation	0.70	0.83
	SP 5b	0.78	To implement and deliver lesson content that emphasize on problem solving skills among students, I give students problems that can challenge their thinking and problem solving skills	0.74	0.83
	SP 5d	0.75	To implement and deliver lesson content that emphasize on problem solving skills among students, I suggest problems where students need to assess on the effect and consequences due to the decision taken	0.70	0.83
	SP 5f	0.73	To implement and deliver lesson content that emphasize on problem solving skills among students, I encourage students to correlate problem, solve	0.68	0.84

Factor	Item	Loading factor	Item Description	Correlation value, r	α value
			activities conducted with the lessons content learned		
	SP 5h	0.67	To implement and deliver lesson content that emphasize on problem solving skills among students, I ensure students are able to make decisions on problems suggested	0.59	0.85
Enhancing Students In-depth Knowledge Activity Implementation	SP 2e	0.71	To implement and deliver lesson content that emphasize on students' in-depth knowledge, I correlate lesson content with students' future needs	0.56	0.84
	SP 3c	0.75	To implement and deliver lesson content that emphasize on students' in-depth knowledge, I give activities that can give them chance to suggest ideas that can be related to real situation	0.60	0.83
	SP 3d	0.84	To implement and deliver lesson content that emphasize on students' in-depth knowledge, I give them activities where they build new information from concept learned	0.72	0.79
	SP 3e	0.79	To implement and deliver lesson content that emphasize on students' in-depth knowledge, I give them activities where students are able to make explanation on the lesson content	0.71	0.80
	SP 3f	0.78	To implement and deliver lesson content that emphasize on students' in-depth knowledge, I give them activities where students are able to make conclusions on an issue/scenario discussed	0.69	0.81
Effective Discussion Implementation	SP 4c	0.77	To implement and deliver lesson content that emphasize on constructive discussion skills among students, i ensure that each individual in a group take active part in the discussion	0.74	0.84
	SP 4d	0.85	To implement and deliver lesson content that emphasize on constructive discussion skills among students, i encourage students to communicate effectively during the discussion activity	0.79	0.80
	SP 4e	0.83	To implement and deliver lesson content that emphasize on constructive discussion skills among students, I ensure each students in group mastered	0.75	0.83

Factor	Item	Loading factor	Item Description	Correlation value, r	α value
the thing/ topic discussed					
Self access learning Implementation	SP 1i	0.84	To implement and deliver lesson content that emphasize on students' higher order thinking, I give activity that form analogy towards lesson content	0.66	0.52
	SP 1j	0.78	To implement and deliver lesson content that emphasize on students' higher order thinking, I give activity that makes inquiry discovery towards lesson content	0.63	0.57
	SP 3b	0.52	To implement and deliver lesson content that emphasize on students' higher order thinking, I encourage students to form relations between concept learned and other subjects	0.40	0.82

Table 4
Summary of Pre-University Teachers Pedagogy Practices (Teaching Assessment) in Enhancing Student Intellectual Quality Exploratory Dimension Factor Analysis Instruments

Factor	Item	Loading Factor	Item Description	Correlation value, r	α value
Evaluation Type	NP 1c	0.70	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I give multiple choice question type	0.64	0.87
	NP 1d	0.76	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I requestion students on the answer chosen	0.78	0.85
	NP 1gii	0.83	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students 'constructive discussion and students' problem solving skills, I make evaluation through observation	0.80	0.85
	NP 1giii	0.72	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I make evaluation through portfolio	0.74	0.86

Factor	Item	Loading Factor	Item Description	Correlation value, r	α value
	NP 2a	0.60	I use the evaluation done for constructive activity	0.55	0.89
	NP 2b	0.77	I use the evaluation done for remedial activity	0.69	0.87
Evaluation Activity	NP 1e	0.86	To evaluate students higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I give essay type question where students need to analyse, debate logically and scientifically in their answer	0.76	0.88
	NP 1f	0.86	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I give issues/ scenario related to lesson content to be solved by the students	0.83	0.87
	NP 1gi	0.73	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I make evaluation through project based learning approach	0.75	0.88
	NP 1giv	0.59	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I make evaluation through quiz question	0.63	0.91
	NP 1gv	0.79	To evaluate students' higher order thinking, students' in-depth knowledge, students' in-depth understanding , students' constructive discussion and students' problem solving skills, I make evaluation through problem solving	0.82	0.87

The original questionnaire for this dimension contains 90 items. After carrying out factor analysis, 43 items were removed for the loading factor overlap between the two factors and the value is less than .30. The final result left 37 items to be tested using Confirmatory Factor Analysis (CFA).

RELIABILITY AND VALIDITY ASSESSMENT USING CONFIRMATORY FACTOR ANALYSIS

CFA analysis test is used to verify the construct or factor obtained through the EFA test analysis (Wothington & Whittaker, 2006). 37 items that have been extracted from the EFA test analysis are then tested for further validation of the teacher pedagogy practices questionnaire through the CFA test analysis using AMOS software version 18.0. Confirmatory Factor Analysis involved three stages beginning with a measurement model analysis for each sub-dimensional of the main dimensions, namely; (i) the dimensions of teaching plan; (ii) the dimensions of teaching strategies; and (iii) the dimensions of teaching evaluation. Then the analysis is proceeded by testing every major dimension measurements model together with each sub dimension. Next, validity assessment model is undertaken covering accuracy matching determination model process, validity and reliability construct. The validity assessment construct was conducted to ensure that all items retained have convergent and discriminant validity. Convergent validity explains the item in each construct is unidimensional while discriminant validity describes one construct is different from the other constructs where an item represents only a construct (Fornell & Larcker, 1981; Lin, 2007; Hair et al., 2010).

There are three key indicators used to assess the convergent validity that is the loading factor exceeds .50 (Hair et al., 2010), the average variance extracted (AVE) \geq .50 (Fornell & Larcker, 1981; Hair et al., 2010) and the constructs reliability value (CR) $>$.70 (Hair et al., 2010). Validity discriminant value is determined when the square root of the AVE is higher than the correlation between the construct and ensure that no cross-loading items with other items (Hair et al., 2010). Apart from the mutant factor value $>$.50, the compatibility assessment model with data (Goodness-of-fit - GOF) is based on three main groups, namely Absolute Fit Indices (AFI), Incremental Fit Indices (IFI), and Parsimony Fit Indices (PFI) (Hair et al., 2010).

(A) Teaching Plan Dimensions

Figure 2 shows the CFA model for teaching plan dimension that contains two sub-dimensions of the TnL plans (RPH) and activity plan to enhance intellectual quality.

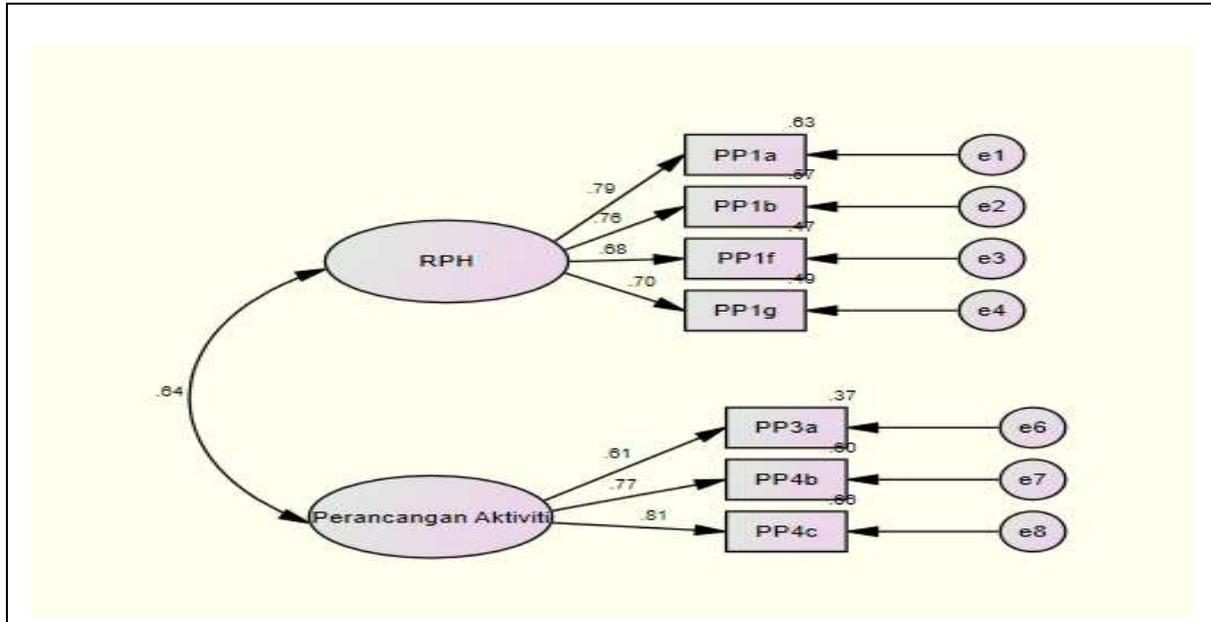


Figure 2: CFA Two Factors Model in Teaching Plan Dimension

The analysis found that the range of the loading factor of 7 Teaching Plan Dimension items is 0.61 to 0.81, all items are maintained. Overall, the Teaching Plan Dimension shows the model value fit the data shown in Table 5.

Table 5
Accuracy Matching Determination Measurement Model in Teaching Plan dimensions

No	Indication value	df	χ^2	Value p	χ^2/df	GFI	AGFI	CFI	PNFI	RMSEA	RMR
Item	Received/ Dimension										
				> .50	≤ 3.0	≥ 0.90	≥ 0.80	≥ 0.90	≥ 0.60	≤ 0.08	≤ 0.08
Teaching Plan		19	85.0	.00	4.4	0.96	0.92	0.96	0.64	0.08	0.26

(B) Teaching Strategies Dimension

Figure 3 shows a model for teaching strategies dimension that contains four sub dimensions, namely the implementation of problem solving activities (PSA), the implementation of increasing student understanding activities (IUA), the implementation of effective discussion activities (EDA) and the implementation of self learning activities (SLA).

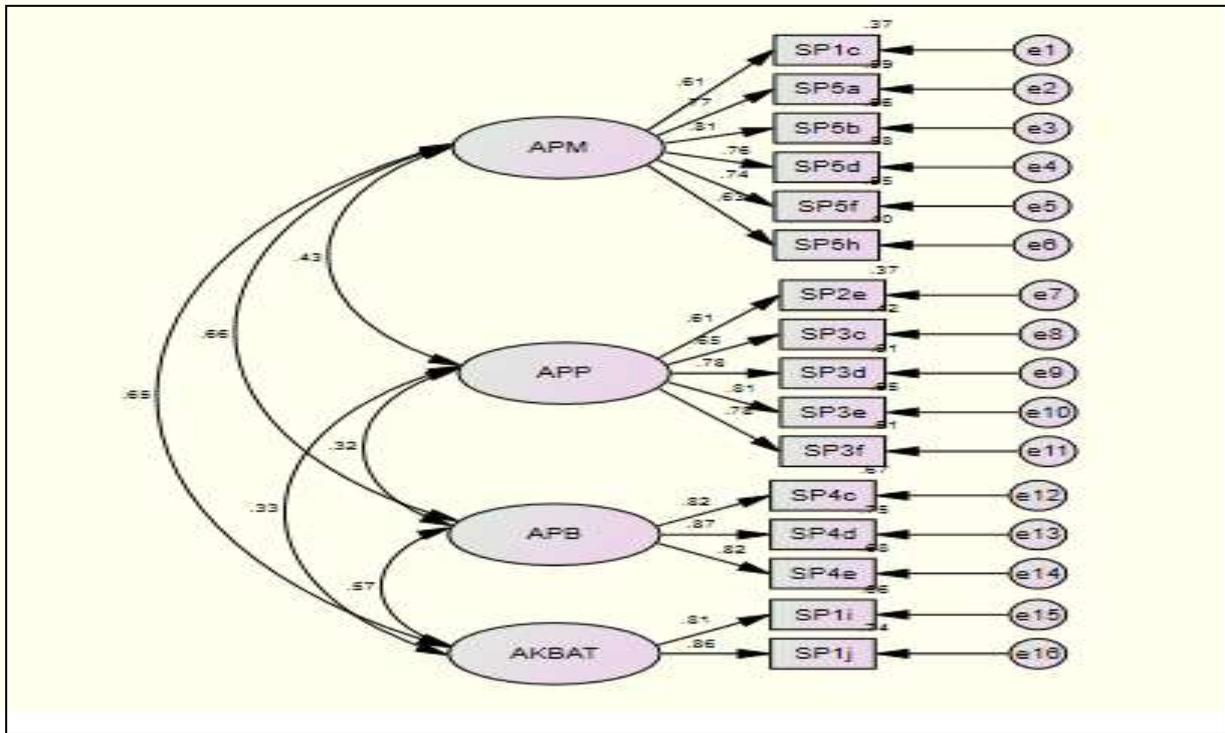


Figure 3: CFA Four-Factor Model of Teaching Strategies Dimension

CFA analysis found that the range of the loading factor of 16 Teaching Strategies Dimension items is 0.61 to 0.87, all items are maintained. Overall, Teaching Strategies Dimension shows the model value fit the data shown in Table 6.

Table 6
Accuracy Matching Determination Measurement Model in Teaching Strategies dimensions

Bil	Indication value	df	χ^2	Value p	χ^2/df	GFI	AGFI	CFI	PNFI	RMSEA	RMR
Item	Received/ Dimension									A	
				> .50	≤ 3.0	≥ 0.90	≥ 0.80	≥ 0.90	≥ 0.60	≤ 0.08	≤ 0.08
Learning Strategy		98	286.9	.00	2.9	0.95	0.91	0.94	0.76	0.06	0.26

(C) Teaching Assessment Dimension

Figure 4 shows a CFA model for teaching evaluation dimension containing sub dimensions of evaluation (JP) and evaluation activities (AP).

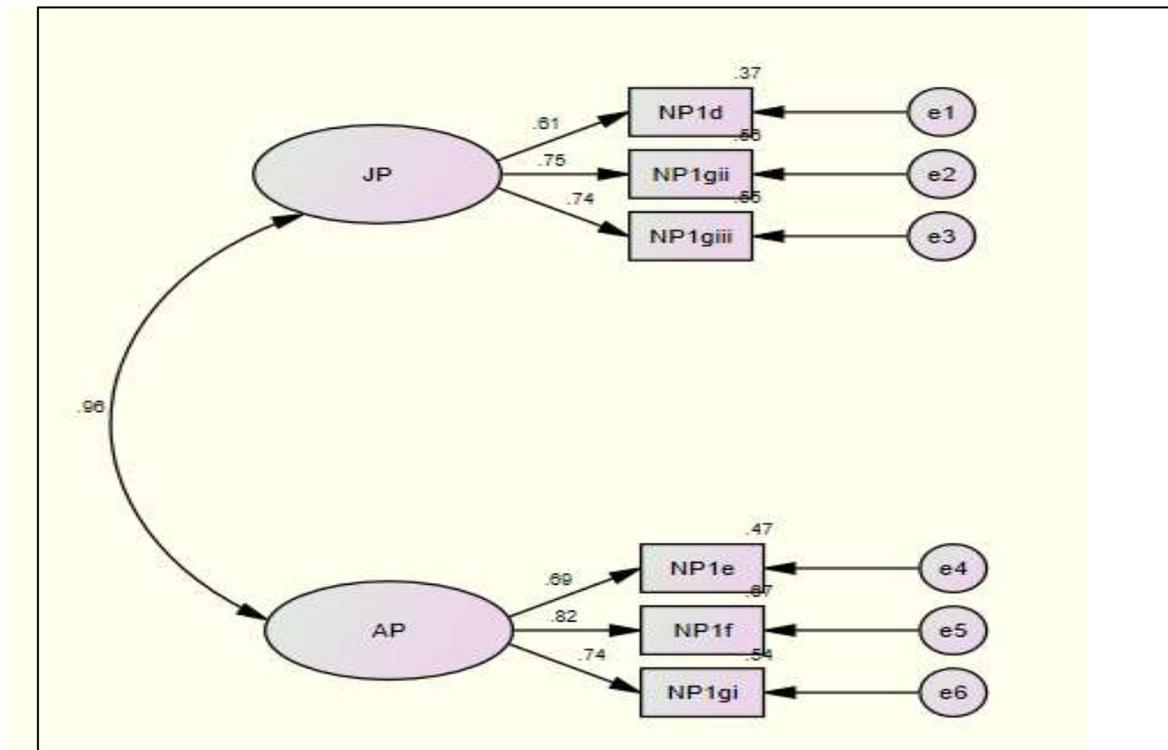


Figure 4: CFA Model Two Factor for Teaching Evaluation Dimension

The results of CFA analysis found that the range of the loading factor of six Teaching Evaluation dimension items is 0.61 to 0.82 with all the items retained. Overall, Teaching Evaluation Dimension shows the model fit the data in Table 7.

Table 7
Accuracy Matching Determination Measurement Model in Teaching Evaluation dimensions

No	Indication value	df	χ^2	Value p	χ^2/df	GFI	AGFI	CFI	PNFI	RMSEA	RMR
Item	Received/ Dimension									A	
				> .50	≤ 3.0	≥0.90	≥ 0.80	≥ 0.90	≥ 0.60	≤ 0.08	≤ 0.08
	Laerning Evaluation	8	115.9	.00	14.4	0.92	0.80	0.92	0.50	0.16	0.04

DISCUSSION & PRACTICAL IMPLICATIONS

Conclusion of the exploration factor analysis (EFA) and confirmation factor analysis (CFA) shows that the items constructed for each dimension respectively show high validity and reliability. The findings of the final analysis showed that for Teaching plan dimension, seven items are retained while for the Teaching Strategy dimension, 16 items are retained and the last dimension which is the Teaching Assessment Dimension, six items are retained. Hence, with the EFA and CFA results, 29 items remained for the questionnaire of Pre-university Teachers' Pedagogy In Enhancing Students' Intellectual Quality from a total of 90 items that can be used on actual samples. Therefore, the Pre-University Teachers Pedagogy Practices in Enhancing Students Intellectual Quality questionnaires can be applied to the actual sample.

This questionnaire can identify teacher pedagogy practices in enhancing student' intellectual quality based on real scenarios of teaching and learning (TnL) process of pre-university students. Thus, the construction of the items in the Teacher Pedagogy Practices in Enhancing Student Intellectual Quality questionnaire contributed towards increment of knowledge on best pedagogy practices used by teachers who taught pre-university in enhancing the intellectual quality among students. As Gardner (2000) stated, a teacher must be sensitive in helping students to develop multidisciplinary thinking in the areas of students interest to make students more productive. Knowing that pedagogy in enhancing students' intellectual quality is still a new method in Malaysia, the parties responsible for providing training to teachers to be and teachers can provide additional exposures on the pedagogical practices to improve students' intellectual quality among secondary schools teachers. Information obtained from this study can be used to improve the quality of teaching and learning of the pre-university teachers through training workshops or seminars. Creativity, innovation and affective aspects of teachers are essential elements in implementing pedagogical practices to enhance the students' intellectual quality. Implementation of intellectual quality aspects among students can help students to excel in academics field and ensure students are well prepared to enter the university and working life, hence enhancing students' intellectual capital to keep abreast with the rapid developing country in the 21st century. It is hoped that this questionnaire will help in the teacher planning and education curriculum planners in planning the TnL towards enhancing student' intellectual quality.

REFERENCES

- Chua Yan Piaw. (2011). *Kaedah penyelidikan: Kaedah dan statistik penyelidikan, Buku 1*. Edisi kedua. Kuala Lumpur: Mc Graw Hill.
- Chua Yan Piaw. (2011). *Kaedah penyelidikan: Kaedah dan statistik penyelidikan, Buku 2*. Kuala Lumpur: Mc Graw Hill.
- Chua Yan Piaw. (2011). *Kaedah penyelidikan: Kaedah dan statistik penyelidikan, Buku 3*. Kuala Lumpur: Mc Graw Hill.
- Chua Yan Piaw. (2011). *Kaedah penyelidikan: Kaedah dan statistik penyelidikan, Buku 4*. Kuala Lumpur: Mc Graw Hill.
- Chua Yan Piaw. (2011). *Kaedah penyelidikan: Kaedah dan statistik penyelidikan, Buku 5*. Kuala Lumpur: Mc Graw Hill.
- Esah Sulaiman. (2004). *Pengenalan pedagogi*. Skudai: Penerbit UTM.
- Falk, I, and Millar, P. (2002). *Non/Working Lives: Implications of 'non-standard for higher education (GESIHE)*. Conference of the Pacific Rim Objective.
- Field, A. (2009). *Discovering statistics using SPSS. Third Edition*. London: SAGE Publications Ltd.
- Fornell, C. & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 48, 39-50.
- Fosnot, C. (1996). *Constructivism: Theory, perspectives and practice (2nd ed.)*. New York: Teachers College Press.
- Gore, J. G. (2001). Beyond Our Differences: A reassembling of What Matters in Teacher Education. *Journal of Teacher Education*, 52(2), 124-135.
- Gore, J. G., & Marrison, K.A. (2001). The perpetuation of a (semi) profession: Challenges in the governance of teacher education. *Teaching and Teacher Education*, 17(5), 567-582.
- Gore, J. G., Giffirths, T., & Ladwig, G. (2004). Towards better teaching: Productive pedagogy as a framework for teacher education. *Teaching and Teacher Education*, 20, 375-387.
- Gunarsa, S.D. & Yulia, S.D. (1991). *Psikologi praktis: Anak, remaja, dan keluarga*. Jakarta: PT BPK Gunung Mulia.
- Halizah Awang. (2010). *Kesan pembelajaran berasaskan masalah dalam kemahiran generik di Politeknik Malaysia*. Tesis PhD Yang Tidak Diterbitkan. Universiti Sains Malaysia.
- Hayes, D., Lingard, B. & Mills, M. (2000). Productive Pedagogies. *Education Links No. 60*.
- Hambur, S., Rowe, K. & Luc, L. T. (2002). *Graduates skills assessment, commonwealth of Australia*. Dicapai daripada <http://link.springer.com/article/10.1007%2Fs10734-010-9308-8> pada 16 September 2014.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. (2010). *Multivariate data analysis. Seventh Edition*. New Jersey: Pearson Prentice Hall.
- Kearns, P. (2001). *Review of research: Generic skills for the new economy*. NCVER. Adelaide.
- Lim Chong Hin. (2007). *Penyelidikan pendidikan: Pendekatan kuantitatif dan kualitatif*. Kuala Lumpur: McGraw Hill.
- Lingard, B. & Ladwig, J. (2001). *School Reform Longitudinal Study: Final report, vol 1*, Report prepared for Educational Queensland by the School of Education. The University of Queensland.
- Lingard, B., Ladwig, J., Mills, M., Bahr, M., Chant, D. Warry, M., Ailwood, J., Capeness, R., Christie, P. Gore, J., Hayes, D. and Luke, A. (2001). *The Queensland School Reform Longitudinal Study*. Vols. 1 and 2. Brisbane: Education Queensland.
- Lublin, J. (2003). Generic objectives and transferable skills: Centre for teaching and learning: Good Practice in teaching and learning. *Engineering Science and Education Journal*, 8 (4), 161-168.
- Mills, M. & Goos, M. (2007). *Productive Pedagogies: working in disciplines and teacher and student voices*. Kertas Kerja yang Dibentang di 'Annual Conference of the Australian Association for Research in Education.
- Newmann, F. M. & Wenlage. (1996). *Authentic achievement: Restructuring schools for intellectual quality*. San Francisco: Josey Bass.
- Osuna, M. (2008). *Information technology as intellectual capital?: Instructional production at the tecnologico de monterrey*. Tesis Doktor Falsafah. Universiti of Arizona.
- Queensland School Reform Longitudinal Study (QSRLS). (2001). *School Reform Longitudinal Study*. Brisbane: The State of Queensland (Department Education).
- Rodiah Ahmad. (2008). *Pengajaran guru persekitaran pembelajaran dan sikap murid dalam pembelajaran komsas*. Tesis Sarjana Pendidikan Yang Tidak Diterbitkan. Universiti Sains Malaysia.

- Saifuddin Azwar. (2002). Pengantar psikologi inteligensi. Yogyakarta: Pustaka Pelajar.
- Sellin, N., & Keeves, J.P. (1997). Path Analysis With Latent Variables. In J. P. Keeves (Ed.), *Educational Research, Methodology And Measurement: An International Handbook*. Oxford: Pergamon Press.
- Sorin, R. & Klein, M. (2002). *Walking the walk and talking the talk: Adequate teacher preparation in these uncertain times?*. Kertas Kerja yang Dibentang di AARE, Brisbane, Australia.
- Sukiman Saad, Noor Shah Saad & Mohd Uzi Dollah. (2012). Pengajaran kemahiran berfikir: Persepsi dan amalan guru Matematik semasa pengajaran dan pembelajaran di bilik darjah. *Jurnal Pendidikan Sains & Matematik Malaysia*. Vol.2 No.1.
- Wilson, E., Klein, M.(2000). *Promoting Productive Pedagogies: Preservice Teacher Education for New Times in Queensland State Schools*.