DESIGN OF TEACHERS WORK COMPETENCIES (TWC) MODEL USING STRUCTURAL EQUATION MODELING (SEM) AMONG MALAYSIAN TEACHERS

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The aim of this study is to design and develop empirically the model that describes the Teachers Work Competencies (TWC). Structural Equation Modelling (SEM) utilizing AMOS Version 22 was employed to design and develop the model. The proposed model was based on Malaysian Teachers Standard. Exploratory Factor Analysis (EFA) was utilized to identify the underlying factors, whereas confirmatory factor analysis was employed to test the construct of the TWC. The study involved 450 primary school teachers from 5 zones areas of Malaysia represented by the states of Kedah, Selangor, Johor, Terengganu and Sarawak. The Teachers Work Competencies (TWC) model was found to be a fit and reliable model with all fit statistics set well above the threshold level. The findings of the Teachers Work Competencies (TWC) model will also benefit educational practitioners in designing a teacher professional development for Malaysia.

Keywords: Education, Educational Management, Work Competencies, Structural Equation Modeling,

1. INTRODUCTION

The conception an idea of competence is probably as old as humankind. Homo sapiens have always been desiring to master skills and to find ways to solve practical, professional and scientific challenges. Certain individuals or people always received the prerogative to perform certain activities which had a highly symbolic meaning (Mulder, 2014). Meanwhile, Preliminary Report for Malaysia Education Blueprint 2013-2025 marks the latest Malaysia government initiative to revamp the education system. The Blueprint establishes the visions and aspirations for the Malaysian education system and lays out a roadmap of policies and initiatives that will be undertaken in order to achieve these goals (Ministry of Education, 2012).

Teacher competencies are hypothetical constructs that are mainly developed in a teacher's educational and professional career and that become part of teacher personality (Glaser-Zikuda & Fur, 2008). Indeed, The Malaysian Education

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Blueprint (PPPM) 2013-2025 dedicated towards providing quality education and that improving teacher quality (Ministry of Education, 2012).

The decisive and conclusive role in ensuring the quality and competence of teachers is not exactly new and has already been stipulated in Malaysia's Education Act 1996, Article 550, and Chapter 9 (Law of Malaysia 2006). High quality educational provision is therefore necessary to achieve these goals, and high quality teaching becomes imperative (Goh, 2012).

Meanwhile, the OECD reported the weaknesses in teacher competencies is serious impediment to overall education quality in Malaysia. A 2011 research study found that only 50% of lessons were being delivered in an effective manner (OECD, 2013). Therefore, this study is to development and modelling of teacher work competencies which is based on Malaysian Teacher Standards (MTS).

2. TEACHERS WORK COMPETENCIES

The meaning of work on the characteristics of high teacher competency has been conducted and is well documented in a series of Handbook of Research on Teaching (Richardson, 2001). In the late 1960s, it was defined that teacher competency was linked to specific character of teacher actions and student learning based on behavioural psychology and child development. This process-product approach suggested that an effective teacher was able to: (a) monitor expectations, (b) provide clear objectives and learning guidelines, (c) encourage student responses during instruction, (c) break a large teaching unit to smaller tasks, and (d) provide regular feedback (Blanton, Sindelar, & Correa, 2006).

In addition, research in the late 1960s continued towards research on teacher planning, teacher beliefs, teacher thinking, and these dominated much of the 1970s and beyond. The complexities of teaching, classrooms and schools began to be addressed and were referred to by different research names such as learning-to teach research, and classroom ecology research (Fenstermacher & Richardson, 2005; Kagan, 1992). It was followed by various other research that looked at teacher planning (Reynolds, 1992), teacher thinking, beliefs and efficacy (Tschannen-Moran & Woolfolk Hoy, 2001) and novice versus expert teaching (Berliner, 1986).

The literature on teaching and understanding teacher competency continues to expand. Changes continue to be made for better clarity towards the concept of effective or successful dimensions of teacher competency. However, regardless of how onerous it is to encompass the concept of teacher competency, educational stakeholders (e.g. students themselves, parents, educators, and educational administrators) need credible measures to judge competency, teaching performance or to help guide teacher education programs. (Goh, 2012). In Malaysia, the proposition that for high quality teaching to occur, a rigorous method of assuring teacher competency should also be in place (Malaysian Teacher Standards, 2009).

Therefore, the Malaysian Teacher Standards developed by the Teacher Education Division of the Malaysian Ministry of Education is described as a guideline to measure teacher's practice which is rigorous and is beyond the minimum requirements of teaching. The Malaysian Teacher Standards has been created to serve two distinct purposes, one being to serve as an early warning system so that teachers themselves are aware of the need to undertake further strengthening, improvement and enhancement of their knowledge, skills and personality. The Malaysian Teacher Standards is seen as an effort to elevate teaching excellence in Malaysia and is an attempt to remove misconceptions of what encompasses competent teaching and to uplift a rather eroded image of the profession (Othman, 2007).

Finally, the original 2009 published edition of the Malaysian Teacher Standards establishes the professional competencies that should be achieved by the teachers and what needs to be provided by training institutes to help teachers achieve the prescribed levels of competency (Malaysian Teacher Standards, 2009). The Malaysian Teacher Standards comprises three content standards which is professional, skill and knowledge. In this study, the teacher work competencies is the standard should be achieved to all Malaysian teacher as mentioned in Malaysian Teacher Standard.

Professional

Professional values within the teaching profession. This standard refers to those values teachers hold and that should be developed so that teachers can more effectively contribute to the teaching profession to achieve the aims of the national education system (Malaysian Teacher Standard, 2009).

Skill

Knowledge and understanding of education, subject matter, curriculum and co-curriculum. Teachers should have sound knowledge to improve professionalism in teaching, carry out their duties efficiently and effectively and be more creative and innovative (Malaysian Teacher Standard, 2009).

Knowledge

Skills of teaching and learning. This standard focuses on the ability of teachers to plan, implement and evaluate teaching and learning, and extracurricular activities (Malaysian Teacher Standard, 2009).

3. RESEARCH METHODOLOGY

Research approaches in this study is a quantitative and survey research design because the intent is to ask narrow objective questions generating quantifiable data that can be analysed using statistics (Cresswell, 2008).

3.1. Population and Sample

The target respondents are among all the primary school teacher in Malaysia. The samples were selected using the multistage cluster sampling techniques. The study involved 450 primary school teachers from five zone areas of Malaysia represented by the states of Kedah, Selangor, Johor, Terengganu and Sarawak. This sample saiz achieve the minimum sample saiz according to Krejcie & Morgan (Krejcie & Morgan, 1970).

3.2. The Instrument

The instrument questionnaire is used as a primary survey instrument in collecting quantitative data in numerical form. The structure of the questionnaire was developed based on *Integrated Teacher Performance Appraisal* by Ministry of Education, 2013 (Ministry of Education, 2013). The adaption and modification questionnaire consists of 32 items and three subscales: professional, knowledge and skill and the questionnaire as shown as appendix.

3.3. Design and Development TWC

Design and Development of TWC contains five distinct approaches were applied to ensure the development and modelling TWC. First, the TWC was initially peer reviewed by the teachers and supervisors after systematically literature review. Second, ten face-to-face discussions with the expert including academician and practitioner. In fact, each subsequent instrument was constructed based on the preceding instrument. Some of the items were modified and redrafted based on the outcome of each discussion so as to ensure their precision and clarity. Third, a pilot study was conducted in order to assess the internal consistency reliability (Cronbach's alpha), and EFA procedure to explore the factor. Forth, a field study was conducted to run CFA, convergent validity and discriminant validity. Finally, this model successfully developed through all of the procedure.

3.4. Pilot Test

A pilot test is regarded a significant approach in ensuring the reliability and validity of the instrument, and its adequacy (Saunders *et al.*, 2007). Ambiguous items will be dropped in order to determine the validity and reliability of the research instrument (Johnson & Christensen, 2008). The instrument across all the items under each construct (Neuman, 2006). Low values of alpha would indicate that the items captured the construct poorly. Cronbach's alpha and item-scales for the TWC were calculated separately based on each construct. Cronbach for the three constructs of the TWC ranges from 0.704 to 0.962, and the item-scale for all items met the threshold of more than 0.7 (Cronbach, 1951). There is 11 items was deleted during the EFA. Therefore, all the 21 items were retained. The Cronbach alpha obtained implied that the overall reliability for the TWC was very high.

3.5. Internal Reliability

TABLE 1: CRONBACH ALPHA OF TWC

	Factors	Item	Cronbach Alpha
TWC	Professional	10	0.962
	Skill	8	0.919
	Knowledge	3	0.704
	Total	21 items	

3.6. Exploratory Factor Analysis

Exploratory factor analysis (EFA) is a method or technique that is used to uncover the structure of a relatively broad scope or set of variables, and it is commonly used when developing or establishing a scale. All the 21 items of the TWC were operated to Principal Component Analysis (PCA) Utilizing the *Statistical Package for the Social Science* (SPSS) Version 20.0. Prior to operating the PCA, the fitness of data for factor analysis was determined. An investigation of the correlation matrix affirmed the existence of many coefficients of 0.5 and above. The Kaiser-Meyer-Oklin value was 0.871, which exceeded the recommended cut off value of 0.6 (Kaiser, 1974). The Barlett's Test of Sphericity reached statistical significance, which was $p < 0.05$, supporting the factorability of the correlation matrix, and indicated that the correlation between items was acceptable to run the factor analysis.

TABLE 2: KMO AND BARTLETT'S TEST

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.871
Bartlett's Test of Sphericity	Approx. Chi-Square	1881.581
	df	210
	Sig.	.000

TABLE 3: ROTATED COMPONENT MATRIX TWC

		$N=100$.Rotated Component Matrix[a]			
	Number of item				factor
		h^2	1	2	3
	Professional				
1.	Da1.	0.75	0.83		
2.	Da10.	0.71	0.78		
3.	Da2.	0.72	0.79		
4.	Da3.	0.80	0.86		
5.	Da4.	0.75	0.81		
6.	Da5.	0.75	0.85		
7.	Da6.	0.72	0.79		
8.	Da7.	0.77	0.82		
9.	Da8.	0.76	0.81		
10.	Da9.	0.78	0.84		

Number of item	N=100.Rotated Component Matrix[a]			
		factor		
	h²	1	2	3
Skill				
11. Dc10.	0.69		0.77	
12. Dc12.	0.65		0.72	
13. Dc2.	0.70		0.68	
14. Dc3.	0.64		0.73	
15. Dc4.	0.68		0.73	
16. Dc5.	0.68		0.81	
17. Dc7.	0.72		0.84	
18. Dc9.	0.55		0.65	
Knowledge	0.74			0.85
19. Db9.	0.67			0.81
20. Db8.	0.56			0.70
21. Db7.				
Eigenvalue		10.6	2.3	1.92

3.7. Normality Distribution

The data are considered normal if Skewness and Kurtosis is between -2 to +2 (Garson, 2012). Therefore, to test the data's probability for a normal distribution, a measurement of Skewness and Kurtosis statistics was carried out. Table 4 presents the normality distribution for items involved in the measurement model. Normality assessment is made by assessing the measure of Skewness and Kustorsis for every item. Prior to analysing the data, descriptive statistics were examined to check the normality of TWC model. Normally the data should be conducted to investigate how the standard of the data that has been collected so that the developing model may suit the parametric technique in the future research. Using Skewness and Kurtosis approach, our data is claimed to be highly significant indicating as normal data. Each item is ranging between -2 to +2 (Garson, 2012).

3.8. Structural Equation Modeling (SEM)

Structural Equation Modeling is powerful and flexible multivariate data analysis technique and permits researchers to examine simultaneously several relationships among manifest and latent variables (Hair, Anderson, Tatham, & Black, 2010; Zainudin, 2015).

3.9. Model Validity

Validity is referring to the capability of the instrument to measure what it supposed to be measured for a construct (Zainudin, 2012). Three types of validity are required for a measurement model, for instance, Convergent Validity, Construct Validity and Discriminant Validity (Zainudin, 2015).

TABLE 4: MULTIVARIATE NORMALITY

Variable	min	max	skew	c.r.	kurtosis	c.r.
Dc10	4.000	10.000	**-.053**	-.459	**1.242**	5.378
Dc7	6.000	10.000	**.454**	3.936	**-.757**	-3.277
Dc5	6.000	10.000	**.269**	2.329	**-.541**	-2.342
Dc12	6.000	10.000	**.305**	2.645	**-1.506**	-6.522
Dc3	6.000	10.000	**.192**	1.663	**-.205**	-.889
Dc4	6.000	10.000	**.310**	2.682	**-1.170**	-5.068
Da1	8.000	10.000	**.044**	.385	**-1.998**	-8.652
Da4	8.000	10.000	**.036**	.308	**-1.999**	-8.655
Da5	4.000	10.000	**-.153**	-1.326	**.346**	1.496
Da8	6.000	10.000	**.165**	1.429	**-1.709**	-7.401
Db7	2.000	10.000	**-.598**	-5.181	**.222**	.960
Db9	2.000	10.000	**-.987**	-8.544	**1.366**	5.916
Dc9	4.000	10.000	**.030**	.263	**.178**	.773
Dc6	6.000	10.000	**.303**	2.628	**-.320**	-1.388
Dc2	6.000	10.000	**.377**	3.268	**-.685**	-2.965
Dc11	6.000	10.000	**.398**	3.444	**-1.423**	-6.161
Da9	6.000	10.000	**.151**	1.307	**-1.301**	-5.633
Da7	6.000	10.000	**-.051**	-.438	**-1.448**	-6.269
Da10	6.000	10.000	**.124**	1.074	**-1.504**	-6.515
Da6	6.000	10.000	**.186**	1.611	**-1.475**	-6.386
Multivariate					**328.844**	112.222

3.10. Convergent Validity

Validity is achieved when all items in the measurement model are statistically significant. The convergent validity could also be verified by computing the Average Variance Extracted (AVE) for every construct. The value of AVE has to be 0.5 or higher for the efficacy to be achieved.

Convergent validity is established or realized when there is a strong degree of correlation between two different sources responding to the same measure. The convergent validity is the validation processes on measurement model.

According to Kline (2011), convergent validity is a set of items in one construct are inter-correlation, at least, moderate in magnitude and is measured through average variance extracted (AVE) where the threshold is above >0.5 indicates a high convergent validity (Fornell & Larcker, 1981). Factor loading of each item at e" 0.6 considered high convergent validity (Hair *et al*., 2010). Table 5 showed all the AVE and factor loading achieved the minimum value for convergent validity.

TABLE 5. FACTOR LOADING, AVE, CR AND √AVE

Item	Factor	Factor Loading (>0.6)	AVE(>0.5)	CR(> 0.6)	√AVE
Da1	Professional	0.845	0.709	0.957	0.84
Da10		0.907			
Da2		0.85			
Da3		0.702			
Da4		0.884			
Da5		0.766			
Da6		0.918			
Da7		0.893			
Da8		0.927			
Da9		0.914			
Db7	Knowledge	0.775	0.654	0.849	0.81
Db8		0.762			
Db9		0.883			
Dc10	Skill	0.768	0.688	0.952	0.83
Dc12		0.837			
Dc2		0.862			
Dc3		0.831			
Dc4		0.881			
Dc5		0.836			
Dc7		0.785			
Dc9		0.789			

3.11. Discriminant Validity

The discriminant validity is to avoid any redundant items in the measurement model (Zainudin, 2012). The items should not be related are in reality not related. It involves the relationship between a latent construct and other constructs of a similar nature. Discriminant validity can be identified by comparing the variance shared by the average AVE between these two constructs (Bove, Pervan, Beatty, & Shiu, 2009). Table 6 showed that the diagonal value (in bold) are higher than any other values in its row and column. Thus, the discriminant validity for the TWC constructs was achieved.

TABLE 6: DISCRIMINANT VALIDITY

Professional	Knowledge	Skill
0.84		
0.49	**0.81**	
0.77	0.49	**0.83**

3.12. Construct Validity and The Measurement Model of the TWC

Construct Validity demonstrates that the instrument used in study measure the construct that it intended to measure. Several fitness indexes must be achieved to the required level to achieve construct validity. The model for this study comprised

of three latent constructs; Professional, Knowledge and Skill. Figure 1 presents the first order confirmatory factor analysis. Meanwhile, Figure 2 presents the second order confirmatory factor analysis (Hair *et al*., 2010). Both of this figure achieved the minimum value fitness indexes.
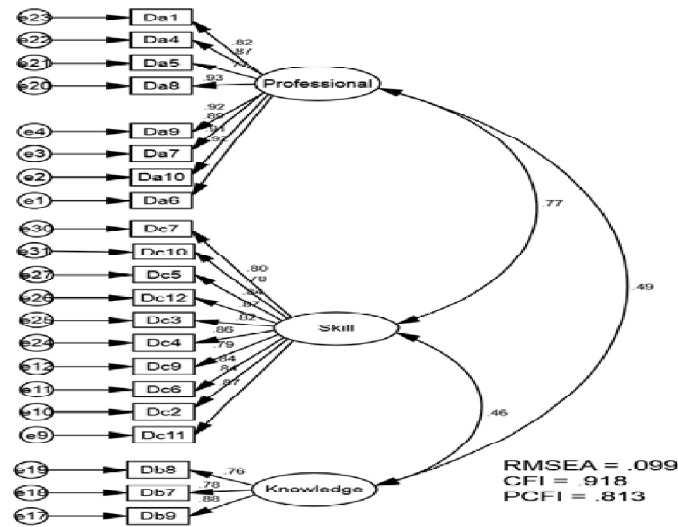

Figure 1:   1ˢᵗ Order CFA

Figure 2:   2ⁿᵈ order CFA

4. MODEL FIT

In SEM, there is several Fitness Indexes that reflect how fit is the model to the data at hand. However there is no agreement among researchers which fitness indexes to use. Hair *et al.* (2010) and Holmes-Smith (2006) recommend the use of at least one fitness index from each category of model fit. There are three model fit categories namely Absolute Fit, Incremental Fit, and Parsimonious Fit. The value of fitness indexes used in this study is the RMSEA (absolute), CFI (relative), and PCFI (parsimonious) and this model was achieved the model indexes.

TABLE 7: MODEL FITNESS INDEXES

Model Fitness Indexes	Finding
RMSEA < 0.1	0.099
CFI > 0.9	0.918
PCFI > 0.5	0.813

5. FINDING AND DISCUSSION

Finally TWC model successful designed and developed empirically. The design, development and validation of the TWC would contribute to a better scholarly understanding and provide a fresh look at teacher competencies. It would also provide the much needed direction for practitioners in the development of a Teacher Education Model for Competence of teachers needs to be improved with a structured development program. The program should be related to the professional, knowledge and skill. This factor or criteria is not much differ with the other model of competence teacher. The findings of the study show the professional is one of the factors that shape measurement model TWC. This factor parallel with model of teacher competence Australia, Canada, Scotland, Brunei, Laos, Filipina, Thailand, Timor-Leste (Department of Education, 2004; Ministry of Education, 2012; Seameo Innotech, 2010; The General Teaching Council for Scotland, 2012).

Meanwhile, the findings of this study shows that skills are one of the factors that shape measurement model TWC. This factor parallel with model of teacher competence Australia, Canada, Scotland, and almost ASEAN country. (Department of Education, 2004; Ministry of Education, 2012; Seameo Innotech, 2010; the General Teaching Council for Scotland, 2012). Factors knowledge also shaped a model in this study. This factor parallel with the model of teacher competence Scotland, Brunei, Cambodia, Indonesia, Laos, Philippine, Singapore, Thailand, Timor-Leste , Vietnam (The General teaching Council for Scotland, 2012; Seamoe Innotech, 2010). Therefore, with a focus on the factor, Malaysian teacher competence will increase better.

6. CONCLUSSION

Realisation of Vision 2020, that is, to become a high-income country by 2020, requires Malaysia to move up the production value chain, away from the current low-cost labour model that relies heavily on imported workers. Education's role in producing the human capital needed is crucial. Unfortunately, despite heavy allocations for education, the quality of education and the quality of teachers leaves much to be desired.

The results of this study are useful for the MOE and policy makers. The evidence will be obtained can be used in all stages of planning and implementation of the national education agenda. This study is important to clarify where the strengths and weaknesses that should be considered by the authorities. This will facilitate the relevant parties to take measures for improvement in the event if there are weaknesses and strengths, promotion measures can be taken to be developed and implemented. In conclusion, this study was done to fill the gap in research with a successful model of teacher competence developed through the analysis of the measurement model. The factors of TWC will help in achieving the national vision and agenda of the national education policy.

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APPENDIX: TWC QUESTIONNAIRE

Instruction : *Each statement (item) in this section describes a process (activity / situation) that occur in your school related to TWC. You are required to read each statement carefully and provide them with appropriate scale to the statement. Use the following scale to represent the level of consent. Tick (/) in the box provided.*

	Questions	Strongly Agree ———————→ Strongly Disagree
	Professional	
Da1	I understand the value of professional	1 2 3 4 5 6 7 8 9 10
Da2	I had a job with professional.	1 2 3 4 5 6 7 8 9 10
Da3	I undertake to maintain relationships with customers.	1 2 3 4 5 6 7 8 9 10
Da4	I undertake to give priority to performance.	1 2 3 4 5 6 7 8 9 10
Da5	I complete my tasks quickly.	1 2 3 4 5 6 7 8 9 10
Da6	I perform my task with profesional.	1 2 3 4 5 6 7 8 9 10
Da7	I perform teamwork.	1 2 3 4 5 6 7 8 9 10
Da8	I had a job with customer-focused.	1 2 3 4 5 6 7 8 9 10
Da9	I perform Transformational Leadership perspective.	1 2 3 4 5 6 7 8 9 10
Da10	I will work in the state can adapt to change.	1 2 3 4 5 6 7 8 9 10
	Knowledge	
Db1	I have a desire to improve the science.	1 2 3 4 5 6 7 8 9 10
Db2	I have a creative and innovative thinking.	1 2 3 4 5 6 7 8 9 10
Db3	I understand the government's policies.	1 2 3 4 5 6 7 8 9 10
Db4	I am aware of the existence of regulations and circulars.	1 2 3 4 5 6 7 8 9 10
Db5	I mastering all the task.	1 2 3 4 5 6 7 8 9 10
Db6	I am skilled in managing the Information and Communication Technology (ICT).	1 2 3 4 5 6 7 8 9 10

Db7	I have strong partnerships with external parties (university, community, international, etc.).	1 2 3 4 5 6 7 8 9 10
Db8	I have a social side job.	1 2 3 4 5 6 7 8 9 10
Db9	I engage in activities outside of the school community.	1 2 3 4 5 6 7 8 9 10
Db10	I engage in peer coaching	1 2 3 4 5 6 7 8 9 10
	Skill	
Dc1	I have a social contribution.	1 2 3 4 5 6 7 8 9 10
Dc2	I am skilled in Teaching & Learning.	1 2 3 4 5 6 7 8 9 10
Dc3	I am knowledgeable in the Teaching & Learning.	1 2 3 4 5 6 7 8 9 10
Dc4	I have plans in Teaching & Learning.	1 2 3 4 5 6 7 8 9 10
Dc5	I know how assessments.	1 2 3 4 5 6 7 8 9 10
Dc6	I have a systematic presentation of the Teaching & Learning.	1 2 3 4 5 6 7 8 9 10
Dc7	I use a variety of reference sources.	1 2 3 4 5 6 7 8 9 10
Dc8	I have good communication skills.	1 2 3 4 5 6 7 8 9 10
Dc9	I use effective questioning techniques.	1 2 3 4 5 6 7 8 9 10
Dc10	I adopt student-centered learning.	1 2 3 4 5 6 7 8 9 10
Dc11	I assess student mastery learning.	1 2 3 4 5 6 7 8 9 10
Dc12	I assess student achievement.	1 2 3 4 5 6 7 8 9 10