

An Evaluation of Measurement Model for Malaysian Teacher Work Competencies: The Confirmatory Factor Analysis Approach

Mohd Faiz Bin Mohd Yaakob
Sultan Idris Education University, Malaysia

Dr. Jamal@Nordin Bin Yunus
Associate Professor, Sultan Idris Education University, Malaysia

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Abstract

Malaysian Teacher Work Competencies (MTWC) measurement model consist of three constructs namely, professional, skills and knowledge. The objectives of this study were (i) To evaluate the measurement model of Malaysian Teacher Work Competencies by Confirmatory Factor Analysis (CFA) (ii) To know the reliability if this model, and (iii) To prove the validity of this model. The confirmatory factor analysis (CFA) has validated the measurement model of Malaysian Teacher Work Competencies (MTWC). Therefore, these measurement models can be assessed for the future research improvements.

Keyword: Teacher Competencies, Standard Competencies, Work Competencies, Educational Management, Educational Planning.

Introduction

The concept 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 always received the prerogative to perform certain activities which had a highly symbolic meaning. (Mulder, 2014).

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 (Kementerian Pendidikan Malaysia, 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 (Gläser-Zikuda & Fuß, 2008). Indeed, The Malaysian Education Blueprint (PPPM) 2013-2025 dedicated

towards providing quality education and that improving teacher quality (Kementerian Pendidikan Malaysia, 2012).

The decisive role in ensuring the quality of teachers is not exactly new and has already been stipulated in Malaysia's Education Act 1996, Article 550, 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 are a 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 evaluate the measurement model of teacher work competencies which is based on Malaysian Teacher Standards (MTS).

Literature Review

The meaning 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 teacher actions and student learning based on behavioral psychology and child development, better known as the process-product approach. 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).

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 (e.g. Reynolds, 1992), teacher thinking, beliefs and efficacy (e.g. 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).

The Malaysian Teacher Standards developed by the Teacher Education Division of the Malaysian Ministry of Education is described as a guideline to measure teachers' 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).

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, p. 3). 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).

Methodology

A quantitative approach and survey research design was chosen for this study because the intent is to ask narrow objective questions generating quantifiable data that can be analyzed using statistics (Cresswell, 2008).

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 612 primary school teachers from five zone areas of Malaysia represented by the states of Kedah, Selangor, Johor, Terengganu and Sarawak. This sample size achieve the minimum sample size according to Krejcie & Morgan (Krejcie & Morgan, 1970).

There is 112 (18.3%) from Kedah, 163 (26.6%) from Selangor, 114 (16.5%) from Terengganu, 101 (18.6%) from Johor and 122 (19.9%) from Sarawak. The total sample size as showed in Table 1.

Table 1: Population and Sample

Zone	State	(N)	%
North	Kedah	112	18.3%
Centre	Selangor	163	26.6%
East	Terengganu	114	16.5%
South	Johor	101	18.6%
Borneo	Sarawak	122	19.9%
	Total	612	

The Measurement Instrument

The 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 (Kementerian Pendidikan Malaysia, 2013).

Validity

Both, endogenous and exogenous constructs were validated by three methods, which are convergent, construct and discriminant validity.

Convergent Validity

The convergent validity is the first method of validation processes on measurement model. 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 ≥ 0.6 considered high convergent validity (Hair et al., 2010).

Construct Validity

The construct validity on all construct of the measurement model as presented in Figure 1 below achieved the good fitness index with RMSEA = 0.079, CFI = 0.940, PCFI = 0.811 and Chi-Square/df = 4.785. All constructs statistically achieved the AVE threshold (>0.5) with high convergent validity as presented in Table 3. AVE for Professional is 0.689, Knowledge is 0.553, and Skill is 0.631

Discriminant Validity

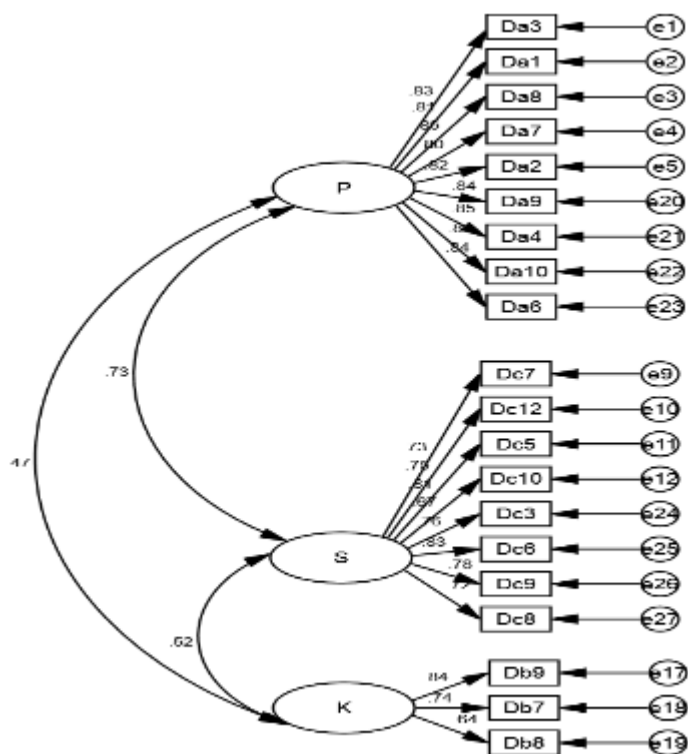
The discriminant validity is to avoid any redundant items in the measurement model (Zainudin, 2012). The items should not be related are in reality not related. It involves the relationship between a latent construct and other constructs of a similar nature.

Discriminant validity can be identified by comparing the variance shared by the average AVE between these two constructs (Bove, Pervan, Beatty, & Shiu, 2009). The estimated correlations between constructs should not be greater than 0.85. The estimated correlations between constructs should not be greater than 0.85 (Zainuddin, 2012).

The Result showed Professional (0.83), Knowledge (0.74) and Skill (0.79) and its showed no redundant items in the measurement model.

Table 2: Discriminant Validity Result

Constructs	Professional	Knowledge	Skill
Professional	Sqrt 0.689 0.83		
Knowledge	0.468	Sqrt 0.553 0.74	
Skill	0.74	0.456	Sqrt 0.631 0.79



P= Professional, S=Skill, K= Knowledge
Figure 1: 1st Order Confirmatory Factor Analysis

Reliability

Reliability will assess through three criteria namely, internal reliability using Cronbach alpha with threshold 0.600 and above (Nunnally and Bernstein, 1994) calculated using SPSS. While construct reliability (CR) should be 0.6 and above and average variance extracted (AVE) should be greater than 0.5 using AMOS application. The result as in Table 3 above revealed Cronbach Alpha is greater than 0.600, CR is 0.6 and above and AVE greater than 0.5.

Table 3: Factor Loading, Average of Variance Extracted (AVE), Composite Reliability (CR), Cronbach Alpha (CA)

Items	Constructs	Factor Loading	AVE(>0.5)	CR(> 0.6)	CA (>0.6)
Da1	Professional	0.816	0.689	0.953	0.953
Da2		0.823			
Da3		0.832			
Da4		0.844			
Da7		0.803			
Da8		0.854			
Da9		0.838			
Da10		0.841			
Da6		0.816			
Db7		Knowledge			
Db8	0.642				
Db9	0.846				
Dc3	Skill	0.795	0.631	0.991	0.910
Dc4		0.83			

Dc5	0.828
Dc6	0.82
Dc9	0.741
Dc12	0.747

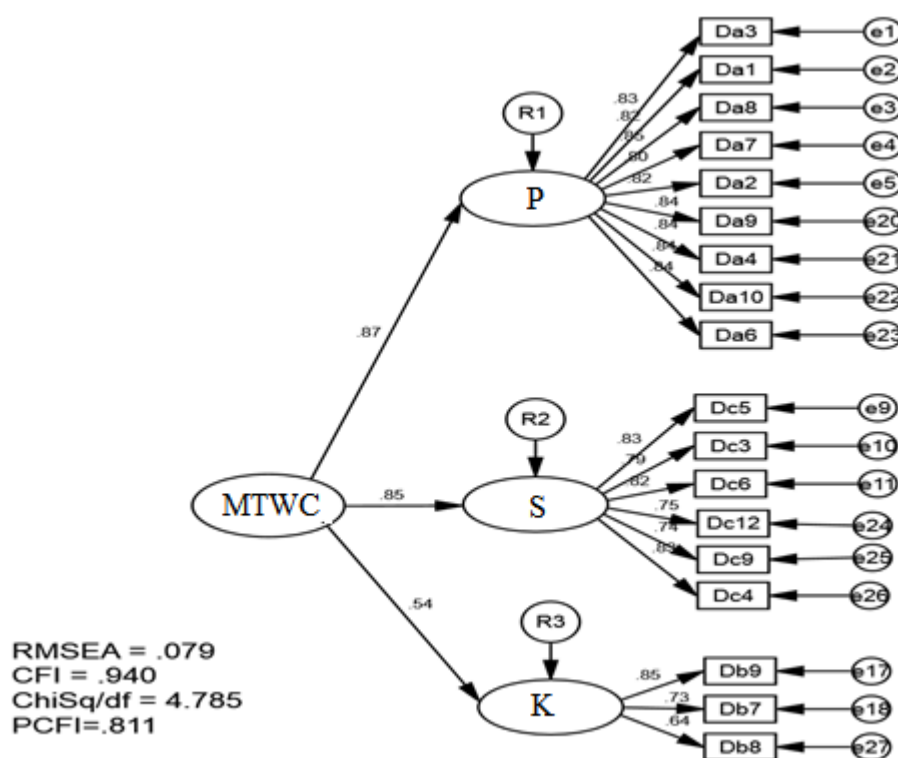
Measurement Model of MTWC

To evaluate the fitness of measurement and structural model (Holmes, Coote & Cunningham, 2006) and Hair, Back, Babin and Rolph (2010) have suggested using, at least, three fit indexes, which are absolute fit, incremental fit and parsimonious fit for construct validity. At least one index should hit the acceptance from each category of model fit as in Table 4 below.

Table 4: Result of Measurement Model MTWC

Model Indexes		Fit Indexes	Result
RMSEA	Absolute Fit	RMSEA < 0.08	0.079
CFI	Incremental Fit	CFI > 0.9	0.940
Chisq/df	Parsimonious Fit	Chisq/df < 5.0	4.785
PCFI	Parsimonious Fit	PCFI > 0.5	0.811

Source: Zainuddin (2010) ; Meyers, Gamst dan Guarino (2006)



MTWC= Malaysian Teacher Work Competencies, P= Professional, S=Skill, K= Knowledge

Figure 2: The Measurement Model of Malaysian Teacher Work Competencies

Conclusion And Recommendation

The validity and reliability of constructs of the study which are Professional, Knowledge, and Skill were measured using CFA with AMOS 21. Only the items of the constructs with factor loading >0.60 remain in the measurement model. Afterward, the AVE of the remain constructs was calculated above >0.5 achieve the convergent validity (Fornell & Larcker, 1981).

Together with a factor loading of all item ≥ 0.6 are considered high convergent validity (Hair et al., 2010). Later, the construct validity are measured with good fitness index on the measurement model with RMSEA = 0.79, CFI = 0.940, PCFI = 0.811 and Chi-Square/df = 4.785. Furthermore, the measurement model was run for the discriminant validity to confirm no redundancy of the constructs. The measurement of this study achieves the discriminant validity where the correlations between constructs are < 0.85 (Kline, 2011).

In addition, Cronbach alpha for the constructs reliability has achieved the threshold 0.600, met the CR with more than 0.60 and AVE greater than the threshold at 0.5 above. All the construct of the study achieved threshold's validity and reliability for further correlation measurement of the research model.

This measurement model can be assessed for the future research so that the next study would be included in this model. However, its need to explore the instruments better reliability across the globe so that the performance of measurement model would be better.

Corresponding Author

Name : Mohd Faiz Bin Mohd Yaakob
Affiliation : Sultan Idris Education University
Country : Malaysia
email ID : p20131001410@siswa.upsi.edu.my
Address : Sultan Idris Education University,
Faculty of Management and Economics
35900, Tg Malim, Perak

Name : Associate Professor Dr. Jamal@Nordin Bin Yunus
Affiliation : Sultan Idris Education University
Country : Malaysia
email ID : Jamal@fpe.upsi.edu.my
Address : Sultan Idris Education University,
Faculty of Management and Economics
35900, Tg Malim, Perak

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Appendix

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 Disagree	Strongly Agree
	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 professional.	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	

Dc1 1	I assess student mastery learning.	1 2 3 4 5 6 7 8 9 10
Dc1 2	I assess student achievement.	1 2 3 4 5 6 7 8 9 10