How Does Teacher Continues Professional Development Practices Help Teachers To Become Competent? Validating Models: A Structural Equation Modeling Approach

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Abstract. This study aimed to validate the instrument of teacher continuous professional development practices (TCPD) and teacher competence to become a quality educator. The instruments were divided into five main dimensions for TCPD and seven dimensions for teacher competence use confirmatory factor analysis (CFA). The study utilized a cross-sectional design involving 383 primary and secondary school teachers selected through stratified random sampling from eastern coastal states in Malaysia. The instrument for this study used a seven-point Likert scale. The hypothesis was tested with a measurement model using IBM SPSS SEM-AMOS version 24.0. Items identified as having low factor loadings were dropped. This finding indicates that the final measurement model is compatible with the data obtained. This model meets the requirements of reliability and constructs validity, convergent validity and discriminant validity. In conclusion, this measurement model could measure the degree of TCPD and the competency level of teachers in order to become a quality educator. The findings of this study have implications for the importance of professional development as ongoing growth which plays a crucial role in student turn over.

1. Introduction

Change is an essential element of any successful pursuit of excellence. In the education system, the continuous professional development practices of teachers is a key component of improving the quality of education [1]. According to Service Circular Number 6, the Year 2005 competency and continuous learning aim to promote personal development, knowledge acquisition, skills, creativity and innovation. Therefore, the human resource training policy has established the involvement of members of the public service sector to be competent by having the appropriate knowledge, skills and attitudes through continuously planned programs.

Teacher continuous professional development (TCPD) enables teachers to enhance their professional competence and skills in their respective fields. It helps teachers consistently improve their skills and knowledge in education. As such, the ministry has introduced various programs such as the Ministry of Education Training Scheme, the World Bank Training Scheme, the Malaysian Trainers Development Project (MTDP) and the Special Teacher Certification Program. Whereas, to enhance the quality of instructional guidance teaching, School Improvement Specialists (SISC+) are assigned to assist and guide through the Professional Learning Community [2]. Although various initiatives have been taken by the MOE to improve the quality of teacher teaching, there are still problems with incompetent teachers. A study by [3] found that teacher's weaknesses in implementing effective teaching resulted in students' lack of interest in learning. Meanwhile, a study by [4] found that as many as 84.8% of the students are not interested and very lazy to learn English because of the use of...
teaching strategies are less effective. In addition, many issues and critiques of teacher teaching are voiced [5].

Furthermore, the PISA Report 2018 showed that Malaysia achieved Average score (AVE) 415 which shows an increase of 17% in literacy, AVE (440) 19% increase in Mathematics and followed by Science AVE (438) 18% compare to PISA results on the year 2012. But this achievement was not enough to make Malaysia shine throughout the international arena while neighboring countries like Singapore remained in the first place than other developed countries in the United State of America. Thus, such a situation could result in the goal of the MOE being unfulfilled. Therefore this research is very important to know the TCPD and competency level among Malaysian school teachers.

2. Teacher Continues Professional Development

As educational institutions move into the new millennium, teachers have to face various reforms and challenges in the educational world, particularly in teaching and learning. Past studies found that schools and school leaders play an important role in ensuring that students receive a quality education; and teachers are very important elements to ensure the students’ achievement [6, 7, 8]. East and west scholars have found that success in change and innovation in education is closely linked to TCPD. This is supported by local and international studies which argue that TCPD is a key pillar of continuous learning and its constant [6, 7, 8, 9, 10, 11]. The ongoing process requires strong support from stakeholders to encourage and motivate teachers to continue learning.

[12] defined TCPD as a process that helps teachers improve their teaching and learning skills. This statement is in line with [13] where he stated that TCPD should start with training for teachers and continue throughout the service. It is a learning process that involves ongoing training and support activities. In addition, TCPD is also defined as the process of establishing a teacher's professional identity. It includes training that contributes to the development of knowledge, professional development in the field of a teacher's expertise [14,15]. According to this approach, teachers need to be prepared to develop themselves because of the many innovations and developments in the field of education and the nature of the teaching profession itself is a dynamic and constantly changing work environment [12]. Besides that, [16,17] view TCPD as a systematic ongoing activity aimed at enhancing the quality of teacher teaching in terms of knowledge, skills, attitudes and effectiveness of their role in the organization and learning environment of schools. It can be concluded that globally TCPD is a very important activity/process in the teaching profession. It helps to enhance the professionalism of teachers who are committed to effective teaching quality.

3. Knowles Adult Learning Theory

The variable of teacher professional development practices in this study are in line with adult learning theory [18]. This theory was founded by Knowles based on his writing The Modern Practice of Adult Education. This theory focuses on adult learning as adults need to learn for self-improvement. In the context of teachers, adult learning is a continuous process throughout the service. This is because the dynamic and changing nature of the teacher’s profession requires that teachers take the initiative to develop themselves through learning. Adult learning theory believes that adults learn when there is a need, a desire, a willingness to learn. [19] argues that adult learners need to be focused as they make decisions, take action and change their actions to the latest. Therefore, this adult tradition and learning pattern should be emphasized in TCPD activities. [20], defines adult learning as an individual process for developing knowledge, skills, values, and strategies. Adult learning is lifelong learning that needs to be equipped with global developments so as not to miss it. TCPD is an integral part of adult learning so it is important to know and understand the key principles of adult learning. This is because the principles in TCPD and adult learning are the same. The assumptions of the Knowles andragogy are (i) Student Concepts - Different individuals have different dimensions of life. Therefore, the process of enhancing self-direction in life requires guidance and encouragement from others, (ii) The role of the student experience - It is common for older students to have more experience and it can be a source of learning for themselves. Such experiences are more meaningful than passive experiences.
(iii) The willingness to learn - in the learning of adults their learning is influenced by the need to learn. When someone has a need to learn, they will be committed to meeting those needs. Therefore, systematic program planning in terms of providing a conducive environment, sufficient equipment to support their level of readiness, (iv) Time perspective - Learning activities should be clear and meet student needs. This is because students are interested in learning knowledge that can be applied immediately, (v) Learning orientation - from an adult learning perspective is a process for improving skills to apply knowledge and skills effectively. Their learning is to enhance their efficiency and self-efficacy based on their achievements. In conclusion, adult learning works to help one live a successful life. The process of finding and discovering life skills is very important in the teaching profession.

4. Teacher Competence

Competence as an academic concept was introduced by McClelland around 1973 [21]. An introduction to the concept of competence was created when McClelland criticized the traditional Intelligence Test. However, the literature review shows that researchers use different definitions for explaining the concept of competence based on field and competency standards their respective countries [22, 23, 24, 25].

In the Malaysian context, teachers’ competencies follow the guidelines provided by Malaysian teacher standards (SGM). It is a basic guide to all civil servants. In the government sector, performance evaluation methods are based on the practice of competence because it can reduce the bias issues due to age, gender, religion, eligibility and SES [26]. Teacher competence means the ability to use skills and knowledge owned to perform any task. Over two decades ago, Western studies summed up competencies are elements that are made up of knowledge, skills, the understanding and attitude shown by an individual in the form behavior in performing an activity or task [27, 28, 29]. A teacher should always strive to improve self-esteem as it will aid in teaching and classroom learning. Involvement in professional development activities whether formally and informally will help improve knowledge and existing skills.

5. Model of teacher competence

The theory of this study based on the iceberg model by [30] In this model competence divided into skills, knowledge, and attitudes. According to Hay McBer teachers’ skills and knowledge can be enhanced by attending courses/workshops or by adopting non-formal activities and behaviors. The behavior depends on the personal nature of the teacher. [25] argues competencies can be divided into two, internal and external. Inner refers to “belonging to a person” where one’s attributes tend to change over time based on one's development in the field or otherwise. While external means “what a person to produce by the level of achievement indicates competence either in the context of learning, social situations or at work. Internal competence this is more of a context that describes behavioral competencies. Competence this behavior is different from the inner competence of one's self Emphasize skills or personal attributes that will help achieve a competent stage [25].

6. Purpose of the study

The aim of this study is to determine the validity and reliability of the proposed level of teacher continues professional development practices to enhance teacher competency level at school. The TCPD model comprises five subconstructs namely keeping up to date, experimenting, reflecting, school development, collaboration lesson, and teacher competency level comprises seven subconstructs namely basic content, subject knowledge, pedagogy, school management, student development, professional attributes, classroom management. To address the research objective, the study used a model of teacher professional development synthesized from [9] and [31] Based on the above objective the research question is as follows

*RQ1.* Is the measurement model for the teacher continues professional development practices of Malaysian school teachers are valid and reliable?
RQ2. Is the measurement model for the teacher competence of Malaysian school teachers are valid and reliable?

Thus, based on the conceptual framework, research objective and research question the following hypotheses were formulated.

H1. All the five models for the teacher's continues professional development of Malaysian school teachers are valid and reliable.

H2. All seven models for the teacher competence of Malaysian school teachers are valid and reliable.

Figure 1: Framework of Teacher Continues Professional Development (BeatricAvalos, 2015; Evers et.al., 2015)

Figure 2: Framework of Teacher Competence (Malaysian Teacher Standard, 2009)
7. Methods

Respondents and Procedures

The design used in the study is a cross-sectional survey method to gather information from the teachers. The cross-sectional method is the best way for this study because it helps to gather responses from a large educational field. The instruments were able to distribute widely in a short period of time. Teachers from primary and secondary school particularly national schools from eastern coastal states involved in this study. National primary schools and national secondary schools are grouped by city and rural category by state. A total of 383 respondents were selected through a random sampling technique based on the states of Kelantan, Terengganu, and Pahang. According to [32, 33], this sampling technique is an appropriate technique to enhance the representativeness of the sample in the study population. This study used seven Likert scale instruments adapted from [9] for TCPD and [31].

The questionnaire for TCPD was from English but the teacher competence questionnaire was originally published in Malay language but the back-translation method was developed as suggested by [34]. Responses were measured on a seven-point scale with 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, 7 = strongly agree. The questionnaire used consisted of three sections. Part A collects demographic data and Part B gathers information on the level of teacher's continuous professional development and Part C gathers information about the level of teacher competence. A total of 383 teachers from primary and secondary school teachers were responded to the questionnaire.

8. Data analysis

The study used SPSS version 25 for data analysis and AMOS 24.0 for the advanced analysis involving (SEM). Since, the multivariate technique is the power to analyze the measurement model thus confirmatory factor analysis (CFA) was used to validate the model in terms of convergent validity and construct reliability [33]. There were three types of measures involved in confirmatory factor analysis, i.e Test for Model Fit, Convergent validity, Construct reliability (Bryne, 2010; [33, 35,36].

| CFA | Fit Indices : At least 3 Fit Indices | Relative Chi-square <.05 |
|-----|-----------------------------------|-------------------------|
|     | Model Fit                         | RMSEA < .08             |
|     | Std factor Loadings >.50          | GFI,NFI,CFI,TLI>.90     |
|     | Convergent validity               | AVE>.50                 |
|     | Construct reliability             | CR>.70                  |

**Figure 3:** An overview of Confirmatory Factor Analysis (CFA) for this study
9. Results

Table 1 shows the demographic information of the respondents obtained from descriptive analysis using IBM SPSS version 25.0 (N=383)

| Demographic      | n  | %   |
|------------------|----|-----|
| **Types of School** |    |     |
| Primary (SK)     | 199| 52.0|
| Secondary (SMK)  | 184| 48.0|
| **Area**         |    |     |
| Urban            | 166| 43.3|
| Rural            | 217| 56.7|
| **State**        |    |     |
| Kelantan         | 130| 33.9|
| Terengganu       | 126| 32.8|
| Pahang           | 127| 33.1|
| **Gender**       |    |     |
| Male             | 187| 48.8|
| Female           | 196| 51.2|
| **Qualification**|    |     |
| Certificate      | 14 | 3.7 |
| Diploma in education | 32 | 8.4 |
| Degree           | 306| 79.9|
| Masters          | 31 | 8.1 |
| **Years of Service** |    |     |
| 1-10 years       | 61 | 15.9|
| 11-20 years      | 140| 36.6|
| 21-30 years      | 171| 44.6|
| >30 years        | 11 | 2.9 |

The respondents' profiles in this study showed characteristics similar to those of the school teacher survey population. The distribution of teachers by area state and gender are almost equal. A total of 199 from primary school and 184 from SMK were involved in this study. Respondents from Kelantan, Terengganu, and Pahang were 33.9, 32.8% and 33.1% respectively. Male respondents were 48.8% while female respondents were 51.2%. The response rate was highest in rural schools at 56.7% and in urban areas by 43.3%. Respondents' professional approval of 80% of respondents had a degree in education. In addition, in terms of teaching experience, the majority of respondents had 21-30 years of teaching experience (45%), followed by 11-20 years (37%) and 1-10 years 16% and > 30 years (3%). More demographic details of the respondents are tabulated as in Table 1.
Table 2: Descriptive Statistics Of Teacher Continues Professional Development Practices Among Malaysian School Teachers

| No of items | Mean   | Std. Deviation | Level |
|-------------|--------|----------------|-------|
| Keeping Up to Date | 5.04   | 0.68           | (3) High |
| Experimenting    | 5.11   | 0.71           | (1) High |
| Reflecting      | 4.81   | 0.69           | (5) High |
| Collaboration   | 4.95   | 0.80           | (4) High |
| School Development | 5.06   | 0.81           | (2) High |

Notes: Level=Low (1-2.33); Medium (2.34-4.67); High (4.68-7.00)

Based on the findings of the descriptive statistics of the study, generally Malaysian school teachers had demonstrated a high level of teacher continues professional development practices (TCPD). The highest score of TCPD was Experimenting (M = 5.11, SD = 0.71), while the lowest was Reflecting (M = 4.81, SD 0.69). However, School development, Keeping Up to Date and collaboration were considered in a high category that falls within the range of (M = 4.95 to 5.04).

Table 3: Descriptive Statistics Of Teacher Competence of Malaysian School Teachers

| No of items | Mean   | Std. Deviation | Level |
|-------------|--------|----------------|-------|
| Basic Content | 6.14   | 0.61           | (2) High |
| Subject Knowledge | 5.93   | 0.61           | (1) High |
| Pedagogy    | 5.74   | 0.58           | (4) High |
| Classroom Management | 5.82   | 0.64           | (3) High |
| Professional Attributes | 5.62   | 0.58           | (6) High |
| School Management | 5.64   | 0.71           | (5) High |
| Student Development | 5.51   | 0.77           | (7) High |

Notes: Level=Low (1-2.33); Medium (2.34-4.67); High (4.68-7.00)

Based on the findings of the descriptive statistics of the study, generally Malaysian school teachers had demonstrated a high level of teacher competence. The highest score of teacher competence were subject knowledge (M = 5.93, SD = 0.60), while the lowest was student development (M = 5.51, SD 0.77). However, Basic Content, classroom management, pedagogy, school management, professional attributes were considered in a high category that falls within the range of (M = 5.62 to 5.91).

10. Findings and Discussions

Confirmatory factor analysis was used to determine the compatibility of the measurement model with the aim of measuring the relationship between constructs. IBM SEM Amos Version 25.0 was used to analyze the data obtained. Figure 4 shows the CFA output of the original measurement model hypothesized. Several compatibility indices are generated to determine the measurement model. The fit of the measurement model is important and needs to be determined in advance and if the measurement does not match the data then the built-in structural equation (SEM) model is invalid [35].
According to [33] measurement models need to reach one of the model's compatibility categories, Absolute Fit (see [37]), Incremental Fit (see [36]) and Parsimonious Fit (see [38]). The measurement model does not achieve good Goodness of fit Indices value. In addition, there are also items with low factor loading which is less than 0.50 as suggested by [33]. Items i.e. PPBGA1, PPBGA2, PPBGC12, PPBGC14, PPBGD18, PPBGE22 identified with low factor loading. The diagram below shows the Goodness of fit Indices values after delete items with a low factor loading.

All four values of Goodness-of-fit Indices (CFI) (0.905), RMSEA (.081), ChiSq / df (3.424). All revised index fit values are CFI, TLI, ChiSq/df has increased after the elimination of the problematic item. The table shows the results of the internal reliability and convergent validity of the constructs.
and sub-constructs in the model. Focusing on the extent to which a set of items serves as an indicator for a particular construct measures the same concept by sharing high variance [33, 35]. Convergence validity is assessed based on factor loadings, average extracted variance (AVE variance extracted) and composite reliability (composite reliability-CR) [33,35].

![Diagram](image)

**Figure 6: Measurement Model Level of Teacher Continues Professional Development Practices**

| Construct                  | CR | (1) | (2) | (3) | (4) | (5) |
|---------------------------|----|-----|-----|-----|-----|-----|
| Keeping up to date (1)    |    | **0.79** |     | *0.75 |     |     |
| Experimenting (2)         |    | **0.86** | 0.34 |     |     | **0.74** |
| Reflecting (3)            |    | **0.75** | 0.26 | 0.53 |     | **0.71** |
| Collaboration lesson (4)  |    | **0.82** | 0.26 | 0.39 | 0.59 | **0.74** |
| School Development (5)    |    | **0.84** | 0.18 | 0.33 | 0.59 | 0.73 | **0.76** |

Note: **Diagonals represent the square root of the AVE extracted while the other entries represent the r²**
According to [33] measurement models need to reach one of the model's compatibility categories, Absolute Fit (see [37]), Incremental Fit (see [36] and Parsimonious Fit) [38]. The measurement model does not achieve good Goodness of fit Indices value. In addition, there are also items with low factor loading which is less than 0.50 as suggested by [33]. Items i.e KGAI1, KGAI2 KGIC13, KGIE33, KGIE34, KGIE35, KGIE36, KGIE37, KGGF49, KGGF50, KGG55, identified with low factor loading. The diagram below shows the Goodness of fit Indices values after delete items with a low factor loading.
Table 5: Result of the Hypotheses Tests

| Construct                  | CR  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Basic Content KGA (1)      | 0.91| **0.83** |    |    |    |    |    |    |
| Subject knowledge KGB (2)  | 0.88| 0.65 | **0.78** |    |    |    |    |    |
| Pedagogy KGC (3)           | 0.92| 0.67 | 0.69 | **0.75** |    |    |    |    |
| Classroom Management KGD (4)| 0.91| 0.61 | 0.57 | 0.74 | **0.79** |    |    |    |

Figure 9: Measurement Model Level of Teacher Competence
As a result of the CFA, the sub-construct of teacher continues professional development namely school development, experimenting, collaboration, reflecting and keeping up to date and also the sub-construct of teacher competence namely basic content, subject knowledge, pedagogy, classroom management, professional attributes, school management, and student development mutually fit without any multicollinearity problem. Therefore, it can be concluded that the validity of five constructs of teacher continues professional development and seven constructs of teacher competence have been achieved. After modifications to the model were done by eliminate items with low factor loading and meet the desired validity and reliability of the model, it can be concluded that there is a consistent model of teacher continuous professional development and teacher competence among Malaysian school teachers with the available survey data.

Thus, hypotheses H1 dan H2 were supported. Nineteen items have remained in the model of teacher continuous professional development and Forty-four items were retained in the model and were able to measure the level of teacher competence in the educational context. As this study is the first study conducted on school especially primary and secondary school teachers from the urban and rural areas to determine the teacher’s continues professional development and teacher competence among Malaysian school teacher-researcher have trouble finding relevant literature that can directly support the findings of this study. However, most of the research which was done focus on a specific subject rather than in general is backed up by this study.

The findings of this study were congruent with [39, 40, 41] all of whom had discovered there is a high level of teacher continues professional development which indirectly supports to teacher competency level. Adding to this several studies conducted by scholars around the world also confirms that educators whom involved in high-quality professional development programs able to improve knowledge and skill which plays important role eventually affect students achievement and teachers competency level [42, 43, 44]. This discovery goes along with the adult learning theory where improving skills to apply knowledge and skills effectively will enhance teacher’s level of competence.

Furthermore, the results of teacher competence constructs of this study support the theory of adult learning as well as the review of past studies. Researchers have found that teacher competence is very important in classroom teaching and learning as suggested in HayMcBer's 1996 model that teachers' skills and knowledge can be enhanced by attending courses/workshops or by adopting non-formal activities and behaviors. The behavior of a teacher depends on the personal nature of the teacher. For example, recent studies show that teacher competence is important for optimal teaching and learning activities. In addition, teacher competence also has a significant relationship with student achievement [45, 46, 48, 49].

This study is important because change is taking place in the education system globally. Teachers are a key element in developing a balanced human model through the national education system. The main aim of the Malaysian Education Development Plan (PPPM) (2013-2025) is to make Malaysia outstanding among other developed countries and that will only be achieved by competent educators. Competent teachers in terms of knowledge, skills, and attitudes are able to produce a
balance of physical, Emotional, Spiritual and Intellectual Capital (National Philosophy of Education, FPK). Readiness to accept changes in education helps a teacher apply 21st-century learning.

11. Implications and Contributions
Theoretically, this study able to successfully produce a five-factor model of teacher continuous professional development and the seven-factor model of teacher competence among Malaysian school teachers. Thus, to confirm the models for this study, qualitative evaluation of the models should be carried out and it will be the next phase of exploration in this area of study. The findings of this study might help the Ministry of education, district offices and schools the importance to know the level of teacher continues professional development practices and teacher competence among school teachers. According to MacCallum et al, 1993, there may be other alternative models that use different sub-constructs with similarities to the same data. Thus, future studies are encouraged to test the existence of other alternative models and to compare them with the original model to help make improvements to the original model.

12. Conclusion
This study’s findings disclose the ongoing opportunity to know the level of teacher continuous professional development practices that enhance teacher competence together. It remains an inevitable issue that should take into consideration. The results show an important element in teacher continues professional development practices and teacher competency level where those elements play an important role as a key component of improving the quality of education.

Hence, based on the data and contemporary studies teacher continues professional development practices and teacher competence gave a great impact on change implementation and its critical for educational transformation change’s success. As has been noted, the individual change readiness in an educational setting especially to develop competence among school teachers was found one of the greatest contributions to the existing theory. Improvement in the quality of education will be more successful if the concern of teacher continues professional development practices and competence level among school teachers are considered. Educational transformation won't be a success unless teachers are ready to change by improving their competency level. Hence, the concept of teacher continues professional development practices and teacher competence should be paid attention.

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