



***INSTRUMENT DEVELOPMENT AND VALIDATION FOR MEASURING
COMPETENCIES AMONG POLYTECHNIC TEACHERS IN MALAYSIA***

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By

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**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

October 2019

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DEDICATION

This PhD thesis is dedicated to all my family members;

“May our life be always blessed by Allah SWT in the world and in the hereafter.”

“Indeed, we belong to Allah SWT, and indeed to Him, we will return”



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment
of the requirement for the degree of Doctor of Philosophy

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October 2019

Chairman : Associate Professor Roziah Mohd Rasdi, PhD
Faculty : Educational Studies

One of the aims of human resource development (HRD) is to manage the career development of an employee, and to enhance his or her future performance in terms of knowledge, skills, and abilities or competencies. As for Polytechnic teachers, their competencies can affect the performance of their students and are an important component to support the practice of competency-based education in polytechnic institutions. Malaysia's TVET education has recently faced the issue of a lack of competent teachers, in terms of on-the-job and personal competencies, including among polytechnic teachers. Through the competency-based approach, the objective of this study is to develop and validate an instrument for measuring competencies among polytechnic teachers in Malaysia, known as the Ma-PTCMI Instrument.

This multiphase study comprised of competency identification and modelling, and the development of the competency measurement instrument, which was methodologically used to achieve the overall research objectives. To enhance the validity of this instrument, 11 experts from various institutional backgrounds have participated in this study. Subsequently, four interconnected competency constructs were proposed to develop a comprehensive framework for the Ma-PTCM model and the Ma-PTCMI instrument, namely teaching competencies, professional competencies, communication competencies, and personal competencies.

The population of this study consisted of teachers from 28 polytechnics in Peninsular Malaysia. A total of 195 teachers took part in the overall instrument testing procedure. Then, 198 items were tested on 35 respondents in the first instrument testing (pilot study). During the second instrument testing, this instrument was refined, where 133 items were re-tested on 50 respondents. In the final instrument testing, 123 items were re-tested on 110 respondents and were identified as essential

items to be included in the Ma-PTCMI instrument. The Winstep software (version 3.72.3) was used to analyse the collected data.

Data analysis using the Rasch Measurement Model showed that the first version of the Ma-PTCMI instrument has an item reliability value of 0.91, with the item separation index of 3.21 and person reliability of 0.99, with separation index of 13.11. As for unidimensionality, the raw variance explained by measures was 60.0%. Unexplained variance in the 1st contrast of 8.8 % was obtained. The final version of the Ma-PTCMI instrument showed improved psychometric properties for item reliability of 0.97, with item separation index of 5.32 and person reliability of 0.99, with person separation index of 11.67. For unidimensionality, the raw variance explained by measures was 64.2%. Unexplained variance in the 1st contrast of 7.5% was obtained, which proved that it has improved from the first version. A total of 75 items were removed from the original instrument. The new self-assessment instrument consisted of 123 items and used the 5-point Likert scale.

The Ma-PTCMI instrument fills a theoretical gap by extending the competency elements of a polytechnic teacher with a comprehensive set of required competencies from the Job and Personality perspectives. The Ma-PTCMI instrument may contribute towards providing related bodies with a framework of competency modelling and a self-assessment tool for assessing the competencies of polytechnic teachers. The outcome is expected to become input for future polytechnic teacher's training and professional development intervention.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PEMBANGUNAN DAN VALIDASI INSTRUMEN BAGI PENGUKURAN KOMPETENSI DALAM KALANGAN GURU POLITEKNIK DI MALAYSIA

Oleh

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Salah satu matlamat pembangunan sumber manusia (PSM) adalah untuk mengurus pembangunan kerjaya seseorang pekerja dan untuk meningkatkan prestasi masa hadapan pekerja tersebut dari segi pengetahuan, kemahiran, dan kebolehan atau kompetensi. Bagi para guru politeknik, kompetensi mereka boleh mempengaruhi prestasi pelajar mereka dan turut menjadi komponen penting dalam menyokong amalan pendidikan berasaskan kompetensi di institusi politeknik. Terkini, pendidikan TVET di Malaysia menghadapi masalah kekurangan guru yang kompeten dari segi kompetensi dalam pekerjaan dan peribadi, termasuk dalam kalangan guru politeknik. Melalui pendekatan berasaskan kompetensi, objektif kajian ini adalah untuk membangunkan dan mengesahkan suatu instrumen untuk mengukur tahap kompetensi dalam kalangan guru politeknik di Malaysia, yang dinamakan instrumen Ma-PTCMI.

Kajian pelbagai fasa ini meliputi pengenalpastian dan pembangunan model kompetensi, serta pembangunan instrumen pengukuran kompetensi yang digunakan secara metodologi untuk mencapai objektif keseluruhan kajian ini. Untuk meningkatkan keesahan instrumen ini, 11 orang pakar daripada pelbagai latar belakang institusi telah terlibat dalam kajian ini. Seterusnya, empat konstruk kompetensi yang saling berkait telah dicadangkan untuk membangunkan rangka kerja yang menyeluruh untuk model Ma-PTCM dan instrumen Ma-PTCMI, iaitu kompetensi mengajar, kompetensi profesional, kompetensi komunikasi, dan kompetensi peribadi.

Populasi kajian ini terdiri daripada guru-guru daripada 28 buah politeknik di Semenanjung Malaysia. Seramai 195 orang guru telah mengambil bahagian dalam tatacara keseluruhan pengujian instrumen. Kemudian, 198 item telah diuji melalui 35

orang responden dalam pengujian instrumen pertama (kajian rintis). Dalam pengujian instrumen kedua, instrumen ini telah diperhalusi dan 133 item telah diuji semula melalui 50 orang responden. Dalam pengujian instrumen terakhir, 123 item diuji semula melalui 110 orang responden dan dikenal pasti sebagai item penting untuk dimasukkan ke dalam instrumen Ma-PTCMI. Perisian Winstep (versi 3.72.3) telah digunakan untuk menganalisis data.

Analisis data menggunakan Model Pengukuran Rasch menunjukkan bahawa versi pertama instrumen Ma-PTCMI mempunyai nilai kebolehpercayaan item sebanyak 0.91, dengan indeks pemisahan item bernilai 3.21, dan kebolehpercayaan individu sebanyak 0.99, dengan indeks pemisahan individu bernilai 13.11. Manakala untuk unidimensionaliti, peratus varians mentah yang dijelaskan oleh pengukuran ialah 60.0%. Peratus varians tidak dijelaskan dalam kontras pertama bernilai 8.8% telah diperoleh. Versi terakhir instrumen Ma-PTCMI menunjukkan peningkatan ciri-ciri psikometri untuk kebolehpercayaan item sebanyak 0.97, dengan indeks pemisahan item bernilai 5.32, dan kebolehpercayaan individu sebanyak 0.99, dengan indeks pemisahan individu bernilai 11.67. Untuk unidimensionaliti, peratus varians mentah yang dijelaskan oleh pengukuran ialah 64.2%. Peratus varians tidak dijelaskan dalam kontras pertama bernilai 7.5% telah diperoleh yang menunjukkan bahawa nilai ini telah meningkat berbanding versi pertama. Sebanyak 75 item telah dikeluarkan daripada instrument asal. Instrumen penilaian sendiri yang baharu mengandungi 123 item dan menggunakan skala Likert 5 titik.

Instrumen Ma-PTCMI memenuhi suatu jurang teori dengan memperluaskan unsur kompetensi guru politeknik dengan satu set kompetensi yang menyeluruh yang diperlukan melalui perspektif Kerjaya dan Personaliti. Instrumen Ma-PTCMI boleh menyumbang kepada badan-badan berkaitan rangka kerja pemodelan kompetensi dan alat penilaian sendiri bagi menilai kompetensi guru politeknik. Hasil kajian ini dijangka mampu menjadi input bagi latihan dan pengantaraan dalam pembangunan professional guru politeknik pada masa hadapan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

CBA	Competency - Based Assessment
CBA	Competency - Based Approach
CBM	Competency - Based Management
CBE	Competency - Based Education
CBT	Competency - Based Training
CI	Competency Identification
CM	Competency Model
CP	Competency Profile
CTT	Classical Test Theory
CVR	Content Validity Ratio
DIF	Differential Item Functioning
EPU	Economic Planning Unit
HRD	Human Resource Development
HRM	Human Resource Management
ICC	Items Characteristics Curve
IRT	Items Response Theory
JA	Job Analysis
JD	Job Design
JKM	<i>Jabatan Kejuruteraan Mekanikal</i>
KSA	Knowledge, Skill and Attitude
LP	Lesson Plan
LTT	Latent Trait Theory
MCE	Malaysia Certificate Education
MoA	Ministry of Agriculture and Agro – Based Industry
MoDTCA	Ministry of Domestic Trade and Consumer Affairs

MoE	Ministry of Education
MoED	Ministry of Entrepreneur Development
MoHR	Ministry of Human Resources
MoW	Ministry of Works
MoRD	Ministry of Rural Development
MoYS	Ministry of Youth and Sports
Ma-PTCM	Malaysian Polytechnic Teacher Competency Model
Ma-PTCMI	Malaysian Polytechnic Teacher Competency Measurement Instrument
MNSQ	Infit Mean-Square
NEM	New Economic Model
NOSS	National Occupational Skills Standard
OD	Organisational Development
OBE	Outcome - Based Education
PCA	Principal Component Analysis
PSM	<i>Pembangunan Sumber Manusia</i>
RMM	Rasch Measurement Model
TD	Training and Development
TO	Teaching Outline
TSP	Training Session Plan
TVED	Technical and Vocational Education Division
TVET	Technical and Vocational Education and Training
UNESCO-UNEVOC	International Centre for Technical and Vocational Education and Training
UPM	Universiti Putra Malaysia

CHAPTER 1

INTRODUCTION

This chapter is an introductory note regarding the problem being studied, which includes the following: (1) background of the study; (2) statement of the problem; (3) research objectives; (4) research questions; (5) study outputs; (6) significance of the study; (7) scope of the study; (8) limitations; (9) delimitations; (10) assumptions; and (11) definition of terms.

1.1 Background of the Study

Human resource development (HRD) can be defined as “an integrated use of training, organisation, and career development to enhance the effectiveness of individuals and organisations” (McGuire, 2011). Therefore, HRD is the framework that can help employees develop their job and personal knowledge, skills, and abilities (KSAs) or competencies, which would enable an individual in the organisation to perform well in his/her current and future professional needs. Organisations have used HRD practices as an important strategic mechanism to stimulate positive behaviour in individuals and impact their KSAs, which can increase performance. Potnuru and Sahoo (2016) contended that HRD through career development (CD) interventions assist in building partnerships between organisations and their employees and enriching their KSAs by improving individual competencies.

In recognition of the importance of competency for an individual’s work performance, HRD through education and training has become an approach to enhance the potential of human resource and it is a relevant factor in determining the status of a country. Within this context, the Technical and Vocational Education and Training (TVET) programme was set up as part of the Malaysian government’s efforts to produce a skilled workforce to support the national development agenda of becoming a high-income nation by 2020. Thus, the development of a strong HRD department is fundamental, not only for the success of any career development programmes, but for the future of a national TVET strategy as well.

As written in the 11th Malaysia Plan as a Game Changer, TVET is one of the catalysts expected to contribute to the number of skilled workers from the current 28% to 35% by the year 2020 (Economic Planning Unit, 2015). In ensuring the production of quality TVET graduates, the Technical and Vocational Education and the Training Empowerment Cabinet Committee (JKKPTVET) was set up. This cabinet comprises of eight ministries, namely the Ministry of Education (MoE), Ministry of Human Resources (MoHR), Ministry of Youth and Sports (MoYS), Ministry of Works (MoW), Ministry of Rural Development (MoRD), Ministry of Entrepreneur Development (MoED), Ministry of Agriculture and Agro-based Industry (MoA), and Ministry of Domestic Trade and Consumer Affairs

(MoDTCA). State governments have been entrusted to recruit competent TVET teachers to ensure that the objective of producing a skilled workforce is achieved.

With TVET programmes moving towards competency-based education (CBE) system, which involves the process of obtaining evidence and thus requiring a study on the level of knowledge, skills, and attitudes of students on an assignment based on the prescribed standard, it has become necessary for TVET teachers to have the right set of competencies in order to deliver the right set of skills and knowledge for a specific profession (Paryono, 2015). This is different than outcome-based education (OBE), where the focus is on what the students should learn, which is expressed in the form of learning outcomes (Gurukkal, 2018). The focus on learning outcomes has changed the emphasis from traditional learning viewpoint to student-centred learning. Thus, in OBE, students are more responsible for their own education because they should be clear of what they want to achieve. Although both approaches aim to produce graduates who have the KSAs to meet the needs of the industry, competency-based assessment (CBA) demonstrated a vital role in the aspects of teachers rather than students (Likisa, 2018).

Based on the existing evidences on the teaching profession, major concerns include the quality and gaps in competencies among them (Ismail, Nopiah, Rasul, & Leong, 2017; Paryono, 2015; Soysouvanh et al., 2013). The competencies of TVET teachers in delivering effective job performance is a crucial factor contributes to the production of quality graduates, given that the delivery of quality teaching is directly related to the level of TVET teachers' competency. To ensure the sustainable quality of education, the development of competent TVET teachers is seen as an area of concern (Hattie, 2008). The most important aspect of TVET teacher training is to support teachers who are preparing their students for the working environment in the future. Hence, they need to conduct competency-related teaching and learning with their students. To do so, they need to be aware of modern methods and approaches related to TVET through Competency-based Education (CBE). These approaches need to change their mind-set from being teachers to being facilitators and moderators of the learning process. TVET teachers not only need to prepare their students, but also themselves in this fast-changing environment.

The recent primary focus of the profession is on the measurement of competence; although it may appear straightforward, this is actually a complex process. The challenges of assessing and measuring the competence of TVET teachers differ from the general teaching profession due to the diverse nature of teaching roles. With the establishment of TVET in the education system, the assessment procedures that dominated TVET teacher training and development have been reviewed, such as the use of competency measurement instruments, with a move towards competency-based assessment (CBA) (Paryono, 2015). The difficulty in finding a useful measure lies in the continuing search for a valid and reliable method for assessing competency. In order to determine the competency of a polytechnic teacher to deliver the expected level of performance, the polytechnic teaching profession needs to develop procedures that would clarify what constitutes a satisfactory performance.

The Department of Skills Development Malaysia has developed the National Occupational Skills Standard (NOSS), which is a comprehensive guideline on performance specifications required in the related occupation. This standard was established through a job analysis technique. However, Sanchez and Levine (2011) stated that the traditional approach of job analysis only describes and measures the requirements of a job task compared to another method known as competency modelling, which creates a channel that can influence a bigger perspective on the job and individual factors. Similarly, Curnow (2005) found that job analyses are more task-oriented and are thus, unable to capture the changing nature of a job, whereas competency models are better in handling this issue. Additionally, a review paper by Ismail et al. (2017) listed one of the key factors contributing to the problems surrounding TVET teachers in Malaysia to be the absence of competency models, which has made it difficult for these teachers to develop profiles and receive appropriate training.

A preliminary study was conducted in this research on the need for a competency measurement instrument to be developed for polytechnic teachers. The results revealed that most of the participating respondents agreed that competency is a crucial concept for polytechnic teachers. Approximately 82.5% of the respondents agreed that no comprehensive model currently exists in the context of polytechnic teachers. Additionally, 87.5% agreed that there is a need to develop a new framework for a competency model for the profession. Accordingly, lists of competencies required for polytechnic teachers must be compiled. The study began by identifying the competencies required for polytechnic teachers from the viewpoint of a TVET expert panel. A self-assessment instrument for competency measurement can be derived from the competency model; this instrument can later be utilised to provide data for competency profiling. As suggested by Spencer and Spencer (1993), and Sanghi (2007), competency self-assessment could potentially be used to guide teachers in their professional development through their strengths and weaknesses. Greenstein (2012) described competency assessment as a process to gain evidence and form judgement on the levels of competency among individuals in performing a task based on identified standards. Similarly, Hager, Gonczi, and Athanasou (1994) defined competency-based assessments (CBA) as an assessment of a person's competence against prescribed standards of performance. Thus, if a profession has established a set of entry-level competency standards, then these details are the standards of performance required of all new entrants to that profession. It is a process of determining whether a candidate meets the prescribed standards of performance.

However, Soysouvanh et al. (2013) pointed out that instruments that are applicable to all types of teachers are mainly developed with general education teachers in mind and therefore, would mostly concentrate on classroom teaching. In contrast, TVET education should, to a large extent, take place outside the classroom, namely in workshops and in real work production environments. Some examples of existing instruments include *Penilaian Bersepadu Pegawai Perkhidmatan Pendidikan* (PBPPP), Professional Standards for Teachers issued in 2007 (TDA, 2007), *Standards für die Lehrerbildung: Bildungswissenschaften* issued in 2004 (KMK,

2004), Standards of Teachers issued in 2010 (MoE, 2010), Model Core Teaching Standards (InTASC) and its updated version issued in 2011 (CCSSO, 2011), and Professional Standard Regulation for Vocational Lecturers and Teachers issued in 2010 (MoLISA, 2010). The findings from the preliminary study also revealed that 90.0% of the respondents agreed that a comprehensive instrument for measuring a polytechnic teacher's competencies does not exist. They agreed that having such an instrument can improve the performance of future polytechnic teachers through training and professional development. Thus, it will be an advantage if a comprehensive measurement tool exists that could measure competencies possessed by a polytechnic teacher.

Competence cannot be directly observed; therefore, the evidence needs to be of sufficient quantity for sound judgment to be made concerning an individual's level of competence (Hager et al., 1994). With the need to shift from an individual construct to one that focuses on the development of a comprehensive model, the importance of being able to measure the performance level of TVET teachers has now been recognised since such measurement is central to the notion of professionalism, and essential to practice. Similarly, evaluation of competence should include effectively assessing competence. The selected method should be based on the relevance of what is being assessed to increase the validity of the evidence and to ensure generalisability of the performance to other tasks. As an option, measurement of employee performance can be done in many ways, for instance, self-assessment (Ross & Bruce, 2007) and portfolio (Tucker, Stronge, Gareis, & Beers, 2003).

These options show the lack of suitable self-assessment tools, as the existing instruments by themselves are insufficient for measuring polytechnic teachers' competencies. Thus, another instrument is needed to support the application of the existing instruments. Teacher self-assessment is an appropriate answer to this problem. To enhance an individual's competencies, Zepeda (2015) studied the development and validation of teacher self-assessment instruments and stated that any approach should start from self-assessment, where one reflects on and evaluates his or her own knowledge, skills, and abilities. Based on the reflections made in the self-assessment, the individual can then go on to set goals and targets for future improvement. Goal-setting leads to devising an action plan to bridge the gap between current and required performances. Teachers are the best judge of their own performance. Given time, encouragement, and resources, they are capable of assuming bigger responsibilities for their own professional development.

In a high-stake study that involves the development and psychometric validation of an instrument, the application of the Rasch measurement model (RMM), which is an Item Respond Theory-based model, should be considered instead of using the Classical Test Theory (CTT) (Petrillo, Cano, McLeod, & Coon, 2015) in data analysis procedures. Petrillo and his colleagues conducted a comparative study to test a similar instrument using a different statistical tool. They summarised that the RMM provided more detailed diagnostic information on how to improve the scale in

a one-to-one comparison. Researchers should select methods they are comfortable with because the current availability of user-friendly “black box” statistical software makes many psychometric methods more accessible than they have been in the past, but blind application of these methods can result in erroneous conclusions. Thus, using RMM to analyse a newly-developed instrument would provide robust grounds to evaluate and improve psychometric properties, including validity and reliability (Boone, 2016).

1.1.1 The Role of Career Development and Employee Competencies in Human Resource Development

HRD aims to develop employees through career development. As part of the primary function of HRD, career development (CD) has its own rich history. Since the 20th century, Parsons (1909) has been referred to as the father of vocational guidance. He advocated planning and guidance to match the abilities and interests of individuals with the needs of the profession. Over the years, two areas of CD have evolved, where one is focused on career behaviour over a person’s life span, and the other addresses careers within organisational systems (Herr, 2001). The latter was notably recognised with McGuire’s human resource wheel identifying CD as a primary function of HRD (McGuire, 2011).



Figure 1.1 : The Human Resource Wheel
(Source: McGuire 2011, p. 6)

More recently, however, the traditional, organisation-based CD has languished (Swanson, 2010). Since the 1990s, a global market breakthrough on business competition has increased the pressure on organisations to be efficient, as well as

innovative. This breakthrough led to changes in the psychological contract of employment and advancement through restructuring and downsizing. Employees become less concerned with loyalty to the employer and become more self-focused on building their own expertise for future preparations. This phenomenon has resulted in a mutual, if somewhat uneasy, understanding that neither employers nor employees anticipate their relationship to be long-lasting, but, for their own reasons, they need to make the most of their time together (Doyle, 2000).

Thus, in 2011, CD, which was previously recognised as one of the pillars of HRD, seemed to lose its potential. Swanson and Holton (2001) noted that CD seemingly “overlooked its relationships with HRD”. However, new evidence suggests that CD is now more valuable (Otoo & Mishra, 2018; Otoo, Otoo, Abledu, & Bhardwaj, 2019). This is the right time to understand the role of CD, as well as how CD within HRD can be more responsive in terms of meeting career requirements. To continuously maintain CD’s potential, HRD must focus on how to meet specific profession requirements to enhance the current Knowledge, skills and abilities (KSAs) or competencies for future performances (Shet, Patil, & Chandawarkar, 2019; Sudirman, Siswanto, Monang, & Aisha, 2019).

Over time and from different perspectives, CD has been defined in various ways by scholars and practitioners. Various studies have been conducted across different professions, including competency studies of TVET teachers. The important thing to understand in this context is that HRD needs a new and invigorated approach to CD to support employee development in terms of KSAs. To be effective, HRD must break away from the traditional programmes to a new approach that would encourage and offer opportunities to employees to learn new sets of KSAs for future performances through specific training and professional development interventions (Potnuru & Sahoo, 2016).

Therefore, a comprehensive approach should be guided by the theory and practice of HRD in today’s world. Such approach should include competency identification, modelling, and tools for competency measurement instrument, where the output of these objectives can generate a competency profile for polytechnic teachers. This effort is able to reverse the effects of past changes, as well as redefine the potential of a career development field into mutual strategies within the institutions. The importance of this practice is the support given to their employees through HRD departments and activities, such as training and professional development training on individual basis.

This study addresses this need by providing a fusion of different perspectives on CD, adding insight to the new CD discussion. It has the advantage of advancing the theory and practice of HRD by pushing beyond the boundaries of the current discussion. The link between both HRD and CD pillars is well-developed. The challenges of developing an employee’s career in the current job environment are many. Yet, CD elements as the shaping force for professions in workplace settings

are clearer now compared to the time since Parsons' initial foray into merging individual interests with organizational needs (Parsons, 1909).

1.1.2 Polytechnic Teacher Competency Enablers

Through literature analysis, some theoretical foundations have provided useful knowledge on the competencies of teachers in general and of vocational teachers specifically. Based on the idea of Frey, Košinár (2014) agreed that the concept of competence is solid due to its practical implementation, consisting of the set of knowledge skills and abilities for the specific profession. Before that, Gudmundsdottir and Shulman (1987) listed out the required knowledge in teaching constructs including broad pedagogical content knowledge, knowledge on subject, knowledge on pedagogical, knowledge on curricula, knowledge on educational system, knowledge on students, and knowledge on the educational objective including values and their backgrounds. Another study by Kleickmann et al. (2012) focused on the professional constructs consisting of personal elements (beliefs, values, goals), knowledge, and skills to represent professional knowledge areas including the five areas of subject knowledge, pedagogical knowledge, organisation knowledge, consulting knowledge, and psychological knowledge. However, this model was criticised by Diep and Hartmann (2016) due to the interconnections between the competence concepts with no concrete links established between competencies and classroom activities.

Nevertheless, competence only in terms of teaching ability is not enough to constitute competent teachers. Nieke (2012) combined the elements of social context to represent his own model. This model is divided into two sections, namely professional constructs and background constructs. Professional constructs comprise five areas namely determining teaching and learning objectives, analysing the situation, planning, implementing, and evaluating. Meanwhile, background constructs relate to the social context and self-reflection which is more concerned with personal competencies. To date, this model is said to be gaining attention and appreciation due to the injection of social context into the framework of competency measurement.

However, as with most of the theories above, this framework also provides no interconnection between competency elements. Besides, TVET teacher competence has not been explicitly analysed. By quoting Diep and Hartmann (2016)'s work as reference, Soysouvanh et al. (2013) in developing a TVET framework for the Lao PDR, used five competence areas which are Acting in an Exemplary Manner, Teaching, Educating, Assessment, and Self-Development and Innovation. These models were developed to reflect the actual environment of Lao PDR, however they can still be used for future reference to understand the nature of TVET teaching as a profession. However, the communication context is still not included in the measurement model. This competence is an essential construct for teachers, including vocational teachers, because they always have to interact with other stakeholders including students, colleagues, parents and others (Diep & Hartmann,

2016). However, to become productive employees, the personal constructs as mentioned by Boyatzis (2008), need to be included even though they are hard to perform and difficult to develop.

Unlike previous studies, this study applies the theory and model which comprehensively concentrates on both job and personal factors to perform competently using the Theory of Personality-Job Fit, Integrated Model of Competence, and Model of Pedagogical Competence to address the specific elements of polytechnic teacher competencies. Through a combination of elements using selected theories and models, the most important determinant is to perform all of the required competencies. Therefore, in line with the objectives of the current study, these theories and models have allowed this study to develop the polytechnic teacher competency measurement framework by four main constructs, which are teaching competencies, professional competencies, communication competencies, and personal competencies.

1.1.3 Recent Competency Initiatives by the Malaysian Government

The intention to develop a specific instrument for measuring polytechnic teacher competencies can be attributed to several reasons. The issues surrounding TVET teacher quality and competency constructs in the profession have been addressed through TVET experts' meetings, with most of the participating countries in Southeast Asia highlighting the need to develop specific measurement instruments for the profession (Paryono, 2015) in order to enhance the competency performance among TVET teachers. As for Malaysia, the needs have been strengthened in line with the latest TVET transformation initiatives (Economic Planning Unit & Prime Minister's Department, 2015) to meet the demands from the industry. A few issues and challenges have also been identified and need to be addressed, including the competency gaps among teachers (see Figure 1.2)

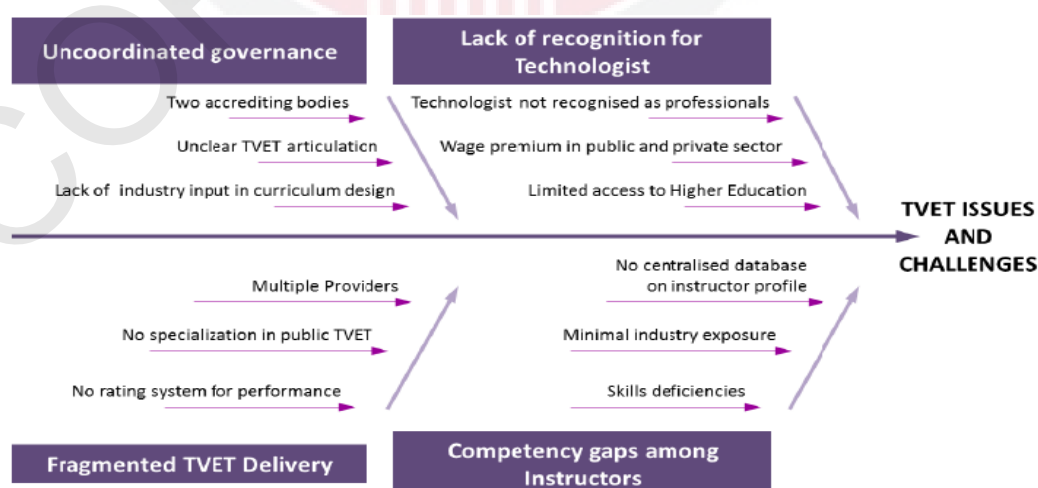


Figure 1.2 : TVET Issues and Challenges

(Source : Economic Planning Unit & Prime Minister's Department 2015, p. 4)

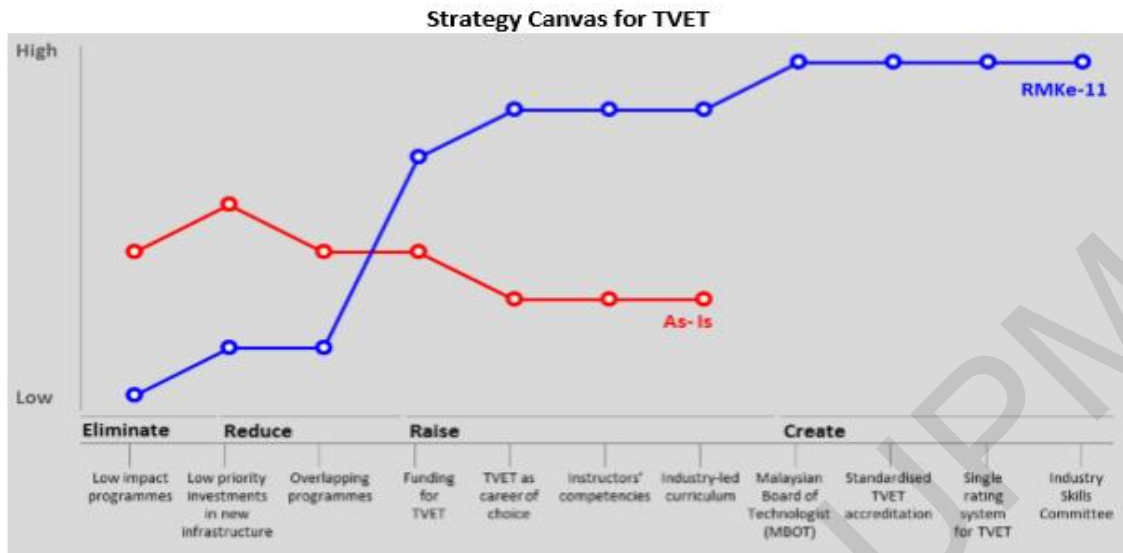


Figure 1.3 : Strategy Canvas

(Source : Economic Planning Unit & Prime Minister's Department 2015, p. 8)

As a result, 11 initiatives (see Figure 1.3) have been identified to be the focus under three central strategy clusters, including to enhance the quality and delivery of TVET programmes so as to ensure the marketability of the graduates. To achieve this new mission, TVET teacher competencies will also be enhanced through training and professional development. With the new government focused on human capital development under the Roadmap 2018-2020 of the 11th Malaysia Plan (RMK11), emphasis will be given to five strategies, including ensuring the quality of TVET instead of the quantity. To improve the competency performance by teachers, tools such as the competency measurement instrument by self-assessment is required not only for purposes of assessment, but the results can be used to tailor specific development programmes based on individual needs.

Based on the issues surrounding the profession and in line with the Malaysian government's initiatives on TVET teacher competencies, it is significant and needful to develop such an instrument that precisely measures polytechnic teachers' competencies. Thus, it could be used as a tool to measure competencies and significantly contribute towards the development input for teacher career and competency development.

1.2 Statement of the Problem

Technical Vocational Education and Training (TVET) in Malaysia has undergone tremendous development in the past few years. The latest TVET transformation resulted in a new masterplan and the rebranding of TVET programmes into TVET Malaysia. Consequently, as the backbone of general education and TVET, the competencies of TVET teachers are critical to ensure vocational students are

provided with the skills and knowledge required by the industries (Paryono, 2015). The issue of the quality and competencies of TVET teachers have been discussed both globally (Grollmann, 2008b; Hamisu, Salleh, Sern, Adamu, & Gambo, 2017; Kurnia, Dittrich, & Ilhamdaniah, 2013; Paryono, 2015) and locally (Economic Planning Unit & Prime Minister's Department, 2015; Ismail et al., 2017; Mohamad, Saud, & Ahmad, 2009; Ridzwan et al., 2017) across public TVET institutions in Malaysia, including among polytechnic teachers (Ismail et al., 2017).

Although there are existing instruments that have been built either internally or externally, most of them have unfortunately been built around teachers' profession from the general perspective. Therefore, they concentrate more on classroom teaching, not least because teachers of general subjects usually outnumber teachers of vocational subjects (Soysouvanh et al., 2013). In contrast, the nature of vocational education involves more situations outside the classroom environment, either in workshop settings or in a real work environment (Soysouvanh et al., 2013). Thus, the knowledge to be imparted is not similar to the contents of general education, as the approach is not purely academic but instead place emphasis on the real world of work and industrial needs. Further, the teaching and learning modes are different for every course.

Studies have confirmed the significance of establishing competency modelling towards the development of a measurement instrument (Muhammad Aiman, Roziah, Muhd Khaizer & Mohd Ashraff, 2017; Blömeke, Zlatkin-Troitschanskaia, Kuhn, & Fege, 2013; Devkar & Kalidindi, 2013; Magenheimer, Schubert, Schaper, & Psychology, 2014; Suhairom, Musta'amal, Amin, & Johari, 2014b) and to serve as guidance for members in a specific profession (Lambert, Plank, Reid, & Fleming, 2014). These studies unanimously agreed that there are apparent benefits in developing and implementing a competency model for each profession as compared with the traditional job analysis approach (Sanchez & Levine, 2012). However, previous studies lack empirical data concerning the development of a specific and comprehensive framework of competency model for TVET teachers specifically in Malaysia (Ismail et al., 2017). Additionally, there is no attempt to include the personality or personal competency elements. According to Boyatzis (2008), these elements are essential to define a competent employee although they are hard to perform and develop. Based on the previous theoretical propositions, it is required to have "Job" and "Personality" elements to define "Competent polytechnic teacher."

Respecting the idea that competence of vocational teacher is still a complex matter, considering features of "the greening of technical and vocational education and training" by Diep & Hartmann, (2016), Muhammad Aiman et al. (2017) proposed a competency measurement framework that consists of teaching competencies and professional, communication and personal competencies as self-evaluation tools for polytechnic teachers and as input for training and professional development. In previous practice, the Malaysian Ministry of Education (MOE) would appoint an external evaluator to conduct the assessment activities. However, until now, there are

still issues related to polytechnic teacher competence thus requiring another parameter to map the polytechnic teachers' competencies in Malaysia.

The recurrent point to emphasise is that teacher evaluation should draw on multiple sources of information. Teacher self-assessment is one of the solutions to the problem. Although it has previously been argued that allocating some responsibility to teachers for the evaluation of their work is an appropriate way to give recognition to their status as professionals (Pennington & Young, 1989), Borg and Edmett (2018) agreed that self-assessments (because they are informed by teachers' broad understanding of what they typically do) can provide a better picture of teachers' competence compared to observations conducted by an external evaluator. This is supported by Thornton (1967) who stated that "Individuals have a significantly different view of their own job performance from that held by other people and the accuracy of an evaluator is only partially relevant." Although it is not new in the measurement field, the self-assessment approach has been applied in various disciplines, and they need to be thought of in conjunction with evaluator ratings specifically in the field of Human Resources.

In testing individual competencies, multiple methods of assessment are encouraged to build valid measurements across tasks and settings (McClelland, 1973). The more exciting constructs in the field of study are always latent, i.e. polytechnic teacher competencies, and cannot be measured directly. Latent variables are not empirical quantities but are tested through reality. The only approach to understanding these "realities" is by using a model that can formulate the interconnection between the constructs. Currently, the most complete and objective model for estimating latent variables is the RMM (Bond & Fox, 2015; Engelhard Jr., 2013; Linacre, 2004). Thus, to address the need for specific tools to enhance polytechnic teacher future performances, the present study is conducted to develop and validate a self-assessment instrument to measure competencies among polytechnic teachers in Malaysia using the Rasch Measurement Model.

1.3 Research Objectives

In general, this study aims to develop and validate a comprehensive instrument to measure competencies among polytechnic teachers in Malaysia. This instrument was developed through competency identification and competency modelling procedures. The competency model and the competency measurement instrument are known as the Ma-PTCM model and the Ma-PTCMI instrument, respectively. The specific objectives of this study are listed as follows:

1. To identify the competencies required by polytechnic teachers in Malaysia.
2. To develop a framework for a competency measurement model to measure polytechnic teachers' competencies in Malaysia.

3. To develop a reliable instrument, with essential validity evidence, to measure polytechnic teachers' competencies in Malaysia using the Rasch Measurement Model.

1.4 Research Questions

To achieve the objectives of this study, the following research questions were generated:

1. What are the competencies required by polytechnic teachers in Malaysia?
 - a. What are the constructs and sub-constructs of polytechnic teacher competencies from content analysis?
2. What would be a valid framework for a competency measurement model to measure polytechnic teachers' competencies in Malaysia?
 - a. What are the lists of competencies required by polytechnic teachers?
 - b. What would be a valid framework for the Ma-PTCM model for polytechnic teachers?
3. What would be a reliable instrument with essential validity evidence to measure polytechnic teachers' competencies in Malaysia using the Rasch Measurement Model?
 - a. What are the items according to each construct in the Ma-PTCMI instrument?
 - b. What are the essential validity and reliability evidence of the Ma-PTCMI instrument using the Rasch Measurement Model?
 - (i) What are the reliability index of items and the separation index?
 - (ii) What are the reliability index of person and the separation index?
 - (iii) What is the item polarity?
 - (iv) What are the item fit and person fit?
 - (v) What is the item dimensionality?
 - (vi) What is the standardised residual correlation?
 - (vii) What is the item calibration?
 - (viii) What is the gender-based differential item functioning?
 - (ix) What is the item targeting of the Ma-PTCMI instrument?

1.5 Study Outputs

- a. A framework of a polytechnic teacher competency model namely the Ma-PTCM model.
- b. A psychometrically sound instrument with sufficient validity and reliability evidence to measure polytechnic teacher competencies using the Rasch Measurement Model, namely the Ma-PTCMI instrument.

1.6 Significance of the Study

1.6.1 Theoretical Advancement

There has been a lack of psychometrically sound scales to measure TVET teacher competence with diverse perspectives (Diep & Hartmann, 2016). Measurements done directly by teachers through self-assessment have been rare in the assessment of TVET teacher competence. Theoretically, this study aims to contribute to the existing body of knowledge in three ways. First, this study seeks to add value to the expansion and integration of all Personality-Job Fit Theory, Crawford's Integrated Model of Competence, and Model of Pedagogical Competence towards the development and validation of a comprehensive Ma-PTCMI instrument specifically to measure the competence of polytechnic teachers in Malaysia. The literature (Paryono, 2015) shows that TVET teacher competence has been a principal focus in the profession.

Accordingly, many researchers have addressed the importance of defining and assessing TVET competence, seeing that elements of the competence can enhance competence-oriented training and guide the performance evaluation of in-service or pre-service teachers (Spöttl & Steinbeis, 2016). Thus, secondly, it is expected that by using this theory and model towards instrument development, a comprehensive tool established through the combination of both professional and individual constructs (namely teaching competencies, professional competencies, communication competencies, and personal competencies) can be produced.

Thirdly, this study introduces the application of the RMM of Item Response Theory to psychometrically validate the instrument, including the validity and reliability evidence to measure the competency of polytechnic teachers. The use of the RMM helps to overcome the limitations of most instruments developed within the CTT framework. This is because theoretically, the RMM overcomes the major weaknesses of CTT, which has a circular dependency of item statistics. More specifically, the RMM enables test developers to make a sample-free or item-free measurement by estimating two latent variables (i.e., person ability and item difficulty), independent of the test sample or the items. The specific RMM procedure applied in this study is presented in Section 3.7.1. The lack of a specific instrument tailored to the TVET teaching profession's needs to measure competencies represents a gap in the existing management literature. Thus, the present study can be considered as one of the specific studies which seeks to develop and validate an instrument that measures the in-service polytechnic teachers.

1.6.2 Policy Development

The involvement of TVET panel of experts from various backgrounds can contribute valuable input towards the restructuring of existing assessment tools by the Technical and Vocational Education Division (TVED) in order to be more

comprehensive and specific for polytechnic teachers in Malaysia. Moreover, the outcome of the competency assessment can be used as reference in drafting and formulating suitable activities for the development of polytechnic teacher competency which has been strategized (Economic Planning Unit & Prime Minister's Department, 2015). Based on the CBM approach used in this study, it is expected that the Competency Identification, Competency Modelling, and Competency Measurement Instrument will be established, which can be extended to set up the competency profiles for polytechnic teacher development in training and professional development in the future, based on individual needs.

1.6.3 Practices

1.6.3.1 Polytechnic Teachers

Existing literature (Paryono, 2015; Spöttl & Steinbeis, 2016) shows that TVET teacher competence has been a principal focus in the profession of vocational teaching. Accordingly, many researchers have addressed the importance of defining and assessing TVET teacher competence because the elements of the competence can enhance competence-oriented training and guide the performance evaluation of polytechnic teachers (Muhammad Aiman et al., 2017). A self - assessment instrument may serve as a useful tool for providing teacher summative feedback. In many studies (Iván Gavotto-Nogales, David, Morales, Lidia, & Castellanos Pierra, 2015; Zepeda, 2015), it has been demonstrated that individual feedback has a significant influence on improving teacher performance. These advantages could ultimately influence the competency development of teachers in the future tailoring of the individual competency gaps.

1.6.3.2 TVET Institutions

Assessment activities on individual teacher performance can be used as a reference for institutions' records. The instrument can be useful for human resource development to conduct assessment activities and the results can later be used for employee selection, development, and promotion (Campion & Odman, 2011). For TVET institutions specialising in teacher preparation, the Ma-PTCMI instrument can be adapted for pre-service to measure their knowledge, skills, and abilities before they graduate (Kamis, Mohamed, Hanapi, Che Kob, & Jamaluddin, 2016) and to keep their new curriculum standard up to date.

1.7 Scope of Study

First, this study had only focused on polytechnic teachers in Peninsular Malaysia. They were chosen for the nature of their work environment, which challenges them to perform with the required competencies in their profession. Since this was a cross-sectional research, the findings had only reflected on the current phenomenon of the areas under research during this research period.

Second, this study only included procedures of competency identification, competency modelling, and the development of the competency measurement instrument to achieve the main objective of the study. The constructs and sub-constructs for the Ma-PTCM model and the Ma-PTCMI instrument were gathered through literature reviews, content analysis, and the consensus of TVET expert panel. Once the required competencies to measure polytechnic teachers' competencies have been identified, this study proceeded to the development and validation stage of competency modelling, which resulted in the Ma-PTCM model. According to Mansfield (2005), competency modelling focuses on data collection procedures and analysis, whereby the utilisation of the competency model is of major concern.

Third, the criteria for the assessment method undertaken in this study were as recommended by Viswesvaran (2011), as a measure of individual work performance at that particular point in time. This assessment method is also known as an indirect formal assessment. The self-assessment instrument was considered reliable, with sufficient validity evidence, since it was developed and thoroughly analysed during each developmental phase. This is the most appropriate method for gathering data on "within-person" decisions, which provides feedback to individuals when identifying their strengths and weaknesses (Viswesvaran, 2011).

Fourth, the Rasch Measurement Model was used to guide the data analysis process and the interpretation of the findings for the Ma-PTCMI instrument. The instrument's psychometric properties were analysed to support arguments on the construct validity of the proposed items.

1.7.1 Limitations

Several points served as limitations for this study. These were the situations and circumstances that might have affected or restricted this study. Limitations are potential weaknesses that are out the control of the researcher. This study encountered five limitations, namely one involving the sample, the approach on competency assessment, the method for data collection, the Rasch diagnosis, and the backgrounds of the experts.

First, although competency values are vital for the practice of polytechnic teachers, this study had only involved polytechnic teachers in Peninsular Malaysia. Due to time and financial constraints, this study did not include polytechnic teachers in Sabah and Sarawak.

Second, in terms of the method of competency measurement, this instrument was developed for individual teachers to perform self-assessment by way of a questionnaire. Therefore, the answers given in the questionnaire were based on their individual perceptions of teaching competencies, professional competencies,

communication competencies, and personal competencies. There is a possibility of the respondents being tainted with biasness.

Third, the quantitative data was collected using a survey. This study was open to the risk of poor responds since hardcopies of questionnaires were distributed to the respondents. Low responds could have affected the validity of the instrument. To reduce the risk, the help of one of the office staff in each polytechnic institution was obtained to ensure as many participants as possible. The researcher had discussions with the representatives of the polytechnic institutions before sending the questionnaire. This discussion helped determined the need for the questionnaire to be distributed through e-mails. An honorarium was given to the representatives and the respondents were given a token of appreciation for their participation.

Fourth, in relation to the involvement of experts in this study, expert views were sought from various backgrounds (i.e., higher academic rank). However, only those listed in Appendix I have agreed to be directly involved in this study.

The last limitation is was the research question relating to the validity and reliability of the Ma-PTCMI instrument. Although several types of validities are commonly used by researchers in instrument development and validation studies, this study was focused only on the face, content, and construct validities due to time constraints.

1.7.2 Delimitations

In terms of delimitations, the parameters for this study were related to the academic rank, objective of the study, competency elements, concepts of competencies, types of analysis, and validity and reliability procedures.

First, although competency values are vital at all levels of TVET public institutions, the focus of this study was mainly on teachers from polytechnic institutions. However, once the Ma-PTCMI instrument has been validated, adjustments can be made to the instrument to suit other targeted samples, for example, among teachers from vocational colleges or community colleges. Second, as for the academic rank, only polytechnic teachers who were directly involved in the process of teaching and learning were involved in the competency assessment (DH 41, DH 44, DH 48, and DH 52). Teachers from other institutions were not involved in order to control the homogeneity of the sample's characteristics.

Third, the primary objective of this study was to develop and validate an instrument that can measure competencies among polytechnic teachers in Malaysia. Thus, this study was not purposely conducted to test the relationships between the variables (independent variables, moderating variables, and mediating variables) and dependent variables.

Fourth, based on the integrated theory and models (Personality-Job Fit Theory, Crawford's Integrated Model of Competence, and Model of Pedagogical Competence) and TVET expert consensus, the measurement models concentrated only on constructs (teaching competencies, professional competencies, communication competencies, and personal competencies) and sub-constructs (content and pedagogy, knowledge of students, setting instructional outcome, knowledge of resources, designing coherent instruction, instruction, organising instruction, implementing instruction, evaluating instructions, teacher-student communication, teacher-parent communication, teacher-colleague communication, teacher-stakeholder communication, personal quality, physical state, self-concept, and motives).

Fifth, out of all the competency approaches, this study was only focused on the concepts of "threshold and differentiating competencies" in order to have both competencies required by all teachers (threshold) and competencies that can differentiate between top and low performers (differentiating). Sixth, in terms of the competency measurement methods, this instrument was developed for use by individual teachers to perform self-assessment by way of a questionnaire.

Lastly, to achieve the psychometric properties, this study has performed analysis using the Rasch measurement model instead of using the classical test theory. The analysis includes the following: (1) the reliability index of items and separation index, and the reliability index of person and separation index; (2) item polarity; (3) item fit and person fit; (4) item dimensionality; (5) standardised residual correlation; (6) item calibration; (7) differential item functioning (DIF); and (8) item targeting of the instrument.

The previously listed delimitations were required to ensure that the objectives of this study can be achieved despite the time constraints. What have been left out are potential topics and perspectives to be studied by future scholars and researchers.

1.8 Assumptions

A few assumptions are applied in this study. The primary assumption is that through the development and validation of the Ma-PTCMI instrument, it is able to measure the competencies of in-service polytechnic teachers in Malaysia. Based on the underlying concepts of "threshold and differentiating competencies," it is assumed that this instrument has the ability to measure and identify at least the best and worst performers as well as the moderate performers among teachers. This means that the instrument can split the teachers into the two categories of 'competent' and 'incompetent', where the instrument items comprise a multi-level group such as easy, moderate, and difficult items. In this sense, not all teachers would select similar competency items.

The present study also assumes that most of the existing instruments have been developed from the perspective of general teachers and would therefore not be a useful tool in a high stake's activity such as competency measurement. Thus, a specific and comprehensive instrument is required with the job and personal competencies elements tailored to TVET teaching profession included in the measurement framework.

In terms of the assessment approach, instead of relying on the external evaluator, the self-assessment instrument is considered to be one of the better and more practical tools to evaluate teacher competence compared to a small number of classroom observations conducted by an external evaluator. Moreover, the combination of the external evaluator and self-assessment methods has become the best practice, is accurate, and also entirely relevant. To overcome the performance issues, self - assessment gives teachers the opportunity to rate themselves and use the results to cater to their needs for future training and individual development.

In selecting the psychometric paradigm, this study believes that although both CTT and RMM have their own advantages, understanding the value of each of these different psychometric approaches is essential. Since competency is considered as a latent variable which cannot be observed and measured directly, thus psychometric tools for latent variables are required. To achieve the best Ma-PTCMI instrument item performance, this study applied the RMM using the specific 8 diagnosis, namely to determine the (1) reliability index of items and separation index and the reliability index of person and separation index; (2) item polarity; (3) item fit and person fit; (4) item dimensionality; (5) standardised residual correlation; (6) item calibration; (7) differential item functioning; and finally (8) item targeting of the instrument.

With regard to the likert scale used in this study, researcher assume that they do not expect a simple answer yes or no but to allow for degrees of agreement to the knowledge, the skills and attitudes they have. Therefore, quantitative data is obtained towards the process of analyzing data. However, the number of rating scale (to be finalized) is determined after the data analysis procedures using the rasch model. Additionally, it is assumed that the results of this study can help the human resource development department to tailor an input for training and professional development in order to provide vocational teachers with a set of knowledge, skills, and abilities. It also provides insights for the MOE and related developing bodies to improve the current initiatives specifically for teachers in Malaysia to enhance their competence in the future through identifying the competency elements that they should possess. Finally, the knowledge, skills, and abilities are prerequisites to polytechnic teacher competencies namely teaching competencies, professional competencies, communication competencies, and personal competencies.

1.9 Definition of Terms

This section provides the definition of the terms that were used in the development and validation phase of the Ma-PTCMI instrument. These definitions will be used consistently throughout this study.

1.9.1 Instrument Development and Validation

Conceptual:

Instrument development is a process of gathering evidence for validity, reliability or interpretability. It can include the development of a new instrument, a substantial adaptation of the previous instrument or the integration of previous instruments to produce a new combination of instruments. The procedural model for developing competency measurement instruments generally involves several steps conducted by instrument developers. Instrument development in this study refers to the phases of competency identification, framework of competency modelling, and the completion of the competency measurement instrument (Suhairom et al., 2014), including the validity procedure.

Operational:

Instrument validation in this study refers to content and construct validity. Content validity in this study refers to expert opinion concerning whether the items in the instrument represent the proposed sub-constructs and dimensions the instrument is intended to measure. Validation will be accomplished through the experts' evaluation. Construct validity, on the other hand, involves checking how well the empirical results coincide with the results suggested by the theory chosen using the RMM (Suhairom et al., 2014).

1.9.2 Measuring Polytechnic Teacher Competencies

Conceptual:

The scores were calculated using the mean value for the scale. This is recommended, especially when measuring latent values, where a single survey item is unable to fully measure a concept (Rickards, Magee, & Artino, 2012). The mean for the three sub-constructs were also calculated.

Operational:

In this study, the total value for the polytechnic competencies was measured using 123 items for the polytechnic teachers' competencies instrument, which represented these four main constructs. Teaching competencies were measured by 39 items from

the sub-constructs of knowledge of content and pedagogy, knowledge of student, setting instructional outcome, knowledge of teaching sources, and designing coherent instruction. Professional competencies were measured by 25 items from the sub-constructs of planning instruction, organising instruction, implementing instruction, and evaluating instruction. Communication competencies were measured by 27 items from the sub-constructs of teacher-student communication, teacher-parent communication, teacher-colleague communication, and teacher-stakeholder communication. Finally, personal competencies were measured by 32 items from the sub-constructs of personal quality, physical state, self-image, and motive.

1.9.3 Competencies

Conceptual:

Hager et al. (1994) stated that competency is the assessment against prescribed standards of performance.

Operational:

Based on this definition, the competency assessment standards in this study refer to teaching, professional, communication, and personal competencies in order to meet the latest requirements of TVET teaching profession. These competencies need to be measured so that they can improve job performance.

1.9.4 Teaching Competencies

Conceptual:

Teaching competencies refer to the knowledge, skills, and abilities of TVET teachers to successfully carry out theoretical, practical, or integrated instructions in the implementation of their teaching duties (Diep & Hartmann, 2016).

Operational:

In the current study, the term 'teaching competencies' is defined as polytechnic teacher knowledge, skills and abilities in content and pedagogy, knowledge of students, setting instructional outcome, knowledge of resources, and designing coherent instructions.

1.9.5 Professional Competencies

Conceptual:

Professional competencies refer to the knowledge, skills, and abilities of TVET teachers to act professionally in teaching and learning activities (Liakopoulou, 2011).

Operational:

In the current study, the term ‘professional competencies’ is defined as polytechnic teacher knowledge, skills, abilities in planning, organising, implementing, and evaluating instructions.

1.9.6 Communication Competencies

Conceptual:

Communication competencies refers to the knowledge, skills, and abilities of TVET teachers to use language and communication skills to convey the learning content logically and attractively, to convince and advise the vocational learners to educate and help them in learning processes, and to communicate effectively with parents of learners, colleagues, as well as other related stakeholders.

Operational:

In the current study, the ‘communication competencies’ is defined as polytechnic teacher knowledge, skills, and abilities in teacher-student communication, teacher–parent communication, teacher–colleague communication, and teacher–stakeholder communication.

1.9.7 Personal Competencies

Conceptual:

Personal competencies refers to the knowledge, skill, and abilities of employees to possess the personal qualities, physical state, self-concept and motive (Spencer & Spencer, 1993). Boyatzis (1982, 2008) stated that personal competencies have an impact on job competencies.

Operational:

For this study, the term “personal competencies” is defined as polytechnic teacher knowledge, skills, and abilities in terms of personal quality, physical state, self-concept, and motives.

1.10 Chapter Summary

The chapter has provided the foundation of the study in which several critical issues in polytechnic teacher competencies were discussed. The gap of knowledge and lack of specific instrument for the local context are the catalysts of the research. The integrated perspective which is used as the foundation in developing the instrument is the main reference in forming an instrument which suits the Malaysia education, based on personal and job competencies.

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