MEASURING PRIMARY SCIENCE TEACHERS' SELF-EFFICACY BELIEFS IN BATANG PADANG, PERAK WITH "PRIMARY SCIENCE TEACHERS' SELF-EFFICACY BELIEFS SCALE"

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ABSTRACT

This research was aimed to measure the primary science teachers' self-efficacy beliefs by using "Primary Science Teachers' Self-Efficacy Beliefs Scale". Causal comparative was used as the research design of this study. The questions of this instrument were adapted from three different instruments and modified for the purpose of this study. Exploratory factor analysis was used to extract the components of the subscales, namely "Pedagogical Knowledge", "Content Knowledge", "Teachers' Effort" and "Student Engagement". The study examined the scores of teachers' self-efficacy by gender, major, years of teaching experience and education qualifications. The weblink of online survey was sent out by email to schools. The sample consisted of 144 primary science teachers in Batang Padang, Perak. *T*-test and ANOVA were used to compare the mean differences of different groups. There was a statistically significant difference between male teachers (M=4.08, SD=0.42) and female teachers (M=3.93, SD=0.39). The *t*-test result also showed statistically significant difference between science major teachers (*M*=4.09, *SD*=0.31) and non-science major teachers (*M*=3.91, *SD*=0.31), *t* (142) =3.34, *p*<.05. ANOVA result showed that there was a statistically significant difference between experienced teachers who have more than six years of teaching experience (M= 4.09, SD= 0.27) and novice teachers who were teaching at their first to third year (M= 3.87, SD= 0.32), *F* (2, 141) = 3.123, *p* = .47. On the contrary, there was no statistically significant difference spotted between primary science teachers who possessed different education qualifications regarding their self-efficacy. In conclusion, there was a statistically significant difference in science teachers' self-efficacy beliefs among teachers of different gender, years of teaching experience and major, while no statistically significant difference were spotted between teachers of different education qualifications. In The findings suggested that experienced teachers should provide mentorship to novice teachers, while policy makers should make sure that only science major teachers will be teaching in science since experienced teachers and science major teachers scored higher in science teachers self-efficacy beliefs.

PENGUKURAN KEPERCAYAAN EFIKASI DIRI GURU SAINS SEKOLAH RENDAH DENGAN MENGGUNAKAN "SKALA KEPERCAYAAN EFIKASI DIRI GURU SAINS SEKOLAH RENDAH" DI BATANG PADANG, PERAK.

ABSTRAK

Kajian ini bertujuan untuk mengukur kepercayaan efikasi diri guru sains sekolah rendah dengan menggunakan "Skala Kepercayaan Efikasi Diri Guru Sains Sekolah Rendah". Kajian perbandingan sebab-akibat digunakan sebagai reka bentuk kajian. Soalan instrumen ini diperoleh daripada tiga instrumen yang berbeza dan diubah suai untuk tujuan kajian ini. Kaedah analisis faktor penerokaan (EFA) digunakan untuk mengekstrek komponen instrumen, iaitu "Pengetahuan Pedagogi", "Pengetahuan Kandungan", "Usaha Guru" dan "Penglibatan Pelajar". Kajian ini mengkaji skor kepercayaan efikasi diri guru mengikut jantina, major, tahun pengalaman mengajar dan kelayakan pendidikan. Alamat web soal selidik dihantar ke sekolah melalui e-mel. Sampel dalam kajian ini terdiri daripada 144 guru sains sekolah rendah di Batang Padang, Perak. *T*-test dan ANOVA digunakan untuk membandingkan perbezaan min antara kumpulan yang berbeza. Keputusan *t*-test menunjukkan perbezaan signifikan secara statistik antara guru lelaki (*M*=4.08, *SD*=0.42) dan guru wanita (*M*=3.93, *SD*=0.39), *t* (142) = 2.40, *p*<.05. Keputusan *t*-test juga menunjukkan perbezaan signifikan secara statistik antara guru-guru yang majornya sains (*M*=4.09, *SD*=0.31) dan guru-guru yang majornya bukan sains (*M*=3.91, *SD*=0.31), *t* (142) =3.34, *p*<.05. Keputusan ANOVA menunjukkan perbezaan signifikan secara statistik antara guru berpengalaman yang mempunyai lebih dari enam tahun pengalaman mengajar (M= 4.09, SD= 0.27) dan guru baru yang mengajar pada tahun pertama hingga ketiga (M= 3.87, SD= 0.32), *F* (2, 141) = 3.123, *p* = .47. Sebaliknya, tiada sebarang perbezaan signifikan secara statistik yang ditunjukkan antara guru sains yang mempunyai kelayakan pendidikan yang berbeza. Kesimpulannya, perbezaan signifikan secara statistik didapati dalam skor kepercayaan efikasi diri guru sains antara guru-guru yang berbeza dari segi jantina, tahun pengalaman mengajar dan major, sementara tidak ada perbezaan signifikan secara statistik didapati antara guru-guru yang berbeza dalam kelayakan pendidikan. Dapatan kajian ini mencadangkan bahawa guru yang berpengalaman harus memberikan bimbingan kepada guru-guru baharu, sedangkan pembuat dasar harus memastikan bahawa hanya guru-guru yang majornya sains mengajar dalam subjek sains memandangkan guru-guru yang berpengalaman dan guru yang majornya sains mendapat skor yang lebih tinggi dari segi kepercayaan efikasi diri guru sains.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CFA	Confirmatory Factor Analysis
CIE	Cambridge International Examinations
EFA	Exploratory Factor Analysis
KMO	Kaiser-Meyer-Olkin
KPM	Malaysian Ministry of Education
KSSR	Primary School Standard Curriculum
MOE	Ministry of Education
OECD	The Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
PISMP	Program Ijazah Sarjana Muda Perguruan
PPPM	Pelan Pembangunan Pendidikan Malaysia
SPM	Sijil Pelajaran Malaysia
TIMSS	Trends in International Mathematics and Science Study
TPACK	Technology Pedagogical and Content Knowledge
TSES	Teachers' Self-Efficacy Scale
U.S.A	United States of America

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CHAPTER 1

"INTRODUCTION"

1.1 Introduction

This chapter starts with the background of the study. Next, the importance of science teachers' efficacy in helping the development of science education was being illustrated. Research objectives were listed down followed with research questions. Conceptual framework was included as the structure of this research.

1.2 Background of The Study

People have always endeavoured to govern the incidents that have an impact on their lives. By gaining control over the events, people can control their lives to what they prefer, and prevent the unpleasant upcoming phenomenon. There were times when

people had a narrow apprehension on the ways to control their world and chose to believe in supernatural agents. Now that human has gained the knowledge and the ability to exercise control over the events, the practice of personal control has developed to improve their lives. It is this belief that they can produce desired outcomes of their actions by rendering them the motivation to act. Hence, efficacy beliefs are the major basis of action (Bandura, 1997).

Self-efficacy belief is a theory derived from Social Learning Theory, which was developed by the renowned Canadian psychologist Albert Bandura. Bandura (1977) agreed upon the idea that the changes of a person's behaviour is claimed to have a direct correlation with his or her perceived self-efficacy. Self-efficacy was also defined as the beliefs of people about their personal capabilities to complete tasks and reach goals at designated levels (Bandura, 1994). The interesting theory brought by Bandura stated that people with high self-efficacy have faith in themselves to achieve a target, and they prone to interpret challenging tasks as something which they will be proficient at but not something to be avoided.

Bandura then amended Social Learning Theory into Social Cognitive Theory (Levin, Culkin & Perrotto, 2001). Social Learning Theory was renamed as Social Cognitive Theory mainly to emphasize that personal factors in three forms, namely cognitive, affective and biological events, behavioural, and environment influences are the three major moulds of human behaviour. The personal factors, behaviour and environmental influences are the fundamental concept of Bandura's (1986) reciprocal determinism, which they create interactions that result in a triadic reciprocality. The reciprocal nature of the determinants of human functioning allows therapeutic and

counselling efforts to be engaged at personal, environmental or behavioural factors. For example, educators can improve their student's emotional states by giving positive encouragements to develop optimistic self-beliefs and habits of thinking (personal factors), inculcate academic skills and self-regulatory practices (behaviour), and provides a friendly atmosphere and classroom structures that help to enhance student's success (environmental factors).

Self-efficacy beliefs are so powerful that it gains control of human thought, feelings, and actions (Bandura, 1986). Human motivation, well-being, and personal accomplishment are so much decided by self-efficacy beliefs. This is because people will persevere when facing predicaments only if they believe that their actions can bring about the consequences they aspire. Bandura stated that self-efficacy beliefs cover nearly every aspect of our lives deciding whether we think optimistically or become vulnerable to stress and depression.

People construe the results of their achievements based on the value of their knowledge and skills. For example, grade B on a term paper would have two different meanings for an "A student" and for a "C student". The grade B disappointed the former and deteriorated his confidence in writing, while the grade B delighted the latter and boosted his writing confidence (Pajares, 2002).

Bandura (1997) claimed that "people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (p. 2). We can predict a person's behaviour by looking at the self-efficacy beliefs a person holds better than looking at the actual capabilities the person has. This is because self-

efficacy beliefs help a person to decide what actions to be carried out. The prediction of course should be made by incorporating the knowledge and skills the person has.

This explains the reason why people who are talented often suffer self-doubt while those who possess only little skills being over-confident. Beliefs always mismatched with reality, and people are normally affected by their beliefs when they engage with the world (Pajares, 2002). Consequently, people's attainments will be better predicted by their self-efficacy beliefs rather than by their former achievements and knowledge or skills they possess. Indeed, people would not be successful if they only have high self-efficacy beliefs, but don't possess necessary skills and knowledge.

People who possess high level of efficacy establish a higher goal to be achieved, and show endurance while facing challenges, they view failure as the consequences of having insufficient knowledge or effort which can be overcome. Nonetheless, people who have low self-efficacy beliefs will give up easily and fall easy victim to stress and depression.

Persistent with the original idea of self-efficacy, Tschannen-Moran and Woolfolk Hoy (1998) explained teacher's self-efficacy as how teachers judge their ability to engage their students in learning, including students who have low motivation. Researchers have discovered that the behaviour and learning of students are related with the characteristics of teachers. Teachers with high self-efficacy beliefs generally have the capability to guide their students to outperform the students in other classes.

1.3 Problem Statement

Teachers' work load has become an alarming issue in Malaysia. More teachers are leaving their profession as they are overwhelmed by the paperwork and massive amounts of work at school. This problem has gone so bad that 45% of young graduates leave their position after two years as a teacher (Khair, 2016). Despite their interest in teaching, lack of professionalism, collegiality, and administrative support are all the challenges that trigger them to leave their position (Inman & Marlow, 2004).

When compared with the other occupations, teachers are the group of people who work under extreme pressure (McCharthy, 2009; Friedman, 2003). Due to the tension, 73% of Malaysian teachers was reported to have moderate to high intention of quitting their job (Ding, 2000). Research showed Malaysian Teachers experience stress when they have to deal with students' misbehaviours, lacking the external supports, parents' insufficient collaboration, occupational stressors, and negative feelings (Shim, 2012). Teachers not only have to teach, they are overwhelmed by never ending work load and duties (Rashid, Abdul Rahman, and Yunus, 2017). With teachers who are not contented with their jobs teaching our young generations, it will eventually have a negative impact on the organisation (Harpaz, 1983).

Self-efficacy has great influence in the way teachers manage stress. Teachers who have low-self efficacy are reported to have higher levels of stress (Betoret, 2006). Research has found that teachers who have lower self-efficacy tend to quit teaching carrier (Harris & Sass 2007). Moreover, self-efficacy is a deciding factor of teachers' job satisfaction (Caprara et al, 2003). Teachers with high self-efficacy have great ability

to cope with stress (Gibson & Dembo, 1984), thus can help to reduce the number of teachers resigning from their position. It is also reported that teachers who are high in efficacy has less chance to experience burnout (Zee & Koomen, 2016). Therefore, the researcher wanted to examine the level of Science Teachers' Self-Efficacy in Batang Padang, Perak.

1.4 Research Objective

Many researchers have checked upon the science teachers' self-efficacy in the past. Despite the abundance evidence showing that teachers' efficacy has great effect on the achievement in education, the literature reveals that little is known about science teachers' efficacy in Malaysia. Consequently, this research aims to find out the score of self-efficacy of primary science teachers in the district of Batang Padang, Perak. The results will provide useful information about the efficacy of science teachers related to their gender, major course, years of teaching experience and qualifications.

The general objective of this research is to design a new scale and examine the score of self-efficacy of primary science teachers in Batang Padang, Perak. The specific objectives of this research are:

1. To design a new scale by adapting items from other instruments to measure primary science teachers' self-efficacy and find out the underlying factors
2. To measure the score of primary science teachers' self-efficacy.
3. To examine the differences of science teachers' self-efficacy by gender,
4. To examine the differences of science teachers' self-efficacy by major course,

5. To examine the differences of science teachers' self-efficacy by years of teaching experience and
6. To examine the differences of science teachers' self-efficacy by education qualifications.

1.5 Research Questions

The purpose of this study is to design a scale to examine the differences of teachers' efficacy related to their gender, age, graduate course, years of teaching experience and qualification levels. Five research questions stated below defined the present study:

1. What are the underlying factors that are presented in the newly developed "Primary Science Teachers' Self-Efficacy Scale"?
2. What is the score of science teachers' self-efficacy among Science teachers?
3. Are there any differences in the scores of science teachers' self-efficacy according to their gender?
4. Are there any differences in the scores of science teachers' self-efficacy according to their major?
5. Are there any differences in the scores of science teachers' self-efficacy according to their years of teaching experience?
6. Are there any differences in the scores of science teachers' self-efficacy according to their education qualifications?

1.6 Hypothesis

Based on the research objectives, hypotheses of the research were as below:

Research Question 3: Are there any differences in the scores of Science teachers' self-efficacy according to their gender?

H_0: There is no difference between the scores of science teachers' self-efficacy of male and female science teachers.

Research Question 4: Are there any differences in the scores of Science teachers' self-efficacy according to their major?

H_0: There is no difference between the scores of science teachers' self-efficacy of teachers who are science major and non-science major.

Research Question 5: Are there any differences in the scores of Science teachers' self-efficacy according to their years of teaching experience?

H_0: There are no differences between the scores of science teachers' self-efficacy of teachers with different years of teaching experience.

Research Question 6: Are there any differences in the scores of Science teachers' self-efficacy according to their education qualifications?

H_0: There are no differences between the scores of science teachers' self-efficacy of teachers with different education qualifications.

1.7 Conceptual Framework

Previous findings revealed that several personal factors of teachers could affect teachers' efficacy. Among the personal factors were education qualifications, years of teaching experience, major and gender.

Previous research also revealed that experienced teachers have higher self-efficacy than novice teachers in teaching (Tschannen- Moran and Woolfolk Hoy, 2007). It was explained that as experienced teachers gain more mastery experience than novice teacher, they outperformed novice teachers in instructional strategy and efficacy for classroom management.

Nonetheless, previous research had different results when compared the teachers' self-efficacy between male and female teachers. There were research suggested that male teachers have higher teachers' self-efficacy (Ng, 2012; Riggs, 1991; Sadkers, 1986) while there were also research suggested that female teachers have higher teachers' self-efficacy (Aurah & McConnell, 2014; Wright & Holttum, 2010). On the other hand, some proposed that the differences of male and female teachers' scores in self-efficacy were merely a consequence of cultural differences (Azar, 2010; Bandura, 1997).

Ample research studies showed that teachers who are major and non-major in Science scored differently in subject matter knowledge, pedagogical content knowledge and efficacy levels. The research carried out by Kamtet, et al. (2009) in Thailand showed that teachers who had bachelor's degrees in science scored better in subject

matter knowledge than those who had bachelor degrees in other majors. Research conducted by Joseph (2010) revealed that science majors scored significantly higher in Personal Science Teaching Efficacy (PSTE) compared to their non-major counterparts. Previous research suggested there are correlation between subject matter knowledge, pedagogical content knowledge and the level of efficacy a teacher hold (Abitt, 2011; McKinney, 2015; Rohaan, Taconis, & Jochems, 2012; WH. E. H. & Sutikno, 2015).

The researcher found that there are primary science teachers who hold different education qualifications in Batang Padang, Perak including diploma, B.Ed, and M.Ed.A research conducted in Nigeria showed that secondary school science teachers who are qualified, by this means who have a B.Ed. scored better than those who are not qualified (Oghenesuvwe & Igwebuike, 2013). It is also found that more qualified with M.Ed. teachers can engage students and have better instructional strategies than a less qualified teachers with B.Ed. (Lekhu, 2013; Shaukat & Iqbal, 2012). Results from most of the research indicated that there are significant differences between teachers who possess different education qualification, often teachers who have higher education qualification scores better in self-efficacy scales.

1.7. 1 Components That Contributed to the Level of Science Teachers' Self-Efficacy

Since self-efficacy is a something that cannot be easily measured, the underlying factors should be discovered by using factor analaysis. Before the factor analysis is conducted, previous studies suggested several components that could possibly contributed to the