

Differences in Cognitive Process Among Primary School Teacher's Problem Solving Skills

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Abstract: Problem solving skills in cognitive processes of teachers are very important in the challenging field of education. This study aimed to identify the problem solving differences in cognitive process of primary school teachers in the district of Batang Padang, Perak. Sample of study consists of 1520 teachers from 95 primary schools from district of Batang Padang, Perak. This study is in the form of survey. Quantitative data obtained through the questionnaire with the validity of the 8 items are 0.97. Findings of the study of problem solving differences in cognitive processes is high, $M = 3.01$, $SD = 0.35$. Respondents by type of school are [National Primary School: $M = 3.01$, $SD = 0.35$, $n = 990$; Chinese Primary School: $M = 2.87$, $SD = 0.28$, $n = 320$; Tamil Primary School: $M = 3.21$, $SD = 0.38$, $n = 210$]. Analyses indicate that the teachers of Tamil Primary School are greater in problem solving differences in cognitive processes compared to teachers of National Primary and Chinese Primary School. The study has signified that there are mean distinction by type of school in problem solving. For National Primary [Chinese Primary: $M = 2.80$, $p < 0.05$; Tamil Primary: $M = -1.16$, $p < 0.05$], Chinese Primary [National Primary: $M = -2.80$, $p < 0.05$; Tamil Primary: $M = -3.96$, $p < 0.05$] and Tamil Primary [National Primary: $M = 1.16$, $p < 0.05$; Chinese Primary: $M = 3.96$, $p < 0.05$]. There are significant differences between National Primary, Chinese Primary and Tamil Primary School in the *Tukey* differences test on the problem solving in the cognitive process.

Key words: Cognitive, primary school, problem-solving skills, teachers

INTRODUCTION

Globalization has impact Malaysia in all the aspects of the well being of the country including education system and teacher's capability in enhancing the progress of the students. As a result, the Ministry of Education (MOE) committed to produce teachers who are knowledgeable and capable in problem solving skills to meet the National Education Philosophy.

According to Hamza (2000), changes in the education system starts from schools. Schools have been touted as a "factory of educating and developing people". Schools produce a knowledgeable and skilled human as a product relevant to life in the present. Any changes implemented in schools should be carefully planned so that the results will bring positive outcomes. It should involve the entire school community and surrounding society and the successful of the changes is depends on many factors, especially teachers.

As a teacher, it is important to teach specific life skills, such as problem solving, which can be applied to a variety of academic disciplines. Even within the problem-solving skill-set, there are several techniques which can be taught, including identifying and re-reading

the problem, brainstorming, beginning with the end in mind and starting even when the entire process cannot be defined and planned. Problem solving is the process of applying prior knowledge, experience, skills and understandings to new and unfamiliar situations in order to complete tasks, make decisions, or achieve goals. In the class room, problem-solving situations can provide the meaningful and exciting experiences through which students learn the concepts and skills.

Ramsden *et al.* (1995) stated good teachers are also good learners; for example, they learn through their own reading, by participating in a variety of professional-development activities, by listening to their students, by sharing ideas with their colleagues and by reflecting on classroom interactions and students' achievements. Good teaching is therefore dynamic, reflective and constantly evolving. Good teachers display enthusiasm for their subject and a desire to share it with their students. Good teachers encourage learning for understanding and are concerned with developing their students' critical-thinking skills, problem-solving skills and problem-approach behaviors.

Romesh (2003) in his study posited that the teacher's role is essential in shaping the creativity of the students.

A creative teacher should conduct a significant activity in the right situation with accordance of the abilities and needs of the students. The creative ability of the students in the class and creative ideas of the students should be used to build a community of excellence. Creative people are always in a happy mood and have a peace of mind that can help them in problem solving easily. They have the ability to adapt new ideas and able to evaluate views of others effectively. On top of that, creative people are always engaged with activities that benefit the community in whole. Hence, the intellectuality of the teachers to assess the ability of the students will help the students to build their creativity in the school.

Maslow (1970) stressed, people who are problem-solvers will focus on the cause of the problem and solve the problems easily without complicating it. The problem-solvers always look calm and have no fear to face problems and compassionate on their jobs. They tend to be easy to face everyday problems and jobs task by making hypotheses, generalizations, give opinions and get new information. With the new information storing in the memory, the problem-solvers would compile, link it with existing knowledge and extended this information to achieve a purpose or solve a complex situation successfully.

According to Günseli (2006), universities in developing countries require a group of people who can think and have an interest in science to face the world's problems. The integrations of critical thinking skills in education at the universities are important for the developing countries in order to develop a politically, economically and culturally ideal society. The creativity of the teachers is vital in shaping a country's educational philosophy

Abdullah (2006) posited that human capital is to be made must be able to think critically and creatively, ability to create new opportunities, have the endurance, the ability to cope with the changing global scenario and able to adapt problem-solving skills. Human capital development of the nation seeks to ensure that Malaysia has the knowledge and expertise for the provision of high employment in the various types of employment.

Hasan (2004) in the theory of thought and ethical stated that teachers must fully integrate to enhance the character and personalities that can build a civilization of the country. It includes four types of human thought and ethics; noble thoughts, thoughts of birth, logical thinking and lateral thinking which can be applied and practiced in various areas of life such as: philosophy, history, politics, economics, science, business, technology, information technology, integrated education can be a complement to critical and creative thinking skills, communication, arts, literature, society and humanity. This type of thinking was born from the right hemisphere of the brain, which can solve education problems and helps to produced teachers

and students whom are capable to face the world. This educational theory of mind is highly suitable as a core and the basis for formulation of stature and character of the teachers that can be applied to school children by revolutionize their minds.

Cognitive theorist believes that individuals motivated when they experience cognitive imbalance or a desire to find solutions to a problem is occurred. Teachers need to ensure students have the desire to seek information and solutions and need to ensure that learning takes place with the constant search by the students. Nowadays, the members of the society have the impression that teacher is not an attractive career due to the workload. Furthermore, there are some who see school as an organization that is bombarded with various heavy workloads and at times, this task is not something that is planned but arises from unexpected situations. If such a situation allowed continuing, it is quite certain the atmosphere of teaching and learning in schools will be moving towards an unmanageable situation and the school will fail to achieve desired goals. Thus, the attributes of teachers who are willing to accept the burden of heavier teaching duties and achieve the desired level of job satisfaction is very important in the school working environment.

Nithyananda (2009) has concluded a perfect and happy life is lies on the spiritual aspect of the life. The unshakeable faith in God will strengthen the confidences to face the challenging life and will increase self happiness and the surroundings. Life will be more peaceful and perfect if the problem solving can be done calmly and with an open minded in order to find an effective solution.

According to the Ministry of Education Malaysia (2007) in the selection of excellent teachers stressed that outstanding teachers should be able to teach effectively, capable to make the lessons interesting, enjoyable and meaningful to the students and to deliver lessons clearly. In addition, excellent teachers should also be able to advance and improve the educational level of the students and encompass of initiative, innovative and creative throughout the years.

This research is guided with the hypotheses as the direction to identify differences in levels of cognitive skills among primary school teachers in the district of Batang Padang, Perak. The following hypotheses were proposed, in accordance with theoretical and empirical evidence.

Ho (1): There is no difference in the mean level of problem-solving skills in the cognitive processes of teachers in three primary schools in the district of Batang Padang, Perak?

Ho (2): There is no difference in the level of problem-solving skills in the cognitive processes of

teachers in three primary schools in the district of Batang Padang, Perak?

METHODOLOGY

Research design: The cross-sectional survey research is conducted with the assistant of an ex post facto type was used. Survey questionnaires were used to obtain the data from the respondents.

Participants: This study was conducted in 95 primary schools in the District of Batang Padang, Perak. It involves a total of 1520 (79%) of the 1917 primary school teachers in this district as the respondent. This study involved teachers in three primary types of schools; 53 of National Primary School (NPS), 23 of Chinese Primary School (CPS) and 19 of Tamil Primary School (TPS). The three types of schools are important because it involves three types of ethnicity from multicultural communities in this country.

Measures: The Northidge Developmental Scale created by Gowan (1974) is the instrument used to measure problem solving skills in the cognitive processes of the teachers. The questionnaires is using four point Likert scale containing eight items that are translated and adapted from psychological tests. Additionally the questionnaires are translated and interpreted in accordance with Malaysian culture. The Cronbach alphas in this study are 0.60 to 0.80.

Procedure: Prior to the research is conducted, a written approval and consent letters from Ministry of Education of Malaysia, Sultan Idris Education University, Perak State Education Department, Batang Padang District Education Department and headmasters of the schools are obtained to conduct the research. In every school the objective of the research was briefed to participated teachers. During the data collection, teachers would be explained and assisted with the definition of the measurement.

Data analysis: Statistical Package for the Social Sciences (SPSS) version 19 is used to analysis the data. As exhibited in Table 1, min score 1 indicates a very low cognitive skills, min score 2 indicates the low cognitive skills, min score 3 indicates a high cognitive skills and min score 4 indicates a very high cognitive skills. Table 2 exhibit statistical analysis used to answer research questions and hypotheses.

Table 1: Mean score indicator

Mean score	Indicator for the mean score
0.00-0.99	very low
1.00-1.99	low
2.00-2.99	high
3.00-4.00	very high

RESULTS AND DISCUSSION

Findings on the 1520 respondents show that the mean and standard deviation for problem solving component is quiet high $M = 3.01$, $SD = 0.35$. Findings by the type of schools are [NPS: $M = 3.01$, $SD = 0.35$, $n = 990$; CPS: $M = 2.87$, $SD = 0.28$, $n = 320$; TPS: $M = 3.21$, $SD = 0.38$, $n = 210$]. Analysis indicated that the teachers of NPS are moderately high in problem solving skills in the cognitive process than the teachers of NPS and CPS. The null hypothesis was rejected because there are differences in problem solving skills in the cognitive processes of teachers in three primary schools are high.

The multivariate test showed that the independent variable has a significant impact on the six independent variables [$F(12, 3026) = 7397$, $p < 0.05$]. The *multivariate* test also indicated that there were main effects of school on a combination of six independent variables of problem solving, as exhibited in Table 3.

The findings of the study proved that there are mean difference by type of school in sub-components of problem solving skills. NPS [CPS: $M = 2.80$, $p < 0.05$; TPS: $M = -1.16$, $p < 0.05$], CPS [NPS: $M = -2.80$, $p < 0.05$; TPS: $M = -3.96$, $p < 0.05$] and TPS [NPS: $M = 1.16$, $p < 0.05$; CPS: $M = 3.96$, $p < 0.05$]. There are significant differences between NPS, CPS and TPS in the *Tukey* test for differences in sub-components of problem solving skills in the cognitive process.

Six sub-components of creative and innovative (six items) are; I am a problem solver (P1), I always focus on the root of the problem and try to solve it (P2), I like to analyze and solve multifaceted problems (P3), I enjoy the challenges of the work and will work for a solutions (P4), I prefer the work process rather than the results (P5) and I can solve my problems easily (P6). The mean of these items are as shown in Table 4.

The findings for the item, I am a problem solver (P1), is high $M = 2.70$, $SD = 0.64$, $N = 1520$. Respondents' results by type of school are [NPS: $M = 2.72$, $SD = 0.62$, $n = 990$; CPS: $M = 2.56$, $SD = 0.58$, $n = 320$; TPS: $M = 2.82$, $SD = 0.75$, $n = 210$]. Analysis showed that the TPS teachers are high for the item I am a problem solver compared to teachers of NPS and CPS. Hence, the colleague accepts these teachers as an excellent problem solver and can be dependable to solve problems at any circumstances.

The results of the item, I always focus on the root of the problem and try to solve it (P2), is high $M = 2.79$, $SD = 0.49$, $N = 1520$. Respondents' views by type of school are [NPS: $M = 2.95$, $SD = 0.50$, $n = 990$; CPS: $M = 2.92$, $SD = 0.42$, $n = 320$; TPS: $M = 3.16$, $SD = 0.51$, $n = 210$]. Analysis indicated that the teachers of TPS are high for the items of I always focus on the root of the problem and try to solve it compared to teachers of NPS and CPS. Thus, a teacher whom often focused on the roots of the problems and tries to resolve it indicates that

Table 2: Statistical analysis used for measuring problem solving skills in cognitive processes

No.	Research questions	Hypothesis	Statistics
1	What is the mean level of problem solving skills in the cognitive processes among teachers in three primary schools in the district of Batang Padang?	Ho (1): There is no difference in the mean level of problem solving skills in the cognitive processes of teachers in three primary schools in the district of Batang Padang.	mean descriptive
2	Are there differences in problem solving skills in the cognitive processes of teachers in three primary schools in the district of Batang Padang?	Ho (2): There is no difference in the level of problem solving skills in the cognitive processes of teachers in three primary schools in the district of Batang Padang.	MANOVA test

Table 3: Multivariate tests^c

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's trace	0.970	8271.337 ^a	6.000	1512.000	0.000
	Wilks' lambda	0.030	8271.337 ^a	6.000	1512.000	0.000
	Hotelling's trace	32.823	8271.337 ^a	6.000	1512.000	0.000
	Roy's largest root	32.823	8271.337 ^a	6.000	1512.000	0.000
School	Pillai's trace	0.057	7.397	12.000	3026.000	0.000
	Wilks' lambda	0.944	7.429 ^a	12.000	3024.000	0.000
	Hotelling's trace	0.059	7.462	12.000	3022.000	0.000
	Roy's largest root	0.047	11.878 ^b	6.000	1513.000	0.000

Table 4: Mean of cognitive skills for sub-component of problem solving

Items of sub-components of problem solving skills	NPS		CPS		TPS		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
P1	2.72	0.62	2.56	0.58	2.82	0.75	2.70	0.64
P2	2.95	0.50	2.92	0.42	3.16	0.51	2.97	0.49
P3	2.73	0.64	2.78	0.63	3.04	0.61	2.76	0.64
P4	2.75	0.66	2.71	0.60	3.08	0.64	2.78	0.66
P5	2.72	0.62	2.72	0.61	2.93	0.64	2.75	0.62
P6	2.69	0.59	2.62	0.58	2.89	0.68	2.70	0.61
Problem solving skills mean	2.76	0.45	2.70	0.39	2.99	0.46	2.78	0.44

teachers can concentrate well on the problems and find solutions for it. Furthermore, this proves the ability of teachers in focusing and brings any issues to the centre of attention.

The item, I like to analyze and solve multifaceted problems (P3), the results are high $M = 2.76$, $SD = 0.64$, $N = 1520$. Study respondents' view by type of school are [NPS: $M = 2.73$, $SD = 0.64$, $n = 990$; CPS: $M = 2.78$, $SD = 0.63$, $n = 320$; TPS: $M = 3.04$, $SD = 0.61$, $n = 210$]. The teachers TPS are high for the item I like to analyze and solve multifaceted problems, than teachers of NPS and CPS. Thus, teachers who are often like to analyze and solve multifaceted problems wisely indicate that these teachers can come up with right strategy to tackle the problems. They also tend to be creative and sharp to suit the nature of the problems.

The results of the item, I enjoy the challenges of the work and will work for a solutions (P4) is high $M = 2.78$, $SD = 0.66$, $N = 1520$. Respondents' results by type of school are [NPS: $M = 2.75$, $SD = 0.66$, $n = 990$; CPS: $M = 2.71$, $SD = 0.60$, $n = 320$; TPS: $M = 3.08$, $SD = 0.64$, $n = 210$]. Analysis indicated that the teachers of TPS are high for the item, I enjoy the challenges of the work and will work for a solutions compared to teachers of NPS and CPS. It can be conclude that, these teachers always fond of challenging situation at work and will work towards solutions, efficiently with creative mind.

The findings for the item, I prefer the work process rather than the results (P5) is high $M = 2.75$, $SD = 0.62$,

$N = 1520$. Respondents' results by type of school are [NPS: $M = 2.72$, $SD = 0.62$, $n = 990$; CPS: $M = 2.72$, $SD = 0.61$, $n = 320$; TPS: $M = 2.93$, $SD = 0.64$, $n = 210$]. Analysis showed that the TPS teachers are high for the item I prefer the work process rather than the results compared to teachers of NPS and CPS. Thus, the teachers who have a preference on the work process than to the results of his work proves he is wise and effective in problem-solving process. Additionally, they could get to the bottom of the problem automatically and intelligently.

The results of the item I can solve my problem easily (P6) is high $M = 2.70$, $SD = 0.61$, $n = 1520$. Respondents' views by type of school are [NPS: $M = 2.69$, $SD = 0.59$, $n = 990$; CPS: $M = 2.62$, $SD = 0.58$, $n = 320$; TPS: $M = 2.89$, $SD = 0.68$, $n = 210$]. Analysis indicated that the teachers of TPS are high for the items of I can solve my problem easily compared to teachers of NPS and CPS. Thus, teachers who can easily solve their work problems proved that these teachers able to face any challenges in their career and life. Moreover, it is become essential in the teaching career which getting is more tedious nowadays.

The findings had answered the question of the study to measure the levels and differences in problem solving skills in the cognitive processes among primary school teachers by type of school. But the study had to reject the null hypothesis because there are different levels of problem solving skills in the cognitive process by type of school among primary school teachers.

CONCLUSION

This survey which involves 1520 teachers from three type of school indicates that the teachers of TPS are high in their ability of problem solving than the teachers of NPS and CPS as the mean scores are $M = 68.31$, $SD = 11.78$. The overall mean and standard deviation for sub-components of the problem-solving for the three schools are [NPS: $M = 68.0$, $SD = 11.66$, $n = 990$; CPS: $M = 65.95$, $SD = 10.61$, $n = 320$; TPS: $M = 73.29$, $SD = 12.61$, $n = 210$].

In teaching scenario, the teachers are responsible in helping the students to solve problems in their disciplines. Whatever the instructional setting you are in, the basic strategy for addressing problems remains similar. First, explain principles in your discipline for assessing a situation and making sense of the given information. Then, explain how to apply these general principles to a particular problem. Help people take control of their lives by teaching them problem-solving skills empower people by showing them they have choices to make. They can make choices in all situations. Teach them the skills so they can solve their own problems. Problem-solving skills help people cope with many of life's problems or challenges. As a teacher, it is important to teach specific life skills, such as problem solving, which can be applied to a variety of academic disciplines. Even within the problem-solving skill-set, there are several techniques which can be taught, including identifying and re-reading the problem, brainstorming, beginning with the end in mind and starting even when the entire process. A

problem-solving skill in the cognitive processes is important for Malaysian teachers to produce students whom are compatible with the changes of the world. This skill will become an essential tool for the well being of the students' life and career.

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