

PROBLEM SOLVING CONFIDENCE AND ATTITUDES IN MATHEMATICS OF GRADE SIX PUPILS OF SAWATA ERNANDCOR CENTRAL ELEMENTARY SCHOOL

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Abstract

The study aimed to determine whether the problem solving confidence had an effect on the attitudes of students in solving problems in Mathematics. Specifically, it sought to find out if low and high problem solving confidence of pupils significantly differs in attitudes in Mathematics. Descriptive-comparative design was used in the study. The study was carried out at Sawata Ernandcor Central Elementary school for forty-eight grade six pupils. Frequency or percentage, Mean, and One- Way MANOVA were used as tools in the analysis of data. Results revealed that there was greater number of students that have low confidence in problem solving in Mathematics; the level of attitudes in Mathematics of grade six pupils was high and there was a significant difference in the problem solving confidence of grade six pupils in terms of their attitudes in Mathematics. Further, there was a significant difference in attitudes in Mathematics associated with the difference in problem solving confidence of grade six pupils. The only substantial deviation in the problem solving confidence was on their willingness to engage in Mathematics. The findings indicated that future teaching of mathematics should engage more challenging problem solving activities to build students' confidence in problem solving and change their attitude to be more positive to mathematics.

Keywords *self-confidence, attitudes, willingness to engage, passiveness, perseverance*

Abstrak

Kajian ini bertujuan untuk mengenal pasti samada keyakinan diri dalam penyelesaian masalah mempunyai kesan terhadap sikap murid dalam menyelesaikan masalah Matematik. Secara terperinci, kajian ini ingin mengetahui samada keyakinan diri yang tinggi dan rendah dalam penyelesaian masalah dalam kalangan murid mempunyai perbezaan sikap yang signifikan dalam Matematik. Kajian ini menggunakan rekabentuk deskriptif-perbandingan dan telah dijalankan ke atas empat puluh lapan orang murid gred 6 sekolah rendah Sawata Ernandcor Central. Data yang diperoleh telah dianalisis menggunakan frekuensi atau peratusan, min dan MANOVA satu arah (*One-Way MANOVA*). Hasil kajian menunjukkan ramai murid gred 6 mempunyai

keyakinan diri yang rendah dalam penyelesaian masalah Matematik; sikap yang tinggi dalam Matematik dan perbezaan yang signifikan dalam keyakinan menyelesaikan masalah Matematik dan sikap dalam Matematik. Terdapat satu persisihan yang utama dalam keyakinan diri menyelesaikan masalah Matematik iaitu kesanggupan melibatkan diri dalam Matematik. Implikasi kajian menunjukkan pengajaran Matematik pada masa hadapan harus melibatkan murid dengan aktiviti penyelesaian masalah yang mencabar untuk membina keyakinan diri mereka dalam penyelesaian masalah Matematik dan mengubah sikap mereka supaya lebih positif kepada Matematik.

Kata kunci *Keyakinan diri, sikap, kesanggupan melibatkan diri, penyelesaian masalah*

INTRODUCTION

Children's self-confidence in mathematics is foreseen most strongly by their own mathematical competence, by ability group and children's acquisition. Self-confidence is the attitude that led to feeling of controlling on life and positive perspective with regard to him/herself [1,2]. Characteristics of successful pupils in mathematics are being described by Serkoak (2000). Based on his definition, students who are successful in mathematics, are not only competent in arithmetic but also in a wide variety of mathematical skills, have more self confidence in problem solving situation, are better prepared to make informed decisions, are more capable of processing information, are more competent at understanding the world around them, have many more career opportunities open to them, can apply mathematical process to many areas of their life and work, appreciate the value of mathematics as a useful tool in everyday living and are better prepared to live in a world of changing technology [9]. (Nunes, et al., 2009). It has been determined that the level of self-confidence of pupils gauged the teachers to give appropriate teaching strategies for pupils. The ability to learn mathematics is attached to their self-confidence. (Zan et. al., 2007).

Attitudes towards mathematics is regarded by the pupils as positive and negative; when it is useful and gentle it is positive but if it is difficult it is negative. There are so many studies and researches conducted in many countries to find out the factors that affect the pupils' performance towards mathematics. Among these factors, students' attitude towards mathematics is one important factor that has been systematically studied (Mohamed & Waheed, 2011).

A pupil with low self-confidence in problem solving is one of the main issues in terms of mathematics education among elementary and high school students and this issue led to declining learning in mathematics. Mathematics teachers always faced to learners that not being proactive in solving the problems and avoid it; the more problems arise that leads in hating the subject (Mafakheri & et al., 2013).

The theories of the study are anchored on the idea of Muneyoshi (2004) which claims that the use of creative problem solving in class generate increased motivation and self-confidence of students and they find positive attitude that learn problem solving, also, it helps them to be active in learning. In addition, Peterson (1996) reminds that

an increase of concentration on critical thinking education and problem solving has caused review in syllabus of schools and these styles of skills create foundation of all. Moreover, it is reinforced by cognitive style theory which claims that problem-solving is a personal -cognitive and innovative process that helps a person to develop effective and useful strategies to solve their everyday problems by using them.

Further, the study aims to determine whether the problem solving confidence has an effect on the attitudes of students in solving problems in Mathematics. Specifically, it sought to answer the following queries: 1. How many students who have high and low confidence in solving problems in Mathematics? 2. What is the attitude of students in solving problems in mathematics in terms of: willingness to engage, passiveness and perseverance? 3. Is there a significant difference between high and low problem solving confidence in the attitudes in Mathematics of grade six pupils of Sawata Ernandcor Central Elementary School, and 4. Is there a significant difference in attitudes in Mathematics associated with the difference in problem solving confidence of grade six pupils?

METHOD

The study utilized descriptive- comparative research design which was concerned with and designed solely to explain the present distribution of variables, without regard to causal or other hypotheses. Meanwhile, it focused on testing the effect of one variable to other variables. Correspondingly, the simple random sampling design was employed where every individual in the population being sampled has an equal likelihood of being included. A total of forty – eight grade six pupils of Sawata Ernandcor Central Elementary School were selected as the respondents of the study.

A problem solving confidence survey questionnaire and a questionnaire on attitudes in Mathematics that was adopted from Gok (2012) was used to gather responses from the respondents. Both the questionnaires consisted of 20- item questions on problem solving confidence and attitudes in Mathematics respectively, measured on a five point Likert scale and validated by panel of experts. As for the questionnaire on attitude, there are three dimensions measured namely, (i) willingness to engage, (ii) passiveness and (iii) perseverance. The students' responses were measured through mean rating and given descriptive interpretation as shown in Table 1.

Table 1 Mean Rating and Descriptive Interpretation of Problem Solving Confidence Level and Attitudes Levels towards Mathematics (Gok, 2012)

Mean Rating	Descriptive Interpretation	
	Problem Solving Confidence Level	Attitudes Level towards Mathematics.
0 – 1.75	Low	Low
1.76 – 3.5	Low	Moderate
3.6 – 5.0	High	High

Statistical analysis of the data collected in terms of percentage or frequency, mean and One-Way Multivariate Analysis of Variance (MANOVA) was also conducted. Frequency or percentage counts the number of students that were classified under low and high confidence. Mean was used to determine the attitudes of students in solving problems in Mathematics and One-Way MANOVA aimed to determine the effect of problem solving confidence on the attitudes in Mathematics of grade six pupils of Sawata Ernandcor Central Elementary School.

RESULTS AND DISCUSSION

This section presents the analysis of the data collected and given a meaningful interpretation.

Table 2 Number of Students and Problem Solving Confidence Level

Variable	Frequency	Percent
Problem Solving Confidence:		
1 (Low)	27	56.25%
2 (High)	21	43.75%
Total	48	100%

Table 2 reveals the number of grade six pupils with problem solving confidence. It depicts that there are 27 students' or 56.25 percent of the students have low confidence while 20 or 43.75 percent of the pupils' marks with high confidence. This means that there are more pupils with low confidence in solving problem in Mathematics.

Table 3 Attitudes Levels towards Mathematics for Each Dimension

Dimensions	n	SD	Mean	Descriptive Interpretation
Willingness to Engage	48	.3548	3.36	Moderate
Passiveness	48	.3468	3.69	High
Perseverance	48	.6341	3.71	High
Total	48	.4778	3.58	High

Table 3 shows the attitudes in Mathematics of grade six pupils of Sawata Ernandcor Central Elementary School. It shows that the attitudes in Mathematics obtain a total mean rating of 3.58 and describe as high. Also, it reveals that perseverance records a mean rating of 3.71 which is higher among the three variables and described qualitatively as high. On the other hand, the willingness to engage tallies a mean rating of 3.36 which is the lowest among the three and can be described as moderate. The results indicate that the attitude in Mathematics of grade six pupils is high. This implies that students

often manifest perseverance and passiveness and they sometimes manifest willingness to engage in Mathematics.

Table 4 Multivariate Test on Problems Solving Confidence in the Attitude Towards Mathematics

Effect	Value	F	Sig	Partial Eta Squared
Problem Solving Confidence				
Pillai's Trace	.386	11.359	.000	.478
Wilks' Lambda	.414	11.359	.000	.478
Hotelling's Trace	.747	11.359	.000	.478
Roy's Largest Root	.847	11.359	.000	.478

Table 4 shows the significance of the difference in problem solving confidence on the attitudes in Mathematics of grade six pupils of Sawata Ernandcor Central Elementary School. Corresponding multivariate tests are depicted in the table; these are Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root. The aim of the different tests is to test the significant differences among the groups on a linear combination of attitudes in Mathematics. Among the tests, the Wilks' Lambda is the commonly used in multivariate test. Based on the result, Wilks' Lambda value marks 0.414 with a p- value of 0.000 which is lesser than 0.05 level of significance, hence, it indicates significant. This means that there is a significant difference in the problem solving confidence of grade six pupils in terms of their attitudes in Mathematics. Most likely, pupils with high confidence have a better attitude in Mathematics. On the other hand, those students with low confidence demonstrated poor attitude towards Mathematics.

This result is in line with the findings of Hedjazi et al., (2012) which reveals that confidence problem-solving style is a factor that affects academic achievement; idea of self-efficacy that means assessment of the individual confidence or his ability to accomplish a specific task (Bandura,1977). Hence, more confidence means more probability of starting a task and more readiness for facing its barriers. On the other hand, the findings of Reid and Skryabina, (2002); Gonen and Basaran, (2008) reveal that most students do not always know what to practice for solving of problems because they lack self-confidence and skill.

Table 5 Multivariate Test on Problems Solving Confidence and Attitude Towards Mathematics

Box's Test of Equality of Covariance Matrices			Test of Between- Subjects Effects			
Box's M	p-value	Source	Dependent Variables	F	p- value	Partial Eta Squared
7.476	.342		Willing- Ness to Engage	17.65	.000	.452
		Problem Solving Confidence	Passiveness	.258	.597	.008
			Perseve- rance	.713	.348	.014
Levene's Test of Equality of Error Variances						
Willingness to Engage	.807					
Passiveness	.643					
Perseverance	.414					

Table 5 exemplifies the significance of the difference in attitudes in Mathematics associated with the difference in problem solving confidence of grade six pupils of SawataErnandcor Central Elementary School. This table is possible only if the result of the multivariate test above is significant. In this table, assumptions of homogeneity and equality of variance are considered. It parades that Box's M test records 7.476 with a p- value of 0.342, hence, it suggests that homogeneity of variance is not violated. In this result, it is expected to have a p- value which is greater than 0.05. Similarly, Levene's Test reveals that the variables tally p- values which are greater than 0.05 thereby indicating that the equality of variance is not violated.

Correspondingly, the effect of problem solving confidence on the attitudes in Mathematics is analyzed in the Test of Between- Subjects Effects. The important thing is considered in analyzing the result. Bonferroni adjustment is introduced to determine the effect of one variable and reduce the chance of Type I error. This is done by dividing the alpha level to the number of analyses made. In this case, the alpha level is 0.05 and the number of analyses is 3, and the result is .017. Therefore a p- value which is lesser than 0.017 is considered significant.

Among the variables, willingness to engage marks a p-value of .000 which is lesser than .017 and the other variables obtain p- values higher than .017. The result indicates that the only significant difference in the problem solving confidence is on their willingness to engage in Mathematics. Further, the impact of problem solving confidence on willingness to engage in mathematics is evaluated using the partial eta squared which marks as .452. This implies that only 45.2 percent of the variance in willingness to engage is explained by problem solving confidence. The effect size is considerably large.

The findings of Morse and Morse (1995) sheds light to the findings above which states that students with positive attitudes towards Mathematics had positive attitudes towards their mathematics teacher, curriculum and classroom climate. Therefore, achievement, motivation and student interest are influenced by positive and negative attitudes (Miller et al., 1961). Moreover, it is important to note that the effect of solving problem on students' attitude toward mathematics is incredibly significant, because problem solving involves patience, determination, perseverance and willingness to accept risks (Charles et al., 1997 and Udousoro, 2002).

CONCLUSION

Based on the foregoing findings, several conclusions were made. Firstly, there seemed to be a greater number of students that have low confidence in solving problems in Mathematics. The attitude of students in solving problems in Mathematics is high. There is a significant difference in the problem solving confidence of grade six pupils in terms of their attitudes in Mathematics. There is a significant difference in attitudes in Mathematics associated with the difference in problem solving confidence of grade six pupils. The only significant difference in the problem solving confidence is on their willingness to engage in Mathematics.

RECOMMENDATIONS

The conclusions drawn highlighted some suggestions for future teaching and learning in the classroom. Teachers should employ more problem solving activities in the classroom that may improve the confidence of students in solving problems in Mathematics. Engaging students in challenging activities may enhance or change their attitudes positively towards Mathematics activities. Teachers may also be sent to trainings or workshops that deal with techniques or approaches in improving the skills of the students in solving problems in Mathematics. Suggestion to design activities that separate poor performers from average and achievers in the class may give chance to others (poor performers) to develop their confidence. Teachers are encouraged to provide meaningful and challenging activities that may encourage passive students to persevere in the assigned task. Further study may be conducted to check the validity of the findings of this study. Other variables may be used to determine the significant effect of attitudes of students in Mathematics.

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