Mathematics Anxiety as a Hindrance to Access Learning Outcomes

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Abstract- *Mathematics is a key subject in secondary schools. The place of Mathematics in modern education must be determined by an analysis of the culture of civilization of the modern society. Weakness of students in Mathematics dims the learning outcomes, expected in each level of education and totally it leads to the one of the notable problems in the development of nation. The present study is a contribution which indicates that Mathematics Anxiety is one of the factors that hinder mathematical problem-solving ability. Mathematics Anxiety is found to be influencing Mathematical problem-solving ability so to remove this hinders we can made students tension free, encouraging environment and creative mind in students, there by planting original thinking among students. Thus, we can reduce mathematical anxiety, will leads fruitful mathematical problem-solving ability among students. Participants of the study include 400 ninth standard students of five district in Kerala. The study reveals significant but low negative linear relationship between the variables, for the components and the total Mathematical problem-solving ability. Mathematics Anxiety is found to be influencing Mathematical problem-solving ability as learning outcomes.*

Keywords: Mathematical Problem-Solving Ability, Mathematics Anxiety, Secondary School Students

Introduction

Mathematics is a key subject in secondary schools. The place of Mathematics in modern education must be determined by an analysis of the culture of civilization of the modern society. The Kothari Commission report (1964-66) rightly points out that the study of Mathematics plays a prominent part in modern education. It says: "one of the outstanding characteristics of scientific culture is qualification". Mathematics, therefore, assumes a prominent position in modern education. Degree of excellence of Mathematics education points out the scientific and technological rapport on development of nation. So it is necessary to groom a child to elicit strong Mathematical ideas to face challenges in the globalization of modern society. The main aim of studying Mathematics education from primary level to secondary level of education is that making a person who is capable of apply these contents in his daily life situation through which develop a capability of Problem solving and decision-making ability.

Weakness of students in Mathematics dims the learning outcomes, expected in each level of education and totally it leads to the one of the notable problems in the development of nation.

Mathematical learning outcomes, expected from students are mainly problem-solving skills, computations, communication, teamwork etc. According to Mehraj Ahmad Bhat (2014) problem solving is the keystone and best provider of achievement in Mathematics. Also, the problem solving ability helps not only in solving Mathematical problems but also different day-today problems that are faced in their surroundings.

As per the main researchers conducted in present areas shows that main reason behind this weakness is anxiety towards Mathematics. Mathematics anxiety is a psychological dimension of learning that is important for educators to identify (Sherman and Wither, 2003; Jackson and Leffingwell, 1999; Steele and Arth, 1998; Yuksel-Şahin, 2008); (Mohamed and Tarmizi, 2010; Karimi and Venkatesan, 2009; Khatoon and Mahmood, 2010). Thus one of the vital but difficult task of Mathematical education to takeout anxiety towards Mathematics among students. Tobias (1995) defined Mathematics anxiety as a feeling of tension and anxiety that appears when someone is engaged in the manipulation of figures to solve Mathematical problems in both academic and daily-life situations. It is easy to forget math equations and to lose confidence when one is experiencing Mathematics anxiety. Many findings show that Mathematical problem solving ability in students is influenced by psychological factors such as Mathematics anxiety (Marsh and Tapia, 2002).Mathematical anxiety should be reduced, by brining Mathematical creativity in classrooms (Midhundas and vijayakumari,2016). There by improve Problem solving ability in students.

Problem solving ability is important, in academic and non academic life of a student by improving problem solving ability. We can do anything in more creatively, which open new way to the development of nation.

Review of related studies reveals that a number of studies are conducted in the area of Mathematical problem solving ability in connection with variables such as Mathematical anxiety. When it comes to Problem solving ability, studies are rare and it demands more research to explore various relationships. So emergence of Mathematical problem solving ability through Mathematical anxiety as a new area of research has sufficient scope.

Objectives

The major objective of the study is to find out the influence of Mathematics Anxiety on Mathematical problem solving ability. The other objectives are:

1. To find out the extent of Mathematical Problem Solving Ability among secondary School Students.
2. To find out the extent of Mathematics Anxiety among Secondary School Students.
3. To find out whether Mathematical Problem Solving Ability differ in the low- and high-Mathematics Anxiety group.
4. To find out whether there is any significant relationship between Mathematical Problem Solving Ability and Mathematics Anxiety of Secondary School Students.

Methodology

Survey method was adopted for the study. Instruments

The variable Mathematical Problem Solving Ability was measured using "Test of problem solving ability in Mathematics" developed by Sumangala and Rinsa (2008). The internal consistency of the test was calculated using Cronbech Alpha Coefficient. The coefficient obtained is 0.94 and hence the test score can be considered as reliable. The correlation coefficient obtained is 0.59 indicating that the test is valid to measure problem solving ability in mathematics.

The variable Mathematics Anxiety was measured using "Scale of Mathematics Anxiety" developed by Sumangala and Malini (1993). This scale is in the form of a five point Likert type attitude scale and is intended to measure the extent of fear or the feeling of apprehension in working with Mathematics. This scale consists of 29 statements measuring both debilitating and facilitating anxiety. The test retest reliability coefficient is 0.860 and reliability estimated by Cronbach's Alpha coefficient is 0.796. The statement of the scale were phrased in the least ambiguous way and hence wording of the statement will suggest that the scale is a good measure of Mathematics Anxiety. This indicates that the scale is reliable and valid to measure Mathematics Anxiety.

Participants

The study was conducted on a sample of 400 ninth standard students from various Districts in Kerala.

Results and Discussion

To know the extent of the variables Mathematical Anxiety and Mathematical problem solving ability among secondary school students, Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis were computed and is presented in table 1.

Table1

Descriptive statistics of the variable Mathematical anxiety and Mathematical problem solving ability

Variables	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Mathematical Anxiety	89.47	92	99	15.34	-0.787	0.482
Problem Solving Ability	11.36	11	11	4.18	0.06	-0.821

Table 1 reveals that mean, median and mode of Mathematical Anxiety are 89.47, 92, 99 respectively. Though mean, median, mode values are not same, value of mean is far less than

that of median and mode. The standard deviation of Mathematical Anxiety is found to be 15.34, which shows that the scores are highly deviated from the mean score. The skewness of Mathematical Anxiety is found to be- 0.787 which shows that the curve is negatively skewed and the value of kurtosis is 0.482, which is greater than 0.263. so it is platy kurtic. Values less than two, indicate a possibility of non-skewed, mesokurtic distribution.

From table 1, it can be seen that Mean, Median and Mode of Mathematical problem solving ability 11.36, 11, 11 respectively. These three values are almost equal. The Standard Deviation of the scores of Mathematical problem solving ability is 4.18 which show that the scores are slightly deviating from the Mean score. Skewness and Kurtosis of the distribution of Mathematical problem solving ability are found to be 0.06 and -0.821. Very small values of Skewness and Kurtosis shows that the distribution is almost symmetric and Mesokurtic. Hence the distribution of Mathematical problem solving ability can be considered as normal.

In order to find whether Mathematical problem solving ability is influenced by Mathematical anxiety, test of significance of Mean difference for independent groups was used. For this the total group was divided into two based on the score on Mathematical Anxiety. The Median value of Mathematical Anxiety (92) was taken as the cut off value for High and Low Mathematics Anxiety group. A score less than 92 was taken as low anxiety and greater than 92 was taken as high anxiety. In the total sample, it was found that 201 students are in low Mathematical Anxiety group and 199 are in the High Mathematics Anxiety group. The significance of difference in Mathematical problem solving ability between the Low Mathematics Anxiety group and High Mathematics Anxiety group was tested and is presented as table 2.

Table 2

Mean, S.D and 't' value of Mathematical problem solving ability between low and high Mathematical anxiety groups.

Variable	Mathematical Anxiety	N	Mean	Std. Deviation	't' Value
Problem solving Ability	High Group	199	10.79	3.95	2.73
	Low Group	201	11.93	4.32	

**p<0.01

Table 2 shows that the obtained 't' value for Mathematical problem solving ability for Low anxiety group and High anxiety group is 2.73. Since the calculated t value is greater than 2.58, there is a significant difference in the mean Mathematical problem solving ability scores of Low anxiety group and High anxiety group ($p \leq 0.01$). Mean value shows that Low anxiety group have high problem solving ability than high anxiety group. Graphical representation of Mean scores on Mathematical problem solving ability of Low Anxiety group and High Anxiety group is given as figure 1.

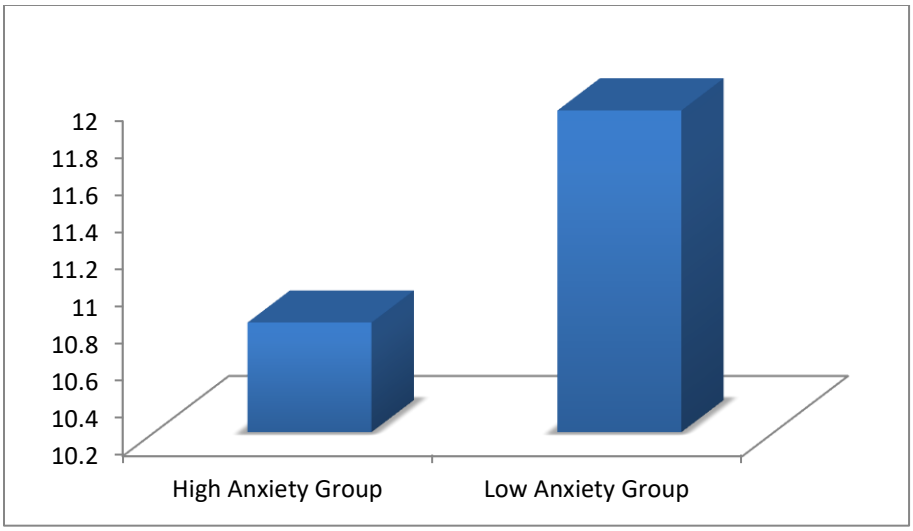

Figure 1: Bar diagram showing Mean Mathematical problem solving ability score of High and Low Mathematics Anxiety groups.

An observation of the mean scores of the two groups and the diagram show that the low Mathematics Anxiety group has comparatively higher score on Mathematical problem solving ability than that of high group. To know whether Mathematics anxiety is related to Mathematical problem solving ability and its nature, Pearson's product moment coefficient of correlation was calculated. To know the linearity of the relationship scatter diagrams were drawn for each case and is presented as figure 2.

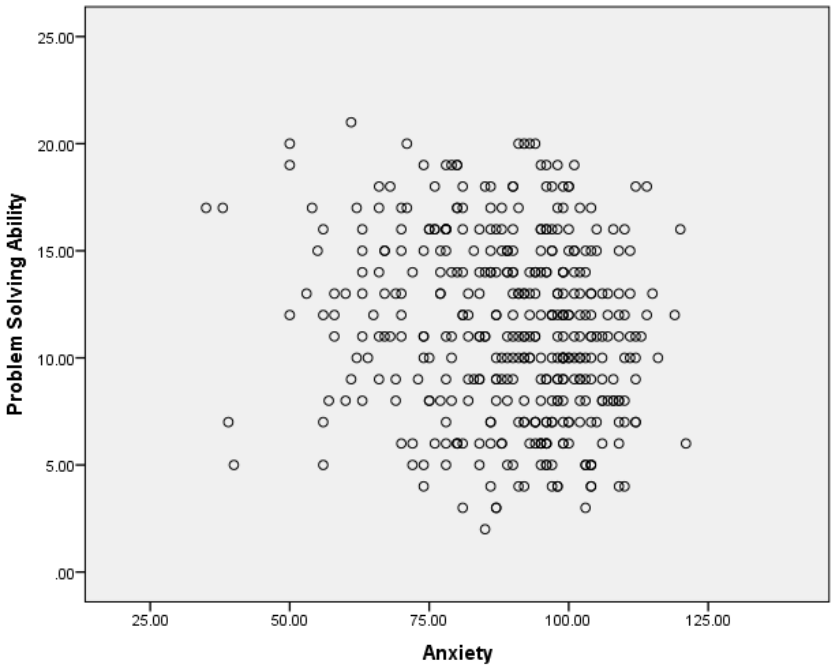

Figure2: Scatter diagrams for Mathematical problem-solving ability with Mathematical Anxiety.

The scatter plots show that the relationship between the variables is linear as the points tend to cluster around a straight line, but the extent of relationship is low. The correlation coefficients between the variables are shown in table 3.

Table 3

Pearson's correlation coefficient for Mathematical problem-solving ability and Mathematical Anxiety

Variable	Anxiety	Problem solving ability	
Anxiety	1	r	$r^2 \times 100$
		-0.164**	2.69

**p<0.01

Table 3 reveals that the obtained correlation coefficients for Mathematics Anxiety and Mathematical problem-solving ability are greater than the value needed for significance at 0.01 level for N=400. Hence there is significant relationship between the variables. A low negative relationship is found for the variable Mathematics Anxiety with Mathematical problem-solving ability. That is Mathematics Anxiety is significantly negatively related with Mathematical problem-solving ability, but the extent of relationship is low. That is for an increase in Mathematics Anxiety there will be a small decrease in Mathematical problem-solving ability. When shared variance is calculated (r2×100) it can be seen that 2.69 percent of variation in Mathematical problem-solving ability can be explained by variance in Mathematics Anxiety.

Conclusion

Mathematical problem-solving ability is an important factor in the progress of every nation. The present study is a contribution which indicates that Mathematics Anxiety is one of the factors that hinder mathematical problem-solving ability. Mathematics Anxiety is found to be influencing Mathematical problem-solving ability so to remove this hinders we can made students tension free, encouraging environment and creative mind in students, there by planting original thinking among students. Thus, we can reduce mathematical anxiety, will leads fruitful mathematical problem-solving ability among students. In order to find the contributing factor of mathematical problem-solving ability, more studies in the area are also recommended.

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