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Mathematics anxiety among secondary school students in relation to gender and parental education

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Abstract

The study proposes and confirms a set of independent variables (Gender and Parental Education) and its effect on dependent variable is mathematics anxiety. The sample size is 1000 secondary school students. The tool used in the Mathematics anxiety scale (MAS) and A Personal Background Assessment Questionnaire and the data was analyzed using computation of means and standard deviation, computation of standard error and use of t-test and f-test for measuring the significant of the difference between the means. There exists significant difference between male and female students so far as their anxiety in math is concerned. Females have more anxiety levels than males in mathematics. It is also found that anxiety of student having different level of parental education. In case of both father and mother, the children whose parents that are not educated or less educated are more anxious than those who have both or one having higher level of education.

Keywords: Mathematics Anxiety, Gender and Parental Education.

1. Introduction

Mathematical thinking is important for all members of a modern society as a habit of mind for its use in the work place, business and finance; and for personal decisions making. Mathematics is fundamental to national prosperity in providing tools for understanding science, engineering technology and economics. It is essential in public decision making and for participation in the knowledge economy.

Math anxiety is an intense emotional feeling of anxiety that people have about their ability to understand and do mathematics. People who suffer from math anxiety feel that they are incapable of doing activities and classes that involve math. Some math anxious people even have a fear of math; it's called math phobia. The incidence of math anxiety among college students has risen significantly over the last decade. Many students have even chosen their college major in the basis of how little math is required for the degree.

Student's gender is significant factor for math Anxiety. The study of math anxiety shows, there are gender differences in math anxiety among younger students, though it appears that during the elementary and junior high school years, boys express slightly more positive affect about math than do girls (Aiken 1970) ^[4]. During the high school and college years Female students report more anxiety about math than do male students (Betz, 1978) ^[7] Numerous studies have shown that male achievement in math is higher. Due to the fact that gender differences do not appear until around puberty. Boys and girls have similar mathematics and science proficiency scores on tests at the age of 9, but a gap begins to appear at around age 13, early findings showed that children (boys and girl) did not differ in their math performance during elementary school but that differences began to appear in middle school and increased with time and schooling (Fennema & Sherman 1978) ^[16] Moreover, mathematics is often labeled as a masculine ability as a result, girls often have low confidence in their math capabilities. These gender stereotypes can reinforce low confidence in girls and can cause math anxiety. However, a note of cautious has to be added while describing gender as a major variable effecting math anxiety. For example, Gierl and Bisanz (1995) ^[17] finds no significant gender difference for math anxiety, on the other hand Campbell and Evans (1997) ^[9] finds that females exhibit more mathematics anxiety in secondary school and in college.

(Fennema and Sherman, 1978) [16]. Females display more math anxiety than males in secondary school and college. (Woodard T. 2004) [24].

Parents have the most influence on adolescent course-taking and career choices, with the mother being the most influential of all this was the finding in a 2001 report in the social psychology of education. Parental encouragement in math has been found to significantly influence student's learning experiences and attitude towards math. Infact, student's grades in math were higher when students perceived that their parents were encouraging their effort in math. Dave and Dave (1971) [12] investigated the relationship of parental education on caste with the academic achievement. They found that higher percentages of rank holder belong to homes with higher parental education where as a higher percentages of failed students belong to those who have lower parental education. Bridge *et al* (1979), and Glasman and Biniaminov (1981) [8, 18] concluded that the achievement level of a student in math is directly proportional to the level of his parent's education.

2. Objectives

1. To compare the mathematics anxiety of secondary school students on gender basis.
2. To study the influence of parental education on mathematics anxiety of students.

3. Hypotheses

1. There is no significant difference in the mathematics anxiety of male and female students.
2. There is no significant difference among the different categories of parent education and mathematics anxiety of students.

4. Tools used

The tools employed for collection of the data mentioned above included the following:

1. Mathematics anxiety scale (MAS)

This test was developed by Dr, (Mrs.) Sadia Mahmood, Department of Education, Aligarh Muslim University, Aligarh and Dr. (Mrs.) Tahira Khatoon, Associate Professor, department of education ,Aligarh Muslim University, Aligarh .

2. A Personal Background Assessment Questionnaire

This questionnaire was prepared by the investigator.

5. Methodology

The research was conducted in Lucknow (U.P) .The researcher selected the sample mainly from the city, Lucknow, U.P India. Simple random sampling methodology was used. Only secondary schools were selected for the study. The sample size was limited to 1000students. The study was conducted taking different variable which contribute towards mathematics anxiety but only gender, parental education are selected. In the study 500 male and 500 female students were administered and taking into consideration.The parental education was divided into mother and father education. It was further divided into no, low, medium and high education.

6. Following statistical techniques were used for analyzing the data

1. Computation of means and standard deviation.
2. Computation of standard error.

3. Use of t –test for measuring the significant of the difference between the means.
4. Use of f –test for measuring the significant of the difference between many means.

7. Results and Analysis

1: Relationship between gender difference and mathematics anxiety

The data was collected from four types of schools that are government schools, private schools, semi government and minority managed school. Out of the sample size of 1000, 250 students are selected from each type of schools.

Gender	N	Mean score	SD	df	t-value	Sig./Not sig.
Male	500	31.18	7.62	998	6.156	Sig. at 0.05
Female	500	34.50	9.37			

The mean anxiety of males is 31.18 with standard deviation of 7.62 and that of females 34.50 with SD of 9.37. The t-value has been calculated as 6.156. The Degrees of freedom in this case = 998. At 95% confidence interval, t value calculated 6.15 is more than t table value at 95% confidence interval with 998 degrees of freedom i.e.1.96. The results clearly indicate that there is significant difference between anxiety scores of both males and females. Females have more anxiety levels than males for mathematics.

2. Relationship between parental education and mathematics anxiety of children

Parents play an important role in child's learning. Besides from being actively involved in his/her education, parents also provide a home environment that impacts learning. Parental education can serve as an indicator of the values and resource with which parents create this environment. To understand impact of parental education better, we analyzed the impact of father's and mother's education separately to discuss the impact.

A: Father's Education

Father's education has been categorized into no education, low, middle and high education.

2.1.1 Summary of analysis of variance in respect to math anxiety and father's education

Source of variance	df	sum of squares	Mean square	F – value	Sig./Not sig.
Between groups	3	15101.46	5033.82	83.00	0.05
Within groups	996	60399.57	60.64		

The analysis of variance is employ to find out the influence of father education as students on math anxiety the total sample was categorized in to four group i.e. No Education, Low Education, Middle Education and High Education. The mean anxiety scores of No, Low, Middle and High were found 36.17, 34.45, 32.16 and 23.52. The total sums of squares between and within means were computed. Analysis of variance of the mathematics anxiety scores of the four group yielded F value as 83.00 which is significant at 0.05 level with df 3, 996. This implied that there is significant overall difference in the means of these groups.

2.1.2 Comparison of mathematics anxiety scores among the four group of father's education

Group	P.E.	N	Mean	SD	T value			
					A	B	C	D
A	No Edu.	252	36.17	7.31	×			
B	Low Edu.	271	34.45	7.17		×		
C	Middle Edu.	271	32.16	9.00			×	
D	High Edu.	130	23.52	7.50				×

Table presents the result of comparison among four group of father education of student on math anxiety of students. The mean, standard deviations for all four groups are given in table.

B. Mother's Educations

2.2.1 Summary of Analysis of variance in respect to math anxiety and mother's education

Source of Variance	df	Sum of Squares	Mean Square	F-Value	Sig./Not Sig.
Between Groups	3	16167.75	5389.25	90.46	Sig. at 0.05
Within Groups	996	59333.28	59.57		

The analysis of variance is employ to find out the influence of mother education of students on mathematics anxiety. The total sample was categorized into four group i.e. No edu., Low edu., Middle edu., High edu. The mean anxiety scores of No, Low, Middle and High were 35.33, 34.12, 27.75 and 22.27 The total sum of squares between and with in means were computed Analysis of variance of the mathematics anxiety scores of the four group yielded f value as 90.46 which is significant at 0.05 level with df 3, 996. This implied that there is significant overall difference in the means of these groups.

2.2.2 Companion of mathematics anxiety scores among the four group of mother education

Group	P.E.	N	Mean	SD	t-value			
					A	B	C	D
A	No Edu.	443	35.33	7.60	x			
B	Low Edu.	346	34.12	7.40		x		
C	Middle Edu.	125	27.75	9.19			X	
D	High Edu.	86	22.27	7.18				x

Table presents the result of comparison among four group of mother education of students on math anxiety of students. The mean, standard deviations for all four groups are given in table. The result of both the table (Father and Mother Education) clearly shows that students of high parental education have lowest mathematics anxiety scores than the other three groups.

8. Discussion

The results of the analysis of data have shown the gender difference, difference in achievement levels, difference in education levels of both mother and father and difference in attitude have significant impact on anxiety among the students towards mathematics. There are significant difference in mathematics anxiety scores between boys and girls in the present study. The findings of this study are well support from other previous studies conducted. This study is

supported by Asante, (2012) [5] found that generally female students attained higher grades in all other school subjects besides mathematics than other male counterpart. Females display more mathematics anxiety than males in secondary school and college (woodand, T. 2004) [24]. Leili Hosseini found that female students scored higher in the subscales of anxiety than male. Abdullah, (2013) [1] found that there was no statistical significant difference between girls and boys in respect of mathematics anxiety but in respect to mathematics problem solving and evaluation girls gained higher mean. Researchers have shown that boys tend to score higher in math than girls.

When data was analyzed to see the relationship between mathematics anxiety and parental education, it is found that anxiety is higher among the students having parents with no or low education, whereas the levels of anxiety are quite low among students having parents with high or middle education. The result is supported by Satyanandan, (1969) [23] found that the children of graduate parents performed better than matriculate parents. Faize Ahamd (2011) [8, 11] found that the performance of students was better having educated mothers that illiterate mothers. E.A. Maloney (2015) [14] finds in his study that parent’s anxiety towards math can play an important role in childrens math’s achievement.

9. Finding and conclusion of the study

1. There exist significant difference between male and female students so far as their anxiety in math is concerned. Females have more anxiety levels than males in mathematics.
2. There is significant difference found in anxiety of student having differents level of parental education. In case of both father and mother, the children whose parents that are not educated or less educated are more anxious than those who have both or one having higher level of education.

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