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# A Study of Mathematics Anxiety among Secondary School Students in Relation to Gender and Mathematics Achievement. 

## ABSTRACT

Mathematics anxiety is the intense topic and which has received extensive attention in this literature but still there is lot of ambiguity about the variables affecting it .The study proposes and confirms a set of independent variables (gender and mathematics achievement) and its effect on dependent variable is mathematics anxiety. The sample size is limited to 500 secondary school students. The tool used in the Mathematics achievement test (MAT), Mathematics anxiety scale (MAS) and A Personal and Environmental Factors Assessment Questionnaire and the data was analyzed using computation of means and standard deviation, computation of standard error and use of t-test for measuring the significant of the difference between the means. The result of the study can be summarized as there is a significant difference between the anxiety levels of males and females. Females are found to be more anxious than male towards mathematics. Second major finding is that people having low achievement in mathematics tend to be more anxious towards the subject.

KEYWORDS : Mathematics Achievement, Gender, Mathematics Anxiety.

## Introduction :

The learning of mathematics is indispensable because of its wide ranging applications in our life. The present society requires the use of the skills such as estimating, problem solving, interpreting data, measuring, predicting and applying mathematics in everyday life situations.. In an increasingly technological society, mathematics is becoming an increasingly important discipline within our occupational and educational structures. Betz (1978) has pointed out that knowledge of mathematics is critical in many occupations. Students often develop mathematical anxiety in schools as a result of learning from teachers who are themselves anxious about their mathematical abilities in certain areas. Typical examples of areas where mathematics teachers are often incompetent or semi-competent include fractions, logarithms algebra , geometry ,calculus, and topology

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.Mathematics anxiety is a feeling of tension and anxiety that interfere with the "manipulation of mathematical problem "in varied situations in ordinary as well as academic life (Richardson \& Suinn, 1972). It can also be explained as a sense of discomfort observed while working on mathematical problems ( Hadfield \& Trujillo, 1999; Ma, 2003) and is associated with fear and apprehension to specific math related situation ( D' Ailly \& Bergering, 1992). It is found among elementary school students (Jackson \& Leffinwell, 1999 Steele \& Arth, 1998); high school students (Hembree, 1990) and in college students (Tobias, 1990, Bitner et al 1994).

## Objectives:

1. To compare the mathematics anxiety of secondary school students on gender basis.
2. To study the impact of anxiety on achievement in math of student.

## Hypotheses:

1. There is no significant difference in the anxiety of male and female student toward mathematics.
2. There is no significant difference in the anxiety of the student having different levels of achievements.

## Tools used:

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

## 1. Mathematics achievement test

This test was developed by Dr. Ali Imam, Associate Professor and Head of department of education, Integral University, Lucknow

## 2. 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 .

## 3. A Personal and Envoirmental Factors Assessment Questionnaire

This questionnaire was prepared by the investigator.

## Methodology:

The research was conducted in Lucknow (U.P) .The researcher selected the sample mainly from capital of the city ie. Lucknow, U.P India. Simple random sampling methodology was used. Only secondary schools were selected for the study. The sample was limited to only from $9^{\text {th }}$ grade secondary schools student .The sample size was limited to 500 students. The study was conducted taking different variable which contribute towards mathematics anxiety but only gender, parental education mathematics achievement and school type were selected. In the study 250 male and 250 female students were administered and taking into consideration the school type variable the sample was divided into 250 for private and 250 for government school. The parental education was divided into mother and father education. It was further divided into no, low ,medium and high education.

## 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.

## Results and Analysis:

1. Relationship between gender difference and mathematics anxiety
Total Number of male and female respondent's was 250 and 250 respectively as indicated in table below. The mean anxiety of males is 32.11 with standard deviation of 9 and that of females is 35.76 with SD of 10.24. The standard errors for males and females are 0.57 and
0.65 respectively and are arrived using formula:

H0: There is no difference between anxiety scores of males and females
H1: There is significant difference between anxiety scores of males and female

| Gender | N | Mean | Standard <br> Deviation | Standard <br> Error | t <br> value | Sig. /not <br> sig. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Males | 250 | 32.11 | 9.00 | 0.57 | 4.24 | Sig. at <br> 0.01 level |
| Females | 250 | 35.76 | 10.24 | 0.65 | 4.24 |  |

The $t$ value has been calculated as 4.24 , Degrees of freedom in this case is 498 .At $99 \%$ confidence interval value calculated 4.24 is more than $t$ table value at $99 \%$ confidence interval with 498 degrees of freedom i.e.2.58. The results clearly indicate that there is a significant difference between anxiety scores of both males and females. Females have more anxiety levels than males for mathematics

## 2.Relationship between Mathematics achievement and mathematics anxiety

The achievement scores of the students are categorized into high ( $>=32$ ), medium ( $>=20,<32$ ) and low ( $<20$ ). To understand the dependence of achievement on anxiety scores, $t$-test have to be conducted pair-wise.

A . H0: There is no difference in anxiety levels of high and low scoring students
H1: There is difference in anxiety levels of high and low scoring students

| Achievement <br> Score | N | Mean <br> Anxiety | Standard <br> Deviation | Standard <br> Error | t- <br> value | Sig/ <br> Not <br> sig |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| High | 118 | 24.76 | 9.44 | 0.87 | 11.51 | Sig at <br> 0.01 <br> level |
| Low | 235 | 36.49 | 7.24 | 0.46 |  |  |

The no. of respondents having high and low scores in mathematics is 118 and 235 respectively. The mean anxiety of people having high scores is 24.76 with SD of 9.44 and for low scores; the mean is 36.49 with SD of 7.24. The standard error has been calculated as 0.87 and 0.46 respectively for high and low scoring students. t-value has been calculated as 11.5 that is more than critical $t$-value of 2.60 at $99 \%$ confidence interval with 351 (235+118-2) degrees of freedom. Hence null hypothesis is rejected, that means there is significant difference in anxiety levels of high and low scoring students.
B. H0: There is no difference in anxiety levels of medium and low scoring students
H1: There is difference in anxiety levels of medium and low scoring students

| Achieve- <br> ment <br> Score | N | Mean <br> Anxi- <br> ety | Standard <br> Deviation | Standard <br> Error | T <br> val- <br> ue | Sig/Not <br> sig |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Low | 235 | 36.49 | 7.24 | 0.46 | 4.58 | Sig at <br> 0.01 <br> level |
| Medium | 147 | 31.97 | 9.32 | 0.77 |  |  |

The mean anxiety scores for low and medium scores are 36.07 and 31.97 respectively with a standard deviation of 7.24 and 9.32 .t-Value has been calculated as 4.58 that is more than 2.6 which is the critical value at $99 \%$ confidence interval with 380 degree, that means null hypothesis is rejected and difference is significant at $99 \%$ confidence interval.

## C. HO: There is no difference in anxiety levels of medium

 and high scoring studentsH1: There is difference in anxiety levels of medium and high scoring students

| Achievement <br> Score | N | Mean <br> Anxi- <br> ety | Standard <br> Deviation | Stand- <br> ard <br> Error | T value | Sig/ <br> Not <br> sig |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Medium | 147 | 31.97 | 9.32 | 0.77 | 6.21 | Sig. at <br> 0.01 <br> level |
| High | 118 | 24.76 | 9.44 | 0.87 | 67 |  |

T-Value has been calculated as 6.21 that is more than 2.59 which is critical $t$-value at 263 degrees of freedom with $99 \%$ confidence interval, that means difference is significant at $99 \%$ confidence interval. Hence null hypothesis is rejected and there is significant difference in anxiety levels of medium and high scoring students. All three difference in relationships among high and low, low and medium, high and medium have come out to be statistically significant. Hence it can be concluded that there is a relationship between anxiety levels of students and their achievement scores in mathematics.

## Finding and conclusion of the study:-

1. There is a significant difference between the anxiety levels of males and females. Females are found to be more anxious than mail towards mathematics.
2. Second major finding is that people having low achievement in mathematics tend to be more anxious towards the subject. There was a significant difference found of anxiety levels among students having different levels of achievements. Students having moderate or high achievements in mathematics have less anxiety levels than that of lower achieving students.
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