

# **Mathematics Anxiety and Academic Achievement of Secondary School Students in relation to their Gender and Medium of school**

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## **Abstract**

Mathematics is an important subject for secondary school students. However, Mathematics as a subject becomes an obstacle to academic progress for secondary school students as some students are not capable of understanding the formulas and laws of mathematics. Therefore the main purpose of present study was to find out the relationship between Mathematics anxiety and Academic Achievement of secondary school students and the difference between Mathematics Anxiety and Academic achievement in relation to their Gender and Medium of School. Descriptive survey method was adopted for this study. The present study comprised of 140 students, out of which 70 boys and 70 girls have been selected as sample. The tool used for data collection was Mathematics Anxiety Scale (MAS) developed by Dr. Ayatollah Karimi and Prof. S. Venkatesan. The obtained data were analysed with the help of Mean, Standard Deviation, t-test and Pearson's Product Moment Correlation. The findings of the study revealed that Negative Correlation between Mathematics Anxiety and Academic Achievement of secondary school students. The study also revealed that girls have more Mathematics anxiety than the boys. The study findings also includes that boys have more academic achievement than the girls as they were having less mathematics anxiety. The study also revealed that the English medium students have better academic achievement than the Odia medium secondary school students.

**Key Words: Mathematics Anxiety, Academic Achievement, Medium of School**

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## **I. Introduction**

Mathematics is essentially needed in every walk of life in many ways. It has always held a key position in the school curriculum. It has occupied its important role not only in mathematical areas but in non-mathematical areas also. Its knowledge is essential in home, business industry, sale and purchase, banking, agriculture, communication, transport, defense, science and technology, etc., yet mathematics is often considered as a difficult subject in schools. This Difficulty creates anxiety among the students. Mathematics is a core subject in secondary schools. The study of mathematics was established to produce competent person who will be able to apply the knowledge of mathematics in everyday life and responsibly in solving problems and making decisions. However mathematics as a subject is unique from other subjects due to its multiple applications like addition, subtraction, multiplication etc. and the mathematical formulas, which becomes a matter of concern for the students specifically at the secondary level. So the weakness among students in learning Mathematics in particular will affect the academic outcomes of the students.

Mathematics is an important subject with broad applicability but to its contrast Mathematics is generally considered as the most difficult Subject of all subjects. Students find lots of problems and difficulties in this subject in understanding the Concepts, remembering the formulas, solving the sums and applying In practical situations. It is seen that students are doing good in all other subjects but fail to do so in Mathematics. There can be many reasons behind this. One of the reason is fear and anxiety towards the subject. Students generally develop this anxiety in their school life and carry this Anxiety though out their life.

Mathematics is a compulsory subject at secondary stage. Access to quality mathematics education is the right of every child. The knowledge of mathematics merely not meant for computational arithmetic and geometrical measurements but also played an important role in the education of all people. Secondary school mathematics teachers' are trying to develop essential skills, thinking and problem solving abilities among their students related and important to this subject.

In Indian Education system, Mathematics is a core subject at secondary level. Learning of Mathematics at secondary level is supposed to establish fundamental base for the next level of mathematics education and for

all education also. It has the significance to affect the future life of the students. Development in other fields may also be influenced by the understanding of mathematical concepts and the reuses. In India due to its diversity, classrooms have different background students. Localities, parents education, teachers anxiety, teachers self-efficacy, students mathematics anxiety and gender are some of the aspects of diversity among students. These aspects are Prevalent among students and would divide the students in different categories. Mathematics anxiety is one of the important factors among all the other psychological and social factors which may affect the students' achievement in Mathematics.

### **Rationale of the study**

Mathematics Anxiety is an obstacle to academic progress, whose reasons is very important to inquire in to but is not always possible to do. This fear is expressed in the students of mathematical class and it is revealed the standard of Improvement of the students. Depending on the Anxiety of mathematics the teaching methods of teacher, teacher-student relationship & difficult to remember formulas etc. It can be said that the Mathematics of the basic education core curriculum is very important for the development of students mind. It enables a student to think logically & systematically. Mathematics phobia is a very serious issue regarding student's mathematics achievement. The students feel that mathematics is a complicated major and they are incapable to understand mathematical problems, consequently learners want to escape from such situations. So in the present study the researchers wants to find out the mathematics Anxiety and Academic Achievement of secondary school Students in relation to their Gender and Medium of school.

### **Objectives of the study**

1. To find out the relationship between Mathematics Anxiety and Academic Achievement among the Secondary School students.
2. To find out the difference between Mathematics Anxiety and Academic Achievement in Relation to their gender.
3. To find out the difference between Mathematics Anxiety and Academic Achievement in relation to their Medium of School.

### **Hypotheses of the study**

H<sub>1</sub>: There exists a significant relationship of Mathematics Anxiety and Academic Achievement among the students.

H<sub>2</sub>: There exists significant difference of Mathematics Anxiety and Academic Achievement in relation to Their Gender.

H<sub>3</sub>: There exists significant difference of Mathematics Anxiety and Academic Achievement in relation to their Medium of School.

### **Operational definition of the variables**

#### **Mathematics Anxiety**

Mathematics Anxiety refers to the scores obtained by the students which have measured by MATHEMATICS ANXIETY SCALE tool developed by Dr. Ayatollah Karimi & Dr. S. Venkatesan to measure the Mathematics Anxiety.

#### **Secondary School Students**

In the present study the students of class IX and X are taken as secondary school students.

#### **Medium of school**

Medium of school is divided into Odia medium school and another one is English Medium School.

### **Review of related literature**

It has been found that there was mathematics Anxiety among secondary school students & there was no such significance different found regards to their Gender & their achievement based on the level of mathematics Anxiety.(Zakaria,2012; Zain, 2012 &Ahmad,2012). Maximum number of researchers found that mathematics Anxiety arises among the students due poor methods of Teaching, lac of teacher students relationship, difficulty in understanding math problems (Vitasari, 2010; Herawan, 2010 & Othman,2010). Researchers also found negative relationship between mathematics anxiety & students mathematics Achievement (khaliq, 2016; Kundu,2 018 & Kar,2018). It is found from the literature that girls are more anxious than boys towards mathematics.(Paul, 2014; Ngirande, 2014 & Awasthi,2015). Researchers found that

there was no significant difference in mathematics Anxiety of students with respect to their gender.(Kumar,2021; Srivastava,2021). Researchers found that the relationship between achievement in Mathematics & mathematics Anxiety is negative & significant at 0.05 level of significance, Mathematics anxiety of high & low achievers was significantly different, similarly a significant difference was observed between mathematics achievements of high & low anxious students & difference in mathematics Anxiety of boys & girls students was not significant.(Yadav,2018 & Singh,2018). Researchers found that the Mathematics achievement of the students increases, their level of math anxiety decreases & the Mathematics achievement decreases, their level of math anxiety increases.(Keziah,2019;Salinas,2019;Tolibao,2019 & Monev,2019).

## II. Method

For the present study researcher adopted descriptive survey method. The Population for the present study consisted of all secondary school students of Sambalpur District. The sample of the study was comprised of 140 students selected in both English medium school (St. John School, Sambalpur) & Odia medium school (Budharaja High school, Sambalpur) students .

The investigator used stratified Purposive sampling technique for selection of the sample. For the present investigation, the investigator used Mathematics anxiety scale developed by Dr. Ayatollah Karimi & Dr. S. Venkatesan. This tool has 37 items. It covers two factors (19 items on 'math's test anxiety' and 18 items in 'numerical anxiety'. The questions are presented along with a Likert scale of 1-5 to measure anxiety from 1-not at all, 2-occasionally, 3-usually, 4- frequently, 5-Always. In this study Student selected in the sample was subjected to the Mathematic anxiety and Achievement was based on the marks obtained by the students in final examinations. The data was analyzed with the help of t- test, mean and standard deviation and Pearson Product Moment method.

### Analysis and interpretation

After the data collection the researchers has to be proceed and analysis the data. The Mathematics Anxiety scale was administered 140 students of secondary schools out of which 70 were boys and 70 girls. The researcher collected the data of mathematics Anxiety level of secondary school students.

### Objective-1

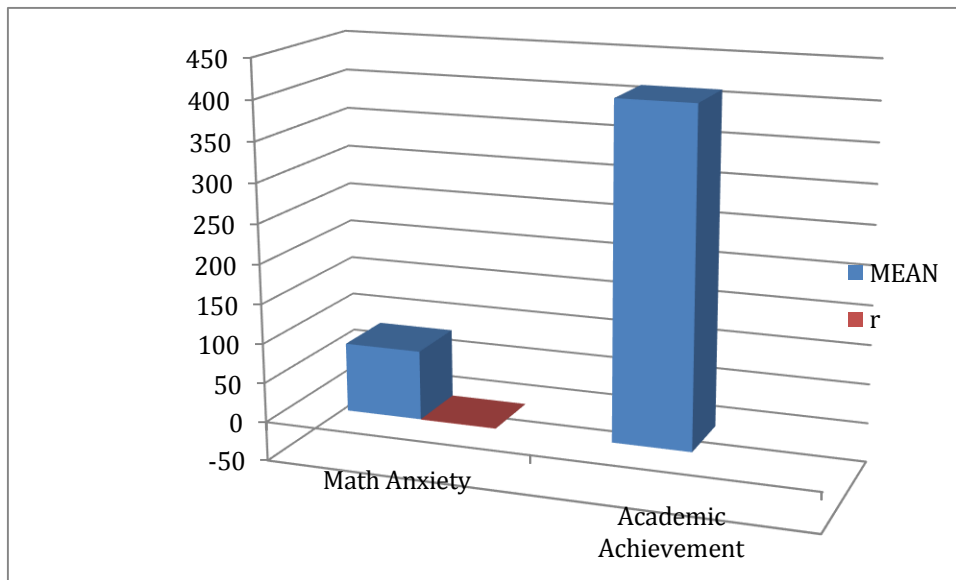
The first objective of the study was to find out the relationship between Mathematics Anxiety and Academic Achievement among secondary school students. For this objective, the investigator has used mathematics Anxiety scale & collected data from 140 students of secondary School students and the scores obtained were subjected to statistically analysed by Pearson Product Moment correlation.

**Table-1**  
**Relationship between Mathematics Anxiety and Academic Achievement among secondary school students.**

Variable	N	M	SD	r	t-value	Remarks
Mathematics Anxiety (X)	140	87.0357	18.8933	-0.363	4.575	Negative Correlation & Significant
Academic Achievement (Y)		414.8286	96.1579			

The Table-1 shows that the relationship between Mathematics Anxiety and Academic Achievement of secondary schools students was Negative Correlation. The table value is more than calculated value and the null hypothesis is rejected and Alternative hypothesis is accepted at 0.05& 0.01 level. Those students who have high Mathematics anxiety they have low academic achievement and those students who have low mathematics Anxiety they have high academic achievement.

**FIGURE-1:**  
**Relationship between Mathematics anxiety and academic achievement of secondary school students Mean and Correlation**



**Objective-2**

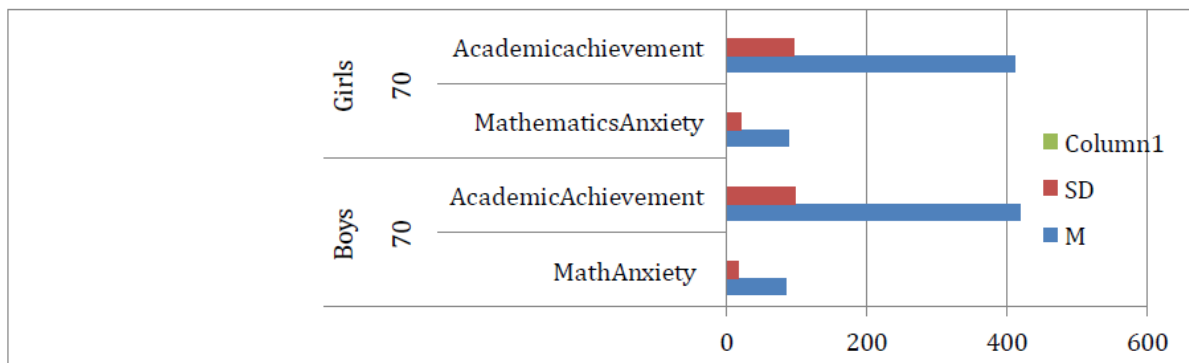
The second objective of the study was to compare the Mathematics Anxiety and Academic Achievement of boys and girls of secondary school students. For this the investigator has used Mathematics Anxiety scale and collected data from 70boys and 70girls.Thus, the scores obtained were subjected to statistical analysis i.e., mean, Standard Deviation, t-test.

**Table-2**  
**Difference between Mathematics Anxiety and Academic Achievement of secondary schools students in relation to their Gender**

Gender	N	Variable	M	SD	df	t-value	Remarks
Boys	70	Mathematics Anxiety	84.7429	17.3662	138	28.1779	Significant
		Academic Achievement	417.9	97.3851			
Girls	70	Mathematics Anxiety	89.3286	20.1701	138	27.6632	Significant
		Academic Achievement	411.8857	95.4479			

Table- 2 shows that mean of Mathematics Anxiety boys and girls are 84.7429 and 89.3286 respectively. It indicates that girls have more anxiety than the boys and their Academic Achievement of boys are 417.9 & girls are 411.88 respectively. It indicates that Boys have more Academic Achievement than the girls. Boys have low Mathematics Anxiety and their Academic achievement is high. Girls have high Mathematics anxiety and their Academic Achievement is low.

**Figure-2: Mean and t-value of Mathematics anxiety and Academic Achievement**



The Figure-2 shows that the obtained' value of boys (28.1799) and girls (27.6632). These significant at 0.01 and 0.05 level of significance is 2.61 and 1.98 respectively with the df of 138. The computed 't' value of boys and girls are more than table value. The null hypothesis is rejected and directional hypothesis is accepted and it is significant. Therefore, the directional hypothesis is "There exit significant difference between Mathematics Anxiety and Academic Achievement of secondary school students in relation to their gender.

**Objective-3**

For the determining the significance difference in mathematics Anxiety and Academic Achievement of secondary schools students both English medium school students are 70 and Odia medium school students are 70. The mean, Standard Deviation, t-test was calculated by using formula applicable for independent large sample. It is shown in table-3.

**Table-3**  
**Difference between Mathematics Anxiety and Academic Achievement of secondary schools students in relation to English medium school students and Odia medium School students.**

Medium of school	N	Variable	M	SD	df	t-value	Remarks
English medium school	70	Mathematics Anxiety	89.3857	22.962	138	29.0159	Significant
		Academic achievement	454.7714	102.8296			
Odia medium school	70	Mathematics Anxiety	84.6857	13.4397	138	34.3744	Significant
		Academic achievement	375.0143	69.3752			

Table-3 shows that mean of Mathematics anxiety 84.6857 and Academic Achievement 375.0143 of Odia medium school students and English medium school students have Mathematics Anxiety (89.3857) & academic achievement is (454.7714) respectively. It indicates that English medium school students have more Anxiety, but their Academic Anxiety high, because teachers provide remedial classes which through English medium students have high Academic achievement and odia medium school students low Anxiety, but their Academic Achievement have low than the English medium school students.

In order to test hypothesis, the Investigator have computed 't' value to know the significance difference between the mean of English medium school students and odia medium school students on their Mathematics anxiety and Academic Achievement.

**Figure-3**  
**Mean and t-value of Mathematics anxiety and academic achievement of English medium school students and Odia medium school students**

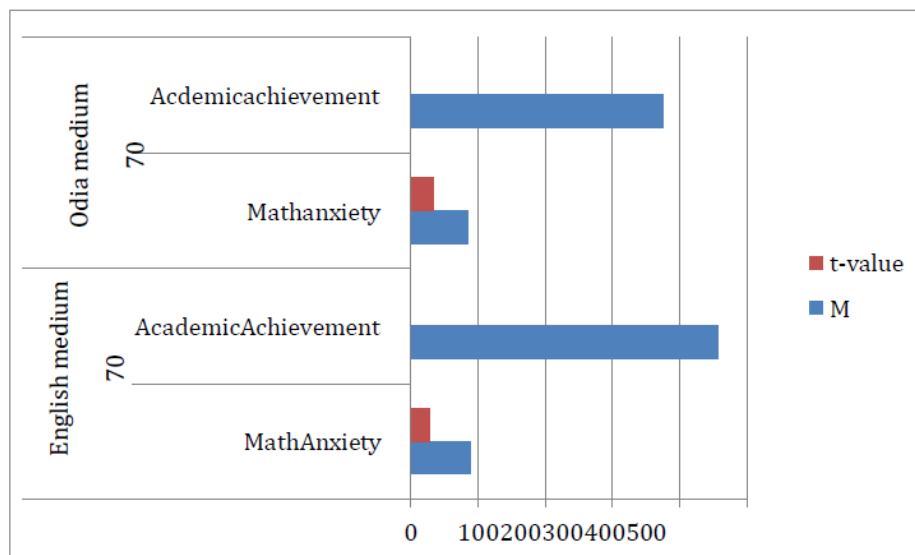


Figure-3 shows that the obtained t-value of Mathematics Anxiety and Academic Achievement of English Medium School students are 34.3744 and Odia Medium School students are 29.01 are significant at 0.01 and 0.05 level of significance is 2.61 and 1.98 respectively with the df of 138. Therefore the directional hypothesis is "There exist significant difference between Mathematics Anxiety and Academic Achievement of secondary school students in relation to their medium of school."

### III. Results

After analysis and interpretation of data it was found that-

1. There is a Negative correlation between Mathematics Anxiety and Academic Achievement of secondary school students. Students who have high mathematics anxiety, their academic achievement is low and those students who have low mathematics anxiety, their academic anxiety is high.
2. The study was found that there is significant difference in Mathematics Anxiety and Academic Achievement in relation to their Gender.
3. The girls are more mathematics anxiety than the boys and boys are more academic achievement than the girls.
4. The study was found that there is significant difference in Mathematics anxiety and academic achievement of English Medium School and Odia Medium School.
5. The study was found that Odia medium school students are low anxious than the English medium school students. Mathematics achievement of English medium school students has more than the Odia medium school students. In this case the English medium school students have more anxiety but their academic achievement is high because the teachers provide remedial classes, they explain simple way, therefore their academic achievement is good.

### IV. Discussion

The findings of the present study has similarity with some research findings which that there was Negative correlation between Mathematics Anxiety and Academic Achievement (Khaliq, 2016u & Kar, 2018). The study has also the similar findings which support that the girls are more anxious than the boys towards Mathematics subject at secondary level.

#### Suggestions for further study

1. This research study was conducted on the students of secondary schools, it is suggested that the same research may be conducted from primary level up to higher secondary and as well as at university level.
2. In this study the investigator selected 70 boys and 70 girls of secondary school students which can be extending the sample size.
3. In this study, the sample was delimited Sambalpur District. It advised to explore the sample in other district.
4. The researcher may be conducted in different subjects other than mathematics.



### **Educational Implication**

1. The findings of the researcher may help to the teachers demonstrate their own interest in mathematics as a means of helping students reduce their mathematics anxiety.
2. The study may help for all the teachers, schools, and parents encouraging those with a vested interest in the success of their students to take in to math anxiety levels before determining effective and appropriate strategies when teaching and learning is carried out. In this way, it is hoped that the level of mathematics phobia can be reduced.

### **V. Conclusion**

In the present study the investigator conclude that Mathematics anxiety and Academic Achievement had Negative correlation and girls have more anxious than the boys. Those students who have high mathematics anxiety they have low academic achievement. Maximum students have above average level among secondary school students. It is necessary to support for Mathematics learning and problem solving to the students. It is expected from the parents, teachers, and educationist that they will motivate students to confront the situation related to mathematics in a confidence manner. The teacher more focus to those students who have high anxiety in Mathematics, he/she solving a math problem through simple and easy examples related to the concept which is helpful for a low achievers students and their math anxiety level should be reduced in this process.

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