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MATHEMATICAL ANXIETY AMONG SECONDARY SCHOOL STUDENTS IN RELATION TO THEIR GENDER, LOCALITY AND TYPES OF SCHOOLS

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ABSTRACT

The major findings of the study were that there is no significant difference in the mathematical test anxieties of secondary school students with regard to their gender has been accepted. In other word it may be expressed that gender does not affect the mathematical test anxiety of secondary school students. The findings are supported by Venkatesh and Karimi (2010) and Devine et al. (2012 conducted research on mathematical anxiety, mathematics performance and overall academic achievement in high school students and found that there is significant difference in mathematical anxiety and academic achievement whereas there is no significant difference between boys and girls in mathematical performance and academic achievement. Similarly, the study found that there is a significant difference in mathematical anxiety among the secondary school students with regard to their gender. Further, it indicates that the level of mathematical numerical anxiety is significant among the boys and girls secondary school students. Therefore, it can be interpreted that the gender affects the mathematical numerical anxiety of secondary school students. It is found there is a significant difference in the numerical anxiety of secondary school students with regard to their locality. Hence, it may be pointed out that locality may affect the mathematical numerical anxiety of secondary school students. The study found that there is no significant difference in the mathematical anxieties of secondary school students with regard to their type of schools. Thus, it can be concluded that the numerical anxiety of government and private secondary school students were found to have no significant difference. Therefore, it can be interpreted that there the school types do not affect the numerical anxiety of secondary school students.

INTRODUCTION

How do children develop the intellectual skills to react and interact with their environment? How so these cognition abilities develop and in what order? These were some of the questions which are answered by French psychologist Jean Piaget in 1952 when he published is ground breaking theory on cognition development in children. Piaget first hypothesis was how children react to their environment? But his observation counter the current thinking of the day (which states that children have no until they are old to learn or to speak) despite of this fact, it had the most and an all influential theory of cognitive development to date. Anxiety is a biological response to protect human beings from. All humans experience normal anxiety at some level and to certain extent. Mathematics is an important subject with broad applicability to everyday life, yet mathematics is often considered as a difficult subject in schools. Mathematics is a core subject and tool for the development of any science-based discipline. These include technology astronomy, graphics, industry and analytical reasoning in daily living. Mathematics is the pillar of all knowledge, showing its relevance to all disciplines. Mathematics is viewed as a valuable tool for academic enhancement and career choice of all individuals regardless of gender and age. Mathematics is important to everyday life. It is described as the queen and servant of sciences. A basic level of mathematics has long been recognized as an essential requirement of everyday life and for most occupations. Efforts have been made at investigating trends of student's achievement in Mathematics as well as factors responsible for the level of such achievement. Some of the reasons attributed to the observed poor achievement in Mathematics as well as factors responsible for the level of such achievement. Some of the reason attributed to the observed poor achievement in Mathematics include; shortage of qualified Mathematics teachers, poor facilities, equipment and instructional material for effective teaching.

CONCEPT OF ANXIETY

The word anxiety is derived from the Latin word 'anxietas' which connotes an experience of varying blends of uncertainty, agitation and dread. It is an unpleasant and aversive state. The individual affected by anxiety is not sure about the causes of this anxiety. According to Collins English dictionary, anxiety is "a state of uneasiness or tension caused by apprehension of possible future misfortune, danger, and worry".

We can say that anxiety is psychological traits which hinder the efficiency of doing any work. Anxiety is also consider as book to an activity. A person who from anxiety may not be able to devote his full energy in the performance of a task. Anxiety is

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feeling similar to fear an experience of alarm, as if something unpleasant were about to happen is anxiety.
young people, creating states of uncertainty and anxiety.

CONCEPT OF MATHEMATICS

The term "Mathematics" is derived from two Greek words: Manthanein and Techne. 'Manthanein' means learning and 'Techne' means art. Mathematics means the art of learning related to disciplines or facilities.

Mathematics is the science of structure, order, and relation that has evolved from elemental practices of counting, measuring, and describing the shapes of objects. It deals with the logical reasoning and quantitative calculation, and its development has involved an increasing degree of idealization and abstraction of its subject matter. In one of the dictionaries it has been given that "*Mathematics is the science of numbers and space"* and also it has been defined as the science of measurement, quantity and magnitude. These definitions clearly indicate that Mathematics is an accepted Science which deals with quantitative aspects of our life and knowledge. It helps us in drawing necessary conclusions and interpreting various ideas with useful meaning.

Mathematics in the real sense is a science of space and quantity that helps in solving the problems of life needing numeration and calculations it provides opportunity for the intellectual gymnastic of the man's inherent powers. It is an exact science and involves high cognitive abilities and powers.

Courtant and Robbins defined mathematics as: "Mathematics as an expression of human mind reflects the active will, the contemplative reason, and the desire for aesthetic perfection. Its basic elements are logic and intuition, analysis and construction, generality and individuality."(1941)

The National Policy on Education (1986) states, 'Mathematics should be visualized as the vehicle to train a child to think, reason, analyses and to articulate logically.

Kant defined it as "Mathematics is the indispensable instrument of all physical resources".

MATHEMATICAL ANXIETY

The academic study of math anxiety originates as early as the 1950s, where Mary Fides Gough introduced the term mathemaphobia to describe the phobia-like feelings of many towards mathematics. The first math anxiety measurement scale was developed by Richardson and Suinn in 1972. Many researches were conducted on math anxiety; some of them are mentioned here: Hembree (1990) conducted a meta-analysis of 151 studies concerning math anxiety. It determined that math anxiety is related to poor math performance on math achievement tests and that math anxiety is related to negative attitudes concerning math. He also suggested that math anxiety is directly connected with math avoidance.

SIGNIFICANCE OF THE STUDY

Anxiety is a normal reaction to certain situations. A small level of anxiety is normal, but sever anxiety can be a serious problem. Due to present developmental age rapid changes are occurring in all aspects of human activities. To keep pace with the changes in the society an individual has to bring some changes in him in anticipation to these societal changes. According to the demand of the changing society, every individual needs to play his role significantly in coping with the changes. The developmental of concepts understanding in mathematics may change the cognitive behavior of human beings in general. Due to the abstract nature of mathematical concepts some students feel fear and anxiety with the subject. At the same time some students show negligence towards this subject. However, mathematics is one of the important subjects since the immemorial.

STATEMENT OF THE PROBLEM

The present study is entitled as "**Mathematical Anxiety among Secondary School Students in Relation to their Gender, Locality and Type of Schools."**

OPERATIONAL DEFINITION OF THE KEY TERMS USED

MATHEMATICAL ANXIETY has been defined as feeling of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life.
Gender means boys and girls students.

LOCALITY is used for making distinction between rural and urban area.

TYPES OF SCHOOL is referred to as Government and private school.

OBJECTIVES OF THE STUDY

1. To compare the mathematical anxiety of secondary school students of Samba block with regard their gender.
2. To compare the mathematical anxiety secondary school students of Samba block with regard to their locality.
3. To compare the mathematical anxiety secondary school students of Samba block with regard to their locality.

HYPOTHESES OF THE STUDY

1) There is no significant difference in the mathematical anxiety of secondary school students with regard to their gender (boys and girls).
2) There is no significant difference in the mathematical anxiety of secondary school students with regard to their locality (urban and rural).
3) There is no significant difference in the mathematical anxiety of secondary school students with regard to their type of schools (Government and Private).

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DELIMITATIONS OF THE STUDY

1. The study was confined to the 9th standard students of Samba block only.
2. The study was delimited to the government and private secondary school of Samba block only.

REVIEW OF RELATED LITERATURE

For the present study, it was not possible for the investigator to get access to entire published and unpublished research in the field but still efforts were made to materialize the ideas discussed earlier. For literature search, the investigator visited different possible sources like; Library, Internet, Journals, Printed, as well as Non Printed Thesis and Dissertations. Also get lots of information regard subject from friends, experts and relatives. The Reviews of the related literature are discussed in Chronological Order:

STUDIES RELATED ON MATHEMATICAL ANXIETY

Wigfield and meece (1988) studied mathematical anxiety in elementary and secondary school students and he found that 9th grade students reported the same worry about the mathematics and 6th grade the least. Girls reported negative affective reactions to mathematics than did boys.

Ashcraft and Kirk (2001) studied the relationship between working memory, mathematical anxiety and performance and he found out individual's high mathematical anxiety demonstrated smaller working memory spans, especially when assessed with a computation based span task. This reduced working memory capacity led to pronounced increase in reaction time and errors when mental addition was performed concurrently with a memory load task.

Tapia (2004) conducted study on the relationship of mathematical anxiety and gender and found that gender had no effect on attitudes towards mathematical anxiety and gender and mathematical anxiety had no influence on attitudes towards math there was an overall significant effect of mathematical anxiety on self confidence, enjoyment and motivation with large effect size. Students with no math anxiety scored significantly higher in enjoyment than studies with high anxiety.

Venkatesh and Karimi (2010) conducted a research on mathematical anxiety, mathematics performance and overall academic achievement in high school students and found that there is significant difference in mathematical anxiety and academic achievement whereas there is no significant difference between boys and girls in mathematical performance and academic achievement.

Erdogen et al. (2011) conducted a study on prediction of high school students' mathematical anxiety by their achievement motivation and social comparison found that achievement motivation and social comparison are significant predictors of high school students' mathematics.

Devine et al. (2012) conducted research on gender differences in mathematical anxiety and relations to mathematics performances while controlling for test anxiety and he found that no gender differences emerged for mathematics performances but levels of mathematical anxiety and test anxiety were higher for girls and boys. Girls and boys showed a positive correlation between mathematical anxiety and test anxiety and negative correlation between mathematical anxiety and mathematics performance test anxiety was also negatively correlated with mathematics performances but this relationship was stronger for girls than boys.

Heciomeroglu (2013) conducted a study on elementary pre service teachers' Mathematical anxiety and mathematics teaching anxiety and results reveals that overall pre service teachers had low level of mathematics anxiety and mathematics teaching anxiety, mathematics anxiety had a statistically effect on mathematics teaching anxiety. Thus, the significant relationship between mathematics anxiety and mathematics teaching anxiety should be acknowledge by mathematics teachers educators.

Carla (2013) conducted a study on relationship between mathematics anxiety and multiple intelligence among rural and sub urban sixth grade students and found that gender has a significant impact on math anxiety and the need for further study to determine the relationship between math anxiety and a person's dominant intelligence.

STUDIES CONDUCTED ON MATHEMATICAL ANXIETY AND GENDER

Aiken (1970) highlighted that "no one would deny that sex can be an important moderator variable in the prediction of achievement from measures of attitude and anxiety". He further stated that "measures of attitude and anxiety may be better predictors of the mathematics achievements of females than that of males".

Betz (1978) and Brush (1978) in their respective studies, reported about gender difference in mathematics anxiety. They reported significant difference in mathematics anxiety of boys and girls.

Preston (1986) took a comprehensive study of mathematics anxiety and its relationship with other variables like sex, college, major, mathematics background, mathematics achievement, mathematics performance, mathematics avoidance, and self rating of mathematics ability. Data was collected from 173 college students in mathematics classroom. As a result of the study it was reported that male and female did not differ in mathematics anxiety levels. He also reported that there was a low relationship between mathematics performance and mathematics anxiety and finally reported that students with high level of mathematics anxiety rated them low on self rating of mathematics ability and higher on self rating of mathematics anxiety.

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Cooper and Robinson (1989) in a similar type of study intended to find out the impact of gender on mathematics anxiety and they found that gender was not the cause for mathematics anxiety among students'. Further, they reported that, gender was not a significant factor for mathematical achievement, ability, and mathematics performance

Meece and Wigfield (1990) while studying mathematics anxiety of elementary and secondary school students found no gender difference in the structure of boys and girls responses to the statements on mathematics anxiety scale. Both boys and girls have responded in similar ways. Boys and girls did not differ on worry dimension, and both groups were equally concerned about doing well in mathematics. However, girls were found having more negative attitude towards Mathematics than the boys.

Garduno (2001) and Pajares and Kranzler (1994) in their study on mathematics self-efficacy and gender they found gender was not an intervening factor for mathematics anxiety among high school students

In a similar study on relationship between gender and mathematics anxiety, Meta analysis was done (Ma, 1999). The result of the study indicated that gender differences were not found statistically significant in mathematics anxiety.

Leily Abadi (2004) conducted a study to determine the level of mathematics anxiety and its relationship with students' self esteem and personality traits of mathematics teachers. MANOVA (multivariate analysis of variance) was used for data analysis. Significant gender difference in mathematics anxiety was reported. It was also reported that boys had more mathematics anxiety than the girls.

Baloglu and Kocak (2006) have highlighted anxiety as one of the most prevalent emotional problems associated with mathematics. In their study they tried to find the relationship between gender and mathematics anxiety. Sample consisted of 759 college students. Revised Mathematics Anxiety Scale (RMARS) and a set of three questions for demographic information were administered on students. As a result of their study, they reported that women have higher mathematics anxiety than men.

Baus and Welch (2008) have studied the effect of gender on mathematics anxiety. Another objective of their study was to find out the amount of variance of gender on mathematics anxiety and mathematics self-efficacy. Result of their study reported that women scored relatively higher (39.29 average) on mathematics anxiety scale than the men (34.50 average). For the next objective they reported that, sex predicted 2% of the variance in mathematics anxiety.

FulyaYuksel-Sahin (2008) in the study of mathematics anxiety among 4th and 5th grade elementary school students investigated the variation in mathematics anxiety according to a group of variables. Sample of the study comprised 249 students. Mathematics Anxiety Scale for Elementary School Students and Personal Information Form were used as tools of data collection.

The variables other than Mathematics anxiety for which effect was observed were gender, grade level, liking Mathematics (subject), and liking teacher (Mathematics). For liking mathematics, information was collected regarding liking the mathematics subject or not liking the mathematics subject from the students.

Student's anxiety was observed and compared by dividing them into two groups who likes their mathematics teacher and one who don't like their mathematics teacher. Result of the study showed a significant difference between mathematics anxiety scores of male and female students ($t=2.11$, $p<0.05$, $df=247$). Female students scored significantly higher ($m=21.42$, $SD=8.94$) than male students' ($m=19.03$, $SD=8.84$).

Chinn (2009) reported gender difference in mathematics anxiety. It was also recorded that mathematics anxiety was rated lower among males than females.

Iossi (2009) on mathematics anxiety of bilingual community college students' data was gathered from 618 students (368 women and 250 men). A test was conducted to see the difference between mean AMAS scores of men and women students'. Mean score on AMAS for women ($M=21.3$ with $SD=7.4$) was significantly different ($t=2.50$) from the mean score, on AMAS for men ($M=19.7$ and $SD=7.7$). It was significant at 0.05 level of significance.

Venkatesh, and Karimi (2010) in their study of mathematics anxiety, mathematics performance and overall academic performance on 424 students (211 males and 213 females), reported a significant gender difference in mathematics anxiety ($t= 4.20$, $p<0.05$; $Mb=63.81$,$Sb=3.13$; $Mg= 69.85$, $Sg=9.37$). Difference in performance of boys and girls in mathematics achievement were not found to be significant ($t=0.27$, $p>0.05$).

Pourmoslemi, Erfani and Firoozfar (2013) took a study on mathematics anxiety, mathematics performance and gender difference among undergraduate students. Sample consisted of 275 undergraduate students (162 women and 113mean). They investigated the relationship between mathematics anxiety and gender. For the purpose of their study, they collected data regarding mathematics anxiety, mathematics evaluation anxiety and total mathematics anxiety. As a result of their study, they reported gender differences in mathematics anxiety among the students. The findings indicated that there is a significant difference between male and female students on the bases of their total mathematics anxiety and learning mathematics anxiety. Mean score for mathematics evaluation anxiety of female students (39.68) was greater than that of male (37.36) but the difference was not found to be significant. Hence this study reported gender difference in mathematics anxiety.

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TOOLS USED FOR DATA COLLECTION

In the present study, MATHEMATICS ANXIETY SCALE prepared and standardized by Dr. Ayatollah Karimi and Prof. S. Venkatesan in the year 2010 was employed to collect the data.

STATISTICAL TECHNIQUES EMPLOYED

The statistical techniques are employed to give concise picture of the whole data for its better comprehensions and in this study suitable statistical procedures and techniques were applied to analyse the data. In the present study the data was analysed by using:

- Mean
- Standard deviation
- Critical ratio/t value
- **ANALYSIS AND INTERPRETATION OF RESULT**

Domain-1 Mathematics Anxiety Test

TABLE.4.1

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Gender (N=260)

Gender	N	Mean	SD	t-value	Level of Significance
Boys	128	45.41	9.20		
Girls	132	45.65	8.85	0.21	0.05

From the table 4.1, it can be clearly observed that the calculated t- value was found to be 0.21 is lesser than the table value 1.96 level; which is not significant at 0.05 level of significance. Therefore, the hypothesis no.1 i.e. there is no significant difference in the mathematical test anxieties of secondary school students with regard to their gender. In other word it may be expressed that gender does not affect the mathematical test anxiety of secondary school students.

TABLE.4.2

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Locality (N=260)

Locality	N	Mean	SD	t-value	Level of significance
Rural	136	46.28	9.71		
Urban	124	44.71	8.14	1.42	0.05

It can be observed from the table 4.2 that the obtained t-value was found to be 1.42 which is less than the table value 1.96 level; which is not significant at 0.05 level of significance. Therefore, the hypothesis that there is no significance difference in the anxieties of secondary school students with regard to their locality (rural and urban) is accepted. It can be concluded that the locality does not affect the mathematical test anxiety among secondary school students. Hence, it can be interpreted that the level of mathematical test anxiety among the secondary school students are same with respect to locality.

TABLE.4.3

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Type of Schools (N=260)

Type of Schools	N	Mean	SD	t-value	Level of significance
Govt.	113	44.77	8.26		
Private	147	46.12	9.53	1.22	0.05

Table 4.3 shows that the calculated t-value was found to be 1.22 which is less than the table value 1.96 levels and is not significant at 0.05 level of significance. Therefore, the hypothesis i.e. there is no significant difference in the mathematical test anxieties of secondary school students with regard to the type of schools. Hence, it can be interpreted that the level of mathematical anxiety among the secondary schools are same with respect to the type of schools.

DOMAIN -ll NUMERICAL ANXIETY

TABLE.4.4

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Gender (N=260)

Gender	N	Mean	SD	t-value	Level of significance
BOYS	128	37.14	8.71		
GIRLS	132	41.73	7.72	4.5	0.05

From the table no.4.4, it can be observed that the obtained t-value was found 4.5 which exceed the table value 1.96 at 0.05 level of significance. Therefore, it can be concluded that there is a significant difference in the mathematical anxiety among the secondary school students with regard to their gender. Further, it indicates that the level of mathematical numerical

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anxiety is significant among the boys and girls secondary school students. Hence, it may be pointed out that hypothesis stating that "There is no significant difference in the mathematical anxieties of secondary schools students with regard to their gender" is rejected at 0.05 level of significance. Therefore, it can be interpreted that the gender affects the mathematical numerical anxiety of secondary school students.

TABLE.4.5

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Locality (N=260)

Locality	N	Mean	SD	t-value	Level of significance
Rural	136	41.77	7.60	4.72	0.05
Urban	124	36.95	8.79		

From the table 4.5, it can be observed that the calculated t-value was found 4.72 which is greater than the table value of 1.96 at 0.05 level of significance. Therefore, it can be concluded that there is a significant difference in the numerical anxiety of secondary school students with regard to their locality. Hence, it may be pointed out that the hypothesis "There is no significant difference in the mathematical anxieties of secondary school students with regard to their locality" is rejected at 0.05 level of significance. Therefore, it can be interpreted that locality may affect the mathematical numerical anxiety of secondary school students.

TABLE.4.6

Significant difference in the mathematical anxieties of Secondary School Students with Regard to Their Type of Schools (N=260)

Type of School	N	Mean	SD	t-value	Level of significance
Govt.	113	39.73	9.16	0.42	0.05
Private	147	39.27	8.02		

The table 4.6 shows that the calculated t- value was found to be 0.42 which is less than the table value 1.96 levels and is not significant at 0.05 level of significance. Therefore, the hypothesis" "There is no significant difference in the mathematical anxieties of secondary school students with regard to their type of schools" has been accepted. Thus, it can be concluded that the numerical anxiety of government and private secondary school students were found to have no significant difference. Therefore, it can be interpreted that there the school types do not affect the numerical anxiety of secondary schools students

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