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A STUDY OF IMPACT OF MATHEMATICS ANXIETY ON MATHEMATICS LEARNING ACHIEVEMENT AND CLASSROOM PARTICIPATION IN MATHEMATICS OF UPPER PRIMARY STUDENTS IN WEST BENGAL

Bijoya Saha

ABSTRACT

Mathematics anxiety and classroom participation in mathematics are two potential variables which may impact on learning achievement in mathematics in different ways.

Aim of The Study

This study aimed to find out the impact of mathematics anxiety on learning achievement and classroom participation in mathematics of upper primary students.

Methodology

200 students of classes VII and VIII (WBBSE) were selected through stratified randomly sampling method form urban and rural areas of Kolkata and South 24 parganas districts. Mathematics Anxiety Scale and Mathematics Classroom Participation Scale were used to collect data. Appropriate statistical techniques were used to obtain the results.

Results

Level of mathematics anxiety of girls is higher than boys, learning achievement in mathematics of boys is higher than girls, impact of mathematics anxiety on the classroom participation of boys is higher than girls, significant difference does exist in the mathematics anxiety of students in respect to location, learning achievement in mathematics differs significantly with respect to location (urban and rural areas) and mathematics anxiety differs significantly with type of schools (government sponsored and private) and learning achievement in mathematics differs significantly with type of schools (government sponsored and private).

KEYWORDS: Mathematics Anxiety, Classroom Participation in mathematics and Learning achievement in Mathematics

Assistant Professor, Department of Education, Calcutta Girl's College, 3, Goaltuli Lane, Kolkata, West Bengal

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INTRODUCTION

Etymologically the term 'Mathematics was derived from two Greek words: 'Manthanein' which means 'learning and 'Techne' which means 'an art or technique'. The dictionary meaning of mathematics is that 'it is either the science of number and space or the science of measurement, quantity and magnitude'. Mathematics is thus defined as the science of quantity, measurement and spatial relations. It is a systematised, organised and exact branch of science. It deals with quantitative facts, relationships as well as with problems involving space and form. It is a logical study of shape, arrangement, and quantity. In Sanskrit, it is called-Ganita Shastra. It means science of counting and calculations for the benefit of mankind.

According to Plato "Mathematics is the subject which provides an opportunity for the training of mind to close thinking, stirring up a sleeping and unstructured spirit".

According to Servais - "Mathematics is an abstract science - it is the science of abstraction. Learning mathematics is learning to abstract, to handle abstractions and to use it. "

According to Courant and Robbins - "Mathematics is an expression of human mind that 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".

The National Policy on Education (NPE) (1986) stated "Mathematics should be visualized as the vehicle to train a child to think, reason, analyse and to articulate logically".

Characteristics of mathematics

a. Mathematics should make use of conventional signs and symbols.
b. Every word or symbol used in mathematics should have a definite purpose.
c. Mathematics language should be clear and

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unambiguous.
d. As far as possible, the statement of mathematics should be simple and brief.

Theoretical Framework of Relationship between Mathematics Anxiety and Learning achievement in Mathematics

The relationship between Mathematics Anxiety and Learning achievement in Mathematics can be described in the following with three different theories like a) The Deficit Theory of James Collins, b) The Deleterious Anxiety Model and Debilitating Anxiety model of Dewey Larson and c) The Reciprocal Theory.

a. The Deficit Theory

The Deficit Theory suggests that students 'who start out with poorer mathematics learning achievement are more likely to develop mathematics anxiety'. For example students with mathematics anxiety might have problems with basic numerical processing (number sense), indicating that perhaps their learning achievement in mathematics was impaired at a very early stage (i.e. before they developed mathematics anxiety). Genetic evidence has also been found which indicates that some of the variation in mathematics anxiety can be explained by genes which affect a person's mathematics learning achievement. The diagram of this theory is following figure1.

Figure 1: The Deficit Theory

b. The Debilitating Anxiety Model

The profounder of this theory was Dewey Larson. In this theory mathematics anxiety may have an effect on mathematics learning achievement at several different levels. Firstly, evidence suggests that students with mathematics anxiety are less willing to engage with mathematics tasks at all. For example, people with mathematics anxiety are less likely to enrol in mathematics classes, and have a tendency to answer questions quickly but inaccurately (perhaps due to trying to escape 'the anxiety-inducing mathematics situation'). This suggests a tendency towards mathematics avoidance in those with mathematics anxiety, which has a negative impact on both learning opportunities and recall in tests.

Secondly, students are engaged in mathematics tasks, mathematics anxiety might act to distract them from what they are trying to learn or remember. The idea that anxiety could interfere with learning and recall is known as 'cognitive interference'– anxiety generates distracting thoughts and sensations which affect memory capacity. This idea suggesting that those with higher mathematics anxiety have poorer working memory (memory used to store, process and manipulate information), and that those with mathematics anxiety do especially poorly in questions which require a high level of working memory to solve. Theory claims that anxiety reduces learning achievement by affecting the pre-processing, processing, and retrieval of information. The Debilitating Anxiety Model also suggests the link between mathematics anxiety and mathematics learning achievement is driven by anxiety and devastating consequences in the learning and recalling of mathematics skills. Other studies have people do a task aimed to reduce mathematics anxiety, and have observed an immediate learning achievement increase. The diagram of this theory is following figure2.

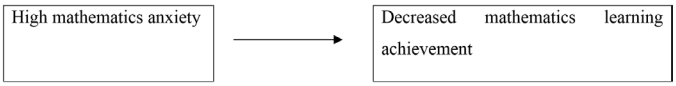

Figure 2: The Debilitating Anxiety Model

c. The Reciprocal Theory

The mixture of evidence for each of the two theories suggests that in fact they might both play a part in the relationship between mathematics anxiety and learning achievement in mathematics. That is, mathematics anxiety might cause decreased learning achievement in mathematics and poorer learning achievement in mathematics might elicit mathematics anxiety. The relationship between mathematics anxiety and mathematics learning achievement operates in both directions. Whilst few studies find explicit proof of a bidirectional relationship, this could be because the two different directions are each best supported by different kinds of study. The effect of mathematics anxiety on learning achievement in mathematics seems to most easily be observed in studies which change a person's mathematics anxiety (in the short term) and see if this affects their learning achievement in mathematics. On the other hand, longitudinal (long term) studies find it easier to see the effect which learning achievement in mathematics has on future mathematics anxiety. The diagram of this theory is following figure 3.

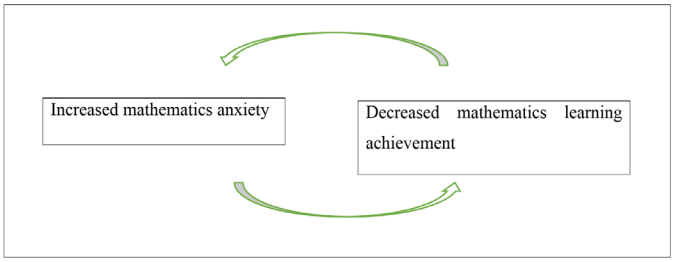

Figure 3: The Reciprocal Theory

Theoretical Framework of Relationship between Mathematics Anxiety and Classroom Participation in Mathematics

Mathematics anxiety seems to be main determiner of mathematics achievement and success in participation in mathematics classroom. When students have high mathematics anxiety levels they can't pay attention in mathematics and they fail in performing mathematics task in classroom. Participation in mathematics classrooms may be particularly anxiety-inducing for students because of the high frequency of situations that could induce a student's fear of failure. Anxiety has been described as a multifaceted reaction to the threat of failure; the idea of failure can be especially devastating when mathematics students put effort into a mathematics task because it can imply that they have a low ability or are incompetent, which threatens their self-worth (Covington 1992). Students often fear failure when their mathematics academic ability is evaluated (Stipek 1993), which has been termed mathematics

achievement anxiety (Covington 1992). Students' mathematics academic abilities are commonly evaluated by assessing their learning achievement on mathematics task such as a quiz or exam (Covington 1992; Stipek 1993); these situations are referred to as evaluative situations.

Nearly all students' mathematics courses have evaluative situations where student achievement anxiety can be activated; the most common evaluative situations in most students courses are exams (Covington 1992). However, participation in mathematics typically has a greater number of evaluative situations compared to traditional lecture courses because of a larger number of assignments and activities during mathematics class. Students can experience mathematics achievement anxiety when they evaluate their own learning, such as when a student is working on in mathematics class assignment and realizes that he or she is unable to solve a problem. Students can also experience mathematics achievement anxiety when they are evaluated by other students or the instructor. For example, answering a mathematics question posed by an instructor can instigate mathematics achievement anxiety, especially if the student does not know the correct answer and worries about the instructor's opinion of them.

Need of the Study

Mathematics anxiety occurred in all levels of education starting from primary school to higher education, and once established, persisted in life, interfering with everyday activities involving numeracy and further learning in mathematics. Early detection of mathematics anxiety among students and to reduce the mathematics anxiety is very important. Students needed to present the mathematics class, so that all those who were in the educational institutions would be able to help students in the control and dealing with the level of mathematics anxiety. Increase the participation in mathematics class, would lead to mathematics learning achievement. Students' realized that their knowledge and understanding of mathematics would improve if they participated in mathematics class more frequently. There is a difference between solve any kinds of problem of mathematics independently and jointly by the students. In case of later students get opportunity to have ample amount of resources and share knowledge and ideas deeply and meaningfully with other students in the mathematics class and also they can easily solve the mathematics problems which would decrease the anxiety of mathematics. Direct participation in the mathematics class students' can sharing of each other mathematics difficulties, accepting criticism as they themselves are also allowed to criticize others, taking responsibility of one's own 'mathematics learning, engaging themselves in meaningful mathematics discussion, develop interpersonal relationship. It also helps in mathematics learning with understanding and joy, gaining confidence and reduces their mathematics anxiety when their peers jointly try to solve mathematics problems. This study will help the educationists, principal of schools, teachers and also investigators to understand on how the mathematics anxiety related with learning achievement in mathematics.

Study of relevant literature

Atoyebi et al. (2023)explored The Impact of Mathematics Anxiety on the Mathematical Value of Secondary School Students in Nigeria. 'This study examined the impact of mathematics anxiety on the mathematical value of secondary school students in Nigeria, focusing on senior secondary schools in the West of Nigeria. To achieve the objective of this quantitative study, two thousand nine hundred thirty-nine senior secondary school students were selected using convenience and purposive sampling techniques. The primary data was collected using a questionnaire that was administered through Google Forms. Simple linear regression was used to analyse the four variables (Critical Thinking in Mathematics, Rationality in Mathematics, Control in Mathematics, and Mathematics Anxiety) identified through factor analysis. This study found that mathematics anxiety significantly negatively impacts the rationality of decision-making among secondary school students in the southwest of Nigeria; there is a significant relationship between mathematics anxiety and the critical thinking abilities of secondary school students in the southwest of Nigeria. Mathematics anxiety significantly negatively influences the ability to control mathematical concepts among senior secondary schools in the West of Nigeria. This study concludes that mathematics anxiety significantly and negatively impacts the mathematical value of secondary school students in Nigeria. The findings have practical implications for educators, policymakers, and curriculum developers, emphasising the need for a holistic approach to education that recognises the emotional well-being of students alongside their cognitive development'.

Caviola et al. (2022) conducted a study on Math Learning achievement and Academic Anxiety Forms, from Sociodemographic to Cognitive Aspects: a Meta-analysis on 906,311 Participants. 'The relationship between anxiety and mathematics has often been investigated in the literature. Different forms of anxiety have been evaluated, with math anxiety (MA) and test anxiety (TA) consistently being associated with various aspects of mathematics. In this meta-analysis, researcher has evaluated the impact of these forms of anxiety, distinguishing between different types of mathematical tasks. In investigating this relationship, researcher have also included potential moderators, such as age, gender, working memory, type of task, and type of material. One hundred seventy-seven studies met the inclusion criteria, providing an overall sample of 906,311 participants. Results showed that both MA and TA had a significant impact on mathematics. Sociodemographic factors had modest moderating effects. Working memory (WM) also mediated the relationship between MAand TA with mathematics; however, this indirect effect was weak'.

Josepha and Rodriguesb (2021) made a study on An Investigation on Grade VIII Students' Mathematical Self-Efficacy and Math Anxiety. 'This quantitative research study aimed to investigate the mathematical self-efficacy and mathematics anxiety among grade VIII students' of Karachi across gender and school systems. The study explored the subscales of self-efficacy and math anxiety (i.e. general mathematical self- efficacy, test anxiety factor, future anxiety and classroom anxiety). Mathematical Self-Efficacy and Math Anxiety (MSEMA) questionnaire (May, 2009) for finding out

various factors which influence mathematical self-efficacy and mathematics anxiety was used. Data from six private community and nine government schools in Karachi were collected and an independent samples t- test was used to compare differences across gender and school systems. On the whole, results revealed that male students showed greater mathematical self-efficacy than female students. The government school students displayed more self- efficacy and less anxiety towards mathematics in comparison to the private community school students. The study recommends a student centred approach which serves the purpose of providing effective classroom activities that encourages students' motivation, interest and added learning achievement. Furthermore, qualitative research studies are needed to identify the reasons for students' mathematical anxiety and address these in order for schools and educators to teach mathematics in an enjoyable manner'.

Siaw et al. (2021) carried on Understanding the Relationship between Students' Mathematics Anxiety Levels and Mathematics Learning achievements at the Foundation Level. 'The aim of the study is to investigate the relationship between mathematics anxiety levels and students' mathematics learning achievements at the foundation level. A sample of 545 students from a local foundation Centre was chosen for this study. Data collection via questionnaire was used where quantitative data were analyzed using correlation, t-test, and descriptive analyses. The results showed that there was a weak positive correlation between students' anxiety levels and the students'mathematics learning achievement in their final examination. Recommendations and future potential for this study were further discussed in this paper'.

Acevedo et al. (2020) observed that Relationship between mathematical anxiety and academic learning achievement in mathematics in high school students. 'The objective of this correlational research is to identify the relation between mathematical anxiety and academic learning achievement in the area of mathematics by analyzing the answers to the Fennema – Sherman mathematical anxiety scale (.88 confidence level) given by 127 secondary school students (68 girls and 59 boys) with an average age of 14.34 years old. The GPA of students was 4.1, a high GPA according to the criteria of the Colombian Ministry of National Education. Furthermore, girls obtained a higher GPA than boys although their level of anxiety was higher too. Regarding the relation between mathematical anxiety and academic learning achievement in the area of mathematics, this study shows that they are inversely related, that is, the greater the anxiety, the lower the academic learning achievement. As a result of this study, the staffs of school directors was suggested to design a program to modify the emotional responses of students, considering the fact that girls are influenced by affection – related factors with regard to the mathematical learning process'.

Bature et al. (2020) worked on Investigating the Perception of Senior Secondary School Students on the Role of Classroom Engagement in Mathematics Problem Solving. 'This study was designed to investigate the perception of students on the role of classroom engagement in student's problem solving in mathematics. Specifically, the study investigated the perception of 6 students taught by 4 mathematics teachers in 2 secondary schools in Nigeria for a period of 2 years. Two research objectives were developed to guide the study. Research journal and video recordings were used to document the focus group discussions and classroom observations. The findings of the study suggested that the mathematics teachers made positive effort to use the engagement strategy as a tool to increase students' problem solving abilities during mathematics classroom instruction. In addition, the result of the study suggested a positive increase in students' problem-solving skills. This was evident in students' engagement in collaboration, participation, increase in positive relationships that existed between students and their teachers. The study also suggested that the mathematics teachers created positive classroom atmosphere for students' participation in classrooms problem solving. It also suggests that teachers provided inclusive support for students' problem solving in mathematics and provided evidence of general traditional teacher centered learning in mathematics as opposed to student-centered learning among the students'.

Yang, X. (2013) constructed a study on Senior Secondary Students' Perceptions of Mathematics Classroom Learning Environments in China and Their Attitudes Towards Mathematics. This research paper investigated how senior secondary school students in China perceived their mathematics classroom environments and the relationship between their perceptions and attitudes towards mathematics. The widely used "What Is Happening In This Classroom'? questionnaire was adapted and data were collected from Grade 10, Grade 11, and Grade 12 students from 75 classrooms in six provinces in China. These senior secondary students generally did not perceive their mathematics classroom environments very favorably and did not hold positive attitudes towards mathematics. Result found that- positive correlations between mathematics classroom learning environments and attitudes towards mathematics were identified. Positive correlations between mathematics classroom learning environments and attitudes towards mathematics were identified. Gender differences and grade differences of students' perceptions of their classroom learning environments were found.

Ewing (2007) made a study on Participation and Non-Participation in Mathematics Classrooms. This paper discussed the use of critical discourse theory and a social theory of learning and participation in mathematics. In doing so, the important elements of these theories, which was, discourse, discursive practice, and subject position, have been linked to identity, participation and non-participation in classrooms. This articulation serves as a framework for understanding the complexity of practices in mathematics classrooms. It also serves as the platform to further understand the practices influential to participation and non-participation in and from such learning communities. The paper draws on several accounts from a larger study of students' accounts of their experiences of learning mathematics.

Critical Appraisal of study of relevant literature

The review of literature also explored major research gap which is not covered even now. Some of them have been mentioned in below.

1. Few previous investigators were emphasized in the relationship between mathematics anxiety and mathematics achievement in the respect of age, gender, location, teaching-learning environment and strategies etc. also few investigators were emphasized the impact of mathematics anxiety on the classroom participation
2. Most of the research paper has been conducted on mathematics anxiety in abroad and very few have been conducted in perspective of upper primary students of West Bengal.
3. Although previous research indicated that there is a close relationship between mathematics anxiety and learning achievement in mathematics, but this relationship varied in different research.

Realizing these problems or research gaps and inspired by these facts the present research has formulated.

METHODOLOGY

Objectives of the Study

The study has been conducted based on the following objectives.

1. To study the Level of Mathematics Anxiety of Upper Primary Students.
2. To study the Impact of Mathematics Anxiety on the Learning achievement in Mathematics of Upper Primary Students.
3. To study the Impact of Mathematics Anxiety on the Classroom Participation of Upper Primary Students.
4. To study the Difference in the Level of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas.
5. To study the Difference in the Learning achievement in Mathematics in Urban and Rural Areas.
6. To study the Difference in the Mathematics Anxiety of Upper Primary Students between the Government Sponsored and Private Schools.
7. To study the Difference in the Learning achievement in Mathematics of Upper Primary students between the Government Sponsored and Private Schools.

Null Hypotheses of the Study

In this research paper following null hypotheses were formulated on the basis of above-mentioned objectives number of 4, 5, 6 and 7-

Ho1: There is no Significant Difference in the Level of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas.

Ho2: There is no Significant Difference in the Learning achievement in Mathematics in Urban and Rural Areas.

Ho3: There is no Significant Difference in the Mathematics Anxiety of Upper Primary Students between the Government Sponsored and Private Schools.

Ho4: There is no Significant Difference in the Learning achievement in Mathematics of Upper Primary Students between the Government Sponsored and Private schools.

Research Design

In this research paper Descriptive Survey research design was used.

Operational Definition of the Key terms

a. Impact

Impact means the point of effect of one variable on another. In the present research paper Mathematics Anxiety impact on learning achievement in Mathematics and Classroom Participation in Mathematics.

b. Mathematics Anxiety

In this research paper, Mathematics Anxiety means- apprehensive, tense/ stressed, anxious, feeling of fear and avoidance when dealing with any situation relating to mathematics.

c. Impact of Mathematics Anxiety

In this research paper Impact of Mathematics Anxiety means feelings of apprehension and tension concerning manipulation of numbers and completion of Mathematical problems in various contexts.

d. Learning achievement in Mathematics

Marks obtained in Mathematics of the annual examination of classes VII and VIII Upper Primary students are considered as Learning achievement in Mathematics in this research paper.

e. Classroom Participation

In this research paper Classroom Participation means it is a feature of many course designs. It can result in insightful comments and interesting connections being made by upper primary students and can foster a high level of energy and enthusiasm in the classroom environment.

f. Upper Primary Students

In this research paper the upper primary students mean class VII and VIII students of Bengali medium schools under the West Bengal Board of Secondary Education.

Delimitations of the Study

In this research paper researcher has selected to only upper primary students of 200, only VII and VIII grade students of both sexes (100 boys and 100 girls) from WBBSE (West Bengal Board of Secondary Education) of study of Bengali medium schools from Kolkata as urban area and South 24 Parganas district as rural area in the West Bengal.

Variables

Independent Variable

A. Mathematics Anxiety. B) Sex (boys and girls). C) Location (urban and rural areas). D) Classroom Participation. E) Type of schools (government sponsored and private)

Dependent Variable

A. Learning achievement in Mathematics.

Population

The population of this research paper is Government Sponsored and Private Upper Primary Students of classes VII and VIII of both urban and rural areas in the West Bengal.

Sample

200 students of classes VII and VIII of both sexes of urban and rural areas was selected as sample. All samples were selected from Kolkata as urban area and South 24 Parganas district as rural area of the West Bengal.

Sampling Technique

For the students' selection, stratified random sampling technique was followed and random sampling method was followed for the selection of schools.

Instruments

To collect the data related to, 14 items standardised Mathematics Anxiety Scale (MAS) constructed by Mahmood and Khatoon (2011) which has split- half reliability of 0.89.

Progress Report Register of the School means the annual marks of mathematics obtained by classes VII and VIII of upper primary students in the West Bengal Board of Secondary Education was used for Learning achievement in Mathematics.

Mathematics Classroom Participation Scale tools have been prepared by the researcher, which is 25 items and its Cronbach's alpha coefficient score was 0.78 and also it was found to possess content and construct validity.

Statistical analysis

Descriptive Statistics like Mean, Standard Deviation (S.D.) and Inferential Statistics like 't'- test was used in this research paper.

Outcomes

Objective 1. To study the Level of Mathematics Anxiety of Upper Primary Students.

Gender	N	Mean	S.D.
Boys	100	40.23	5.51
Girls	100	45.78	6.60

Table 1: Mathematics Anxiety of Upper Primary Students

Table1 describe that the mean and S.D. of mathematics anxiety scores of upper primary students of both boys (N=100) and girls (N=100).Through the mean score of the girls reveal high score (M=45.78) with S.D.= 6.60 than the boys (M=40.23) with S.D.=5.51. Based on the present research paper it can be assumed that girls are not interested to learn the mathematics and generally they avoid the classes of mathematics.

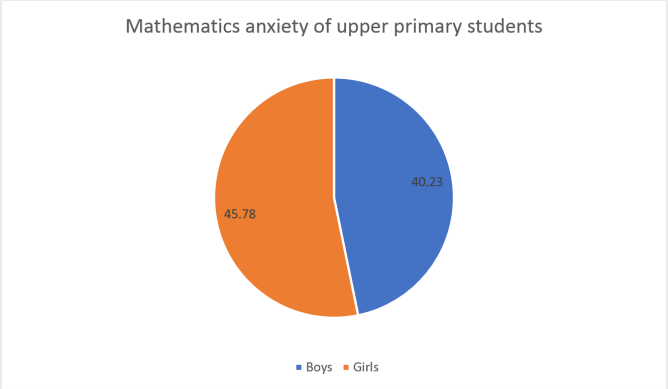

Figure 4: Graphical representation of Mathematics Anxiety of Upper Primary Students

From figure 4 shows a significant comparison could be drawn in mathematics anxiety between both boys and girls of upper primary students. It is clear that girls' students mathematics anxiety are higher than boys' students. Similar results were found in Halder and Chatterjee (2024), Srivastava et al. (2016), Kathuria (2021) in mathematics anxiety studies.

Objective 2. To study the Impact of Mathematics Anxiety on the Learning achievement in Mathematics of Upper Primary Students.

Gender	N	Mean	S.D.
Boys	100	55.21	7.29
Girls	100	41.89	6.52

Table 2: Learning achievement in Mathematics of Upper Primary Students

Table2 describe that the mean and S.D. of learning achievement in mathematics scores of upper primary students of both boys (N=100) and girls (N=100). Though the mean score of the boys shows high score (M=55.21) with S.D.= 7.29 than the girls (M=41.89) with S.D.= 6.52. Based on the present research paper it can be presumed that girls are not interested to learn the mathematics and generally they can't do good learning achievement in mathematics.

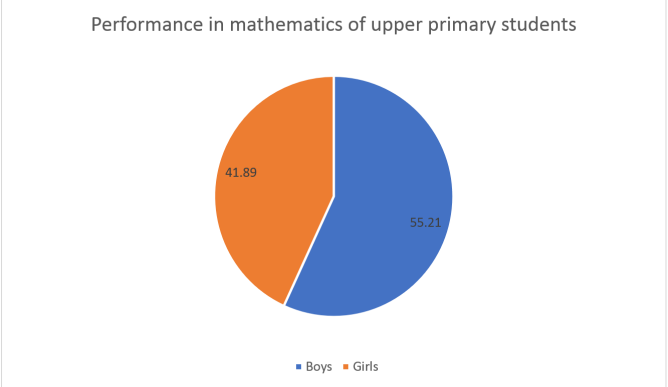

Figure 5: Graphical representation of Learning achievement in Mathematics of Upper Primary Students

From figure 5 a significant comparison could be drawn in learning achievement in mathematics between both boys' and girls' of upper primary students. It is clear that boys' students obtained better score than girls' students. Similar outcomes were found in the Ghasemi et al. (2019), Gulnaz and Fatima (2019), Mulenga et al. (2024) in learning achievement in mathematics studies.

Objective 3. To study the Impact of Mathematics Anxiety on the Classroom Participation of Upper Primary Students.

Gender	N	Mean	S.D.
Boys	100	42.28	8.45
Girls	100	39.89	7.64

Table 3 Mathematics Anxiety on the Classroom Participation of Upper Primary Students

Table 3 illustrate that the mean and S.D. of the classroom participation scores of upper primary students of both boys (N=100) and girls (N=100). Though the mean score of the boys indicates high score (M=42.28) with S.D.=8.45 than the girls (M=39.89) with S.D.=7.64. Based on the present study it can be assumed that boys are interested to learn the mathematics and generally they do not avoid the classroom participation in mathematics.

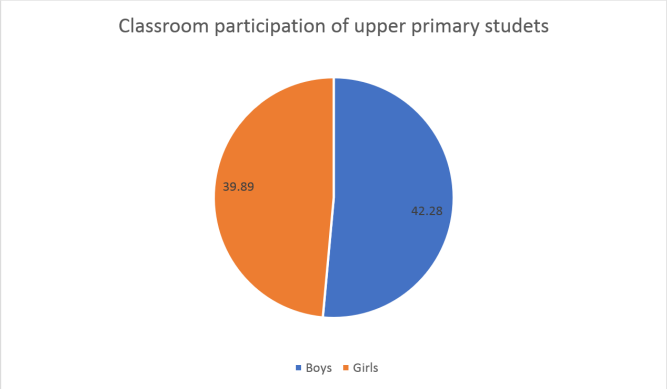

Figure 6: Graphical representation of Classroom Participation of Upper Primary Students

Objective 4 To study the Difference in the Level of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas.

Ho1. There is no Significant Difference in the Level of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas.

Variable	Urban (N=100)	Rural (N=100)	't' value	df	Table value
Mathematics Anxiety	M=23.45 S.D.=7.06	M=25.01 S.D.=8.36	2.04*	198	1.96

*Significant at 0.05 level

Table 4: Difference in the Level of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas

Table 4 describe that the location wise (urban and rural areas) difference in mean, S.D. and t- Scores of mathematics anxiety of upper primary students. Though the mean score is high of rural areas than the urban areas also the t- value (t=2.04) with degrees of freedom (df) is 198 showed significant difference in mathematics anxiety between the two groups (urban and rural areas).So, the null hypothesis is rejected. Thus, there is significant difference in the mathematics anxiety of upper primary students in respect to location.

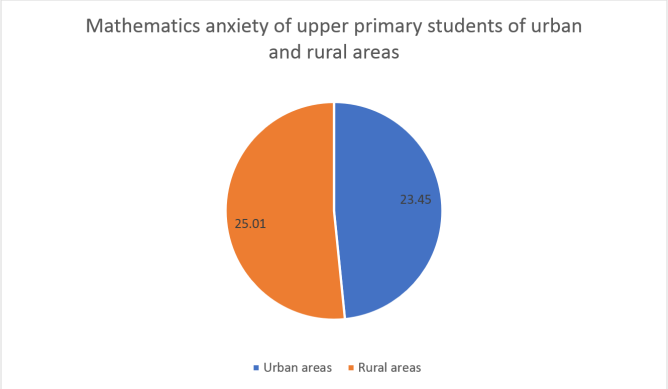

Figure 7: Graphical representation of Mathematics Anxiety of Upper Primary Students of Urban and Rural Areas

The graphical distribution (figure 7) also gives a picture the difference in the mathematics anxiety of urban and rural areas. The mean value of rural areas (M= 25.01) is high than the urban areas (M= 23.45). Although, there is significant difference in the mathematics anxiety of urban and rural areas. Dissimilar study was found on Halder and Chatterjee (2024) study of mathematics anxiety in respect to location.

Objective 5. To study the Difference in the Learning achievement in Mathematics in Urban and Rural Areas

Ho2. There is no Significant Difference in the Learning achievement in Mathematics in Urban and Rural Areas

Variable	Urban (N=100)	Rural (N=100)	't' value	df	Table value
Learning achievement in Mathematics	M= 29.05 S.D.=7.02	M=24.65 S.D.=6.12	2.64**	198	2.62

** Significant at 0.01 level

Table 5: Difference in the Learning achievement in Mathematics in Urban and Rural Areas

Table 5 describe that the mean, S.D. and t Scores of the learning achievement in mathematics of upper primary students of urban and rural areas. The mean score indicated differences in both urban (M=29.05 with S.D.= 7.02) and rural (M=24.65 with S.D.=6.12) areas but t score also showed difference in both variables. Based on the above table it reveals that the upper primary students of urban area get lots of educational facilities than the rural areas.

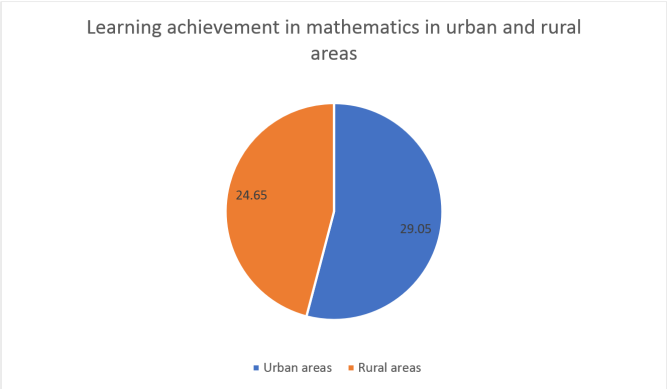

Figure 8: Graphical representation of the Learning achievement in Mathematics in Urban and Rural Areas

The graphical distribution (figure 8) also gives a picture the difference in the learning achievement in mathematics of urban and rural areas. The mean value of urban areas (M= 29.05) is higher than the rural areas (M= 24.65). Although, there is significant difference of the learning achievement in mathematics in urban and rural areas supporting Ahmed et al. (2020) study.

Objective 6. To study the Difference in the Mathematics Anxiety of Upper Primary Students between the Government Sponsored and Private Schools.

Ho3. There is no Significant Difference in the Mathematics Anxiety of Upper Primary Students between the Government Sponsored and Private Schools.

Variable	Government Sponsored Schools (N=100)	Private Schools (N=100)	't' value	df	Table value
Mathematics Anxiety	M= 37.02 S.D.=3.21	M=30.46 S.D.=4.01	2.21*	198	1.96

*Significant at 0.05 level

Table 6: Difference in the Mathematics Anxiety of Upper Primary Students between the Government Sponsored and Private Schools

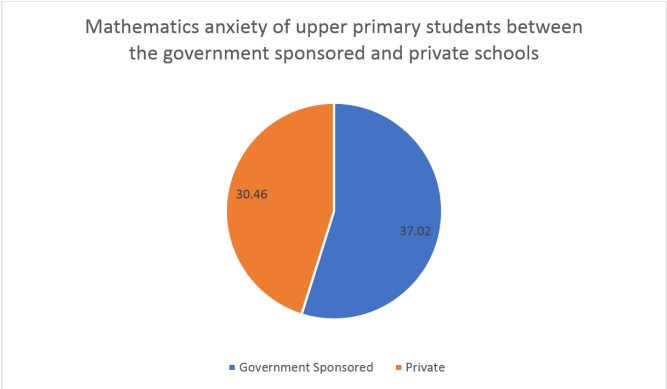

Figure 9: Graphical representation of difference in the Mathematics Anxiety of Upper Primary Students between the Government sponsored and Private Schools

The graphical distribution (figure 9) also gives a picture the difference in the mathematics anxiety of upper primary students between the government sponsored and private schools. The mean value of government sponsored (M= 37.02) is higher than the private schools (M= 30.46). Although, there is significant difference in the mathematics anxiety of upper primary students between the government sponsored and private schools. Based on the above results it can be assumed that the school environment (like teaching learning process, evaluation method, teacher-parent interaction, infrastructures of school, location of school etc) is favourable of the private schools than the government sponsored schools. The above results also match Awasthi et al. (2015), Srivastava et al. (2016), Kathuria (2021) studies in mathematics anxiety in respect to type of schools.

Objective 7. To study the Difference in the Learning achievement in Mathematics of Upper Primary Students between the Government Sponsored and Private Schools.

Ho4. There is no Significant Difference in the Learning achievement in Mathematics of Upper Primary Students between the Government Sponsored and Private Schools.

Variable	Government Sponsored Schools (N=100)	Private Schools (N=100)	't' value	df	Table value
Learning achievement in Mathematics	M= 39.52 S.D.=3.58	M=42.32 S.D.=4.12	2.38*	198	1.96

*Significant at 0.05 level

Table 7: Difference in the Learning achievement in Mathematics of Upper Primary Students between the Government Sponsored and Private Schools

Table 7 interpret that the mean, S.D. and t scores of the learning achievement in mathematics of upper primary students of the government sponsored and private schools. The mean score indicated differences between private (M=42.32 with S.D. = 4.12) schools and government sponsored (M=39.52 with S.D. = 3.58) schools. Also, t-score showed there is significant difference in the learning achievement in mathematics of upper primary students between the government sponsored and private schools.

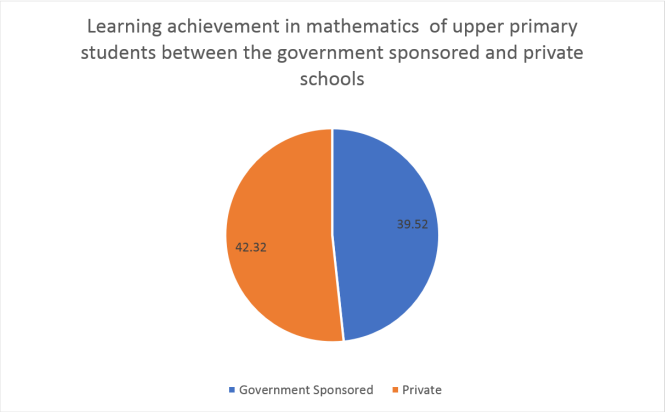

Figure 10: Graphical representation of difference in the Learning achievement in Mathematics of Upper Primary Students between the Government sponsored and Private Schools

The graphical distribution (figure10) also gives a picture the difference in the learning achievement in mathematics of upper primary students between the government sponsored and private schools. The mean value of private schools (M= 42.32) is higher than government sponsored (M= 39.52) schools. Although, there is significant difference in the learning achievement in mathematics of upper primary students between the government sponsored and private schools. The above results supported Khun-Inkeeree et al. (2016), Kumar and Choudhury (2021), Saha and Kalita (2013), Borah (2021), Azigwe et al (2016), Ahmed et al. (2020) studies of learning achievement in mathematics in respect of type of schools.

Recommendation for further research

- A comparative study of Learning achievement in Mathematics and Mathematics Anxiety and Classroom Participation between the West Bengal Board of Secondary Education (WBBSE) and Central Board of Secondary Education (CBSE), Central Board of Secondary Education (CBSE) and Indian Certificate of Secondary Education (ICSE), West Bengal Board of Secondary Education (WBBSE) and Indian Certificate of Secondary Education (ICSE) board may be conducted.
- A comparative study of different Technological Classroom Teaching Method may be conducted on Students of different Boards of Education.
- For the present research necessary 200 data were collected from upper primary students in WBBSE. Similar study may be conducted on the larger sample and other classes.
- Present study researcher only focused on Bengali medium students. Research may be conducted in future on other cultural groups of students because India is a various culturally society.
- In order to understand teaching practices, a study should be done on traditional and non-traditional teaching practices and their effects on student's mathematical learning achievement and mathematical anxiety.
- A qualitative study such as interviews with teachers, principals, counsellors, parents, and with participants may lead to better understanding of the relationship between mathematics anxiety and mathematics learning achievement.

Limitation of the study

The following limitations of this study were realized-

- This study was restricted the Government Sponsor and Private schools under the West Bengal Board of Secondary Education. Not select other boards such as Central Board of Secondary (CBSE) and Indian Certificate of Secondary Education (ICSE). This refrains the researcher in generalizing results of this study to all the Secondary Schools from Urban Area Kolkata City and from Rural Area South 24 parganas District.
- Another drawback is the learning achievement in mathematics is a broad concept and it may be affected by numerous factors but only five independent variables were investigated like Mathematics Anxiety, Gender (boys and girls), Location (urban and rural areas), Classroom Participation, and Type of schools (Government Sponsored and Private Schools).

CONCLUSION

Concerning the above results of the study, the following conclusions were drawn-

Classroom participation is positively related to learning achievement in mathematics but mathematics anxiety is negatively related with learning achievement in mathematics. This means that increase the scores of classroom participation would increase the scores of learning achievement in mathematics. But, the increase of score of mathematics anxiety would lead to decrease the score of learning achievement in mathematics.

In the time of data collection, researcher observed that upper primary students showed unusually getting nervous when they were doing or thinking mathematics. They also think that he or she is the only one unqualified student who is not solves the mathematics solutions, even if the mathematics is extremely complicated. Some of them believe that they are naturally not good in mathematics and always will be so he or she not interest to improve themselves. Furthermore, students showed lack of confidence in doing mathematics, so they depend on other people for solving mathematics for him or her. Finally, researcher also observed that the mathematics classroom becomes a significant source of stress for the upper primary students due to the curriculum structure, mathematics teacher's negative attitude, poor teaching methods, lack of child-friendly environment etc especially government sponsored schools.

On the basis of above observation of mathematics anxiety of upper primary student's researcher suggest the following tips to overcome the mathematics anxiety-

- Build a positive environment from the childhood stage for reducing mathematics anxiety.
- Motivate the child to tackle in mathematics.
- Join the parent-teacher meeting and visit school as frequently as possible.
- Introduce the child into mathematics teaching aids.

- Create close student-teacher relationship.
- Students should regularly participate the mathematics class and regularly practice the mathematics.
- Not to compare the child's capabilities to others.
- Always mathematics teachers motivated the students for the better learning achievement in mathematics.
- An intervention program would build the confidence in upper primary student's mathematical ability and help reduce their negative attitudes towards mathematics.
- Use computer aids, modern devices and tools in mathematics teaching learning situation.
- Curriculum designer should be developing mathematics on the basis of learner-centred and activity-centred curriculum.
- Clarify the positive uses of mathematics.

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