



Mathematics Anxiety among Secondary School Students in Imphal East District

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ABSTRACT

Mathematics anxiety is an important affective aspect which determines the engagement, confidence, and performance of the students in mathematics especially at the secondary school level. The aim of the current study was to test the level of mathematics anxiety among the secondary school students of the Imphal East District of the state of Manipur and to determine the variation according to gender, locality and type of school management. The study took a descriptive survey approach. The sample size used was 160 Class X students who were stratified randomly in government and private secondary schools. Standardized Mathematics Anxiety Scale and personal data sheet were used to collect data. Data analysis was done using descriptive statistics and independent sample t-tests. The results showed that most of the students had average to above-average levels of mathematics anxiety and this showed that anxiety is not an extreme situation but a rather widespread worry. Considerable disparities were noted based on gender, the location, and nature of school management in mathematics anxiety. The levels of mathematics anxiety were higher among the male students, rural students as well as the students at the private schools. The paper makes an emphasis on the role of contextual and institutional variables in the development of mathematics anxiety and the necessity to implement positive, inclusive, and anxiety-reducing mathematical teaching at the secondary school level.

INTRODUCTION

Mathematics occupies a central position in the educational curriculum due to its critical role in developing logical reasoning, analytical thinking, and problem-solving abilities. In today's world characterised by rapid technological advancement, data-driven decision-making, and creativity, mathematical competency is essential for personal development and the progress of the state. The educational policies and curricular framework in India have consistently



emphasised mathematics as a core subject essential for scientific reasoning, rational thought, and participation in emerging knowledge economies (NCERT, 2005).

Despite its recognised importance, mathematics is nevertheless perceived by many students as a difficult and stressful subject. Mathematics anxiety is a significant emotional barrier to effective mathematics learning, characterised by feelings of tension, fear, and concern that hinder performance and understanding (Richardson and Suinn, 1972). Anxiety in mathematics often results in pupils avoiding math-related activities, diminished self-confidence, and poor academic achievement, irrespective of their cognitive abilities (Ashcraft, 2002). Ultimately, this fear constrains students' educational opportunities and undermines their engagement in academic programs and occupations requiring advanced mathematics.

Research indicates that mathematics anxiety is a multifaceted phenomenon influenced by instructional methods, assessment frameworks, classroom environment, and socio-demographic factors. The factors of gender, locality, and school administration type have been extensively examined; nonetheless, the results are not consistently analogous across many situations (Dowker et al., 2016). Moreover, the majority of contemporary research has focused on certain features, such as cognitive or achievement-related factors, sometimes neglecting the broader socio-cultural dimensions of students' emotional experiences while studying mathematics.

This disparity is particularly significant in the Indian context owing to the nation's social and cultural diversity. Other characteristics that significantly influence the educational experience of students, such as student expectations and access to resources related to social categories and religion, have been inadequately addressed in the research on mathematical anxiety. The lack of inclusive and context-sensitive investigation undermines the generalisability of existing findings and limits the development of equitable pedagogical interventions.

Furthermore, there is a scarcity of studies about the North-Eastern states of India, including Manipur. Imphal East District presents a unique educational landscape characterised by rural-urban disparities, diverse school administration systems, and varying socio-cultural contexts. Understanding mathematics anxiety within this specific setting is essential for generating significant and practical evidence.



This research seeks to investigate mathematics anxiety among secondary school students in Imphal East District of Manipur, focusing on differences related to gender, locality, and type of school management. The project aims to integrate psychological and socio-cultural perspectives to enhance understanding of mathematics anxiety, thereby informing culturally responsive teaching and policy modifications to promote equitable, supportive, and anxiety-free mathematics education.

Objectives of the Study

1. To identify the overall mathematics anxiety among secondary school students in Imphal East district of Manipur.
2. To examine the difference in the levels of mathematics anxiety among secondary school students based on gender.
3. To analyse the difference in the levels of mathematics anxiety among secondary school students based on their locality (urban/rural)
4. To examine the difference in the levels of mathematics anxiety among secondary school students of Imphal East District depending the types of school on the basis of management.

Hypotheses of the Study

- 1) H_{01} : There is no significant difference in the levels of mathematics anxiety between male and female secondary school students.
- 2) H_{02} : There is no significant difference in the levels of mathematics anxiety among secondary school students based on their locality (urban/rural).
- 3) H_{03} : There is no significant difference in the levels of mathematics anxiety among students studying in government or private schools.

REVIEW OF RELATED LITERATURE

Mathematics anxiety (MA) has been thoroughly examined as a significant affective factor influencing student engagement, performance, and perseverance in mathematics. Richardson and Suinn (1972) initially formulated the construct by defining mathematical anxiety (MA) as a psychological condition that impairs mathematical performance. Subsequent cognitive research by Ashcraft (2002) demonstrated that mathematics anxiety disrupts working memory and problem-solving efficacy, hence adversely affecting performance. International study indicates that MA is cultivated through a synthesis of personal and environmental factors.



Souza et al. (2024) assert that the educational environment interacts with gender to influence anxiety levels, while Smith et al. (2024) discovered that mathematics anxiety may diminish over time, while gender disparities are expected to endure. Studies in Africa and Asia have shown that elevated levels of mathematical anxiety (MA) are generally associated with diminished mathematical performance (Bornaa et al., 2023; Malu et al., 2024), although meta-analytic findings suggest that the strength of this correlation varies based on the educational context (Tawaldi et al., 2023).

The findings regarding gender disparities in mathematics anxiety are ambiguous. Certain research revealed heightened anxiety among female students (Rahaman et al., 2023; Sarfo et al., 2020), while others found no discernible gender differences (Karim et al., 2023; Delgado Monge et al., 2020). These disparities can be attributed to variations in cultural expectations, evaluation methods, and measurement tools. Alongside gender, teacher-specific and classroom-related characteristics have emerged as significant predictors of mathematics anxiety, with Zanabazar et al. (2023) identifying the quality of instruction and teacher-student interaction as potentially critical factors.

These confusing and contextual findings are evident in Indian studies. Dafadar (2023) emphasised the role of educators in recognising and alleviating mathematics anxiety through helpful educational practices. Kaushal et al. (2022) conducted a systematic review indicating that student-related, teacher-related, curricular, and socio-environmental factors had similar influence. Research has yielded inconclusive results regarding gender, locality, and school type (Mahato and Sen, 2021; Arya and Ansari, 2022; Sangral et al., 2023), while intervention-based studies indicate that targeted strategies can mitigate mathematics anxiety and enhance performance (Arup and Bijoya, 2019). The research on North-East India is limited; Tepusa (2024) reported average anxiety levels in Nagaland, while Singh and Singh (2021) identified a negative association between mathematics anxiety and problem-solving abilities among secondary pupils in Manipur.

The research indicates that, although mathematics anxiety has been extensively examined in both international and Indian contexts, significant gaps persist. The existing literature predominantly analyses demographic characteristics such as gender, area, or school type in isolation, offering limited insights into their influence on mathematics anxiety. Secondly, the



evidence from the North-Eastern states of India is particular, so rendering the issue of under-representation of local educational realities due to rural-urban disparities and varying school administration systems inadequately addressed. Furthermore, insufficient attention has been directed on secondary school pupils at the board-examination level, a period characterised by significant academic stress and emotional vulnerability. This research project aims to conduct a comprehensive, localised investigation into the nature of mathematics anxiety among high school students in the Imphal East District of Manipur, considering factors such as gender, locality and type of school management.

METHODOLOGY

The current research paper used a descriptive survey research design in order to investigate the mathematics anxiety level of secondary school students and to explore the variation across the selected demographic variables. The descriptive survey technique was found to be suitable because it allows one to collect data in a systematic manner to describe the current conditions without intervention of variables.

All students in Class X studying in the Imphal East District of Manipur were included in the population of the study, which was made up of all students attending secondary school. The stratified random sampling technique was used to sample 160 students of Class X of government and private secondary schools. The stratification was performed by gender, locality (urban and rural), and type of school management to have enough representation of the various sub-groups.

Mathematics anxiety was a dependent variable. Independent variables were gender (male/female), locality (urban/ rural), social category, religion and type of school management (government / private).

Math Anxiety Scale (MAS) created by Mahmood and Khatoon (2012) was used to collect the data; it is a standardized and commonly used tool. The scale assesses the anxiety of the students as pertains to the classroom learning, numerical tasks, and assessment situations. Demographic information was also collected using a personal data sheet.

Once the permission was taken, the tool was used directly by the researcher. The obtained data were analysed through descriptive and inferential statistics (independent sample t-test) at the



level of significance of 0.05. All the study procedures were conducted with regard to confidentiality, voluntary participation and informed consent.

ANALYSIS AND INTERPRETATION OF DATA

Objective 1: To identify the overall level of Mathematics Anxiety among Class X Students of Imphal East District

To accomplish this objective, the scores that were acquired by the sample of 160 students on the Mathematics Anxiety Scores were examined and classified into seven levels. These levels were as follows: Extremely High Anxiety, High Anxiety, Above Average Anxiety, Average Anxiety, Low Anxiety, Very Low Anxiety, and Extremely Low Anxiety. Table 4.1 provides a presentation of the information regarding the frequency and percentage distribution of students across different levels.

Table 4.1 Distribution of Secondary School Students by Levels of Mathematics Anxiety (N = 160)

<i>Level of Mathematics Anxiety</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Extremely High Anxiety</i>	<i>2</i>	<i>1.3</i>
<i>High Anxiety</i>	<i>8</i>	<i>5.0</i>
<i>Above Average Anxiety</i>	<i>52</i>	<i>32.5</i>
<i>Average Anxiety</i>	<i>58</i>	<i>36.3</i>
<i>Low Anxiety</i>	<i>35</i>	<i>21.9</i>
<i>Very Low Anxiety</i>	<i>4</i>	<i>2.5</i>
<i>Extremely Low Anxiety</i>	<i>1</i>	<i>0.6</i>
<i>Total</i>	<i>160</i>	<i>100.0</i>

Interpretation:

The spread of students among the seven levels representing mathematics anxiety indicated that the mathematics anxiety showed that most of the participants were in the average category of mathematics anxiety (36.3%), and the above average category of mathematics anxiety (32.5%). Another large percentage (21.9) had low anxiety levels. High and extremely high anxiety (5.0 and 1.3 respectively) were only present in few students (5.0 and 1.3 respectively), very low (2.5) and extremely low (0.6) was least represented.

In general, the results show that the majority of students have experienced anxiety scores in the average to above average range, and not many of them have experienced very high or very low Mathematics Anxiety.

Distribution of Mathematics Anxiety Levels among Secondary School Students (N=160)

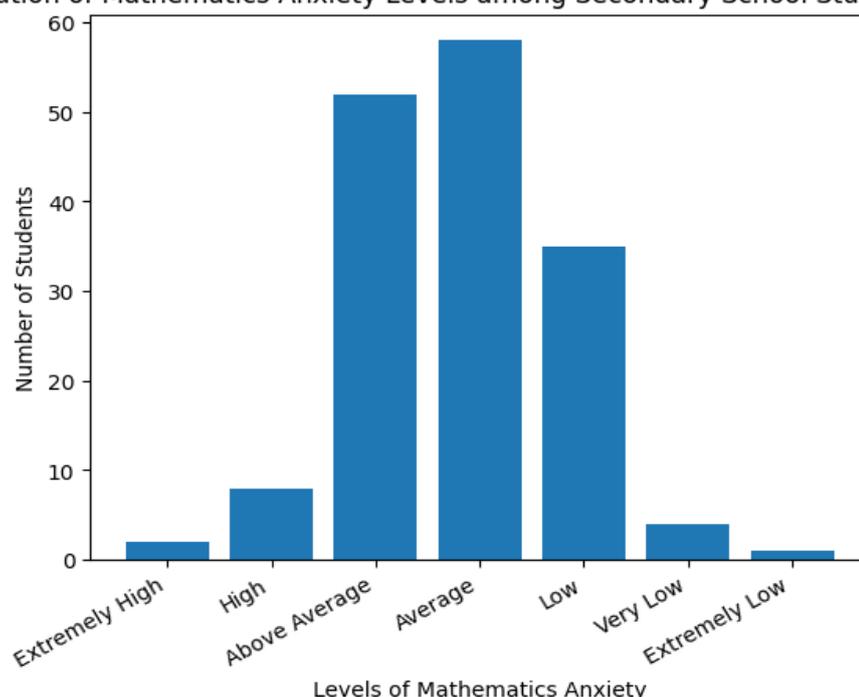


Figure 4.1: A Bar Chart showing levels of Mathematics Anxiety scores

Objective 2: To Examine the difference in the levels of Mathematics Anxiety among Secondary Students based on Gender.

The second objective of the study was to test the existence of significant difference in the levels of mathematics anxiety between the male and the female students of Imphal East District belonging to Class X. In this regard, the null hypothesis was as follows:

H₀₁: There is no significant difference in the levels of mathematics anxiety between male and female secondary school students.

The t test was used to compare the mean score of male students and female students when the samples were independent. Table 4.2 is the presentation of the results.

Table 4.2 Independent Sample t-Test Results of Mathematics Anxiety Scores by Gender



Gender	N	Mean	SD	Std. Error Mean	df	t-value	p-value	Result
Male	80	90.50	45.38	5.07				
Female	80	70.50	45.38	5.07	158	2.79		

Interpretation:

The mean mathematics anxiety score of male students ($M = 90.50$, $SD = 45.38$) is higher than that of female students ($M = 70.50$, $SD = 45.38$). The obtained t value (2.79 , $df = 158$) is statistically significant, since the corresponding p value (0.006) is less than the 0.05 level of significance.

Therefore, the null hypothesis (H_0) is rejected, which proves that the difference between gender in math anxiety is significant among students. The anxiety level was higher in the male students compared to the female students. This observation indicates that the gender factor is a contributor of mathematics anxiety in this context. It also indicates that the male students can have more emotional or psychological impediments in approaching mathematics than the female students.

Objective 3: To analyse the difference in the levels of Mathematics Anxiety of students depending on the locality (urban/rural).

The third objective of the study was to analyse whether mathematical anxiety levels differ significantly with reference to their locality (urban/rural).

The following null hypothesis was formulated:

H₀₂: There is no significant difference in the levels of mathematics anxiety among secondary school students based on their locality (urban/rural).

An independent samples t test was employed to compare the mean scores of urban and rural students. The results are presented in Table 4.3.

Table 4.3: Independent Sample t -Test Results of Mathematics Anxiety Scores by Locality

Locality	N	Mean	SD	Std. Error Mean	df	t-value	p-value	Result
Urban	90	67.57	46.86	4.94				
Rural	80	97.13	40.20	4.80	158	4.29		



Interpretation:

The average mathematics anxiety score of students in urban area ($M = 67.57$, $SD = 46.86$) is less than students in rural area ($M = 97.13$, $SD = 40.20$). The t value (4.29 , $df=158$) obtained is statistically significant, as the value of the p value (0.000) is below the 0.05 level of significance. Therefore, the null hypothesis (H_{02}) is rejected, and it means that the difference between the mathematics anxiety of urban and rural students is significant. The level of anxiety in rural students was higher in comparison with their urban counterparts. This result indicates that residential background is an influential factor in the mathematics anxiety, as the rural students might have more difficulties in overcoming mathematical tasks than urban students.

Objective 4: To examine the difference in the levels of mathematics anxiety among secondary school students depending on their types of school.

The fourth objective of the study was to examine the difference in the levels of Mathematics Anxiety depending on the types of school based on management (Government/Private).

Accordingly, the following null hypothesis was framed:

H₀₃: There is no significant difference in the levels of Mathematics Anxiety among secondary school students studying in schools under Government or Private. To test this hypothesis, an independent samples t test was applied. The results are presented in Table 4.4.

Table 4.4 Independent Sample t -Test Results of Mathematics Anxiety Scores by Type of School Management

Type of School	N	Mean	SD	Std. Error Mean	df	t-value	p-value	Result
Government	80	42.10	10.52	1.17				
Private	80	42.19	11.49	1.29	158	2.92		

Interpretation:

The mathematical anxiety average of students in government schools.

This is lower ($M = 42.10$, $SD = 10.52$) as compared to that of the students in the private's school ($M = 47.19$, $SD = 11.49$). The t value (2.92 , $df = 158$) obtained is statistically significant, since the corresponding p value (0.004) is less than the level of significance of 0.05 . The null hypothesis (**H₀₃**) is therefore rejected since there is significant difference in mathematics



anxiety between the government and private school students, with the latter having higher levels of mathematics anxiety.

DISCUSSION

The current research examined the mathematics anxiety among students of Imphal East District in secondary schools and studying the differences on gender, locality and the type of school management. The results show that most students report average to higher than average anxiety in mathematics implying that mathematics anxiety is a normal emotional issue and not a severe condition that only happens to a few students. This finding is in line with previous research that found moderate mathematics anxiety in students in secondary schools (Tepusa, 2024; Karim et al., 2023). These results support the fact that mathematics anxiety is instilled in the everyday classroom activities, specifically at the secondary level where academic expectations and test anxiety are intense (Ashcraft, 2002).

In terms of gender, it was found that male students had much higher levels of mathematics anxiety as compared to female students. This result is in contrast to the existing literature that found that female students were more anxious (Sarfo et al., 2020; Rahaman et al., 2023), and it is consistent with the existing literature that suggested that gender differences in mathematics anxiety are not universal (Karim et al., 2023; Delgado Monge et al., 2020). The current result implies that social expectations, fear of low achievement, and pressure to perform among boys in school, especially in an exam-based system, could be a factor in the development of anxiety, which reinforces the hypothesis that the origin of mathematics anxiety is not gender-based but rather rooted in social-cultural determinants (Souza et al., 2024).

The locality analysis showed that the rural students experience significantly more mathematics anxiety than urban students. This finding is in alignment with the records of Indian research that has found rural urban discrepancies in educational resources, academic aid, and experience of effective pedagogical practices (Mahato and Sen, 2021; Sangral et al., 2023). The lack of learning opportunities and confidence about the academic performance of the rural students can be the reason behind the increasing anxiety which means the environmental and institutional factors play a significant role in the definition of emotional responses towards mathematics.



On the type of school management, the study established that students in private schools were more anxious about mathematics compared to students in the government schools. This finding confirms previous studies that the levels of anxiety can be increased in cases of competitive academic settings, performance-based assessment programs, and high parent expectations in private schools (Dafadar, 2023; Arup and Bijoya, 2019). Whereas the schools of this kind tend to offer better infrastructure, in the case where high academic results are at stake, these factors can mean nothing, which results in the development of stress and anxiety among students.

In general, the findings of the present study support the literature regarding mathematics anxiety as a multifaceted phenomenon that relies on psychological, social, and institutional factors (Kaushal et al., 2022; Zanabazar et al., 2023). The given study makes a contribution to the available research and dispersion of the research on the relevance of context-sensitive, supportive, and anxiety-reducing teaching methods in the level of secondary school by providing region-specific evidence reported in Manipur.

CONCLUSION

The paper has investigated the mathematical anxiety of the secondary school students in Imphal east district of Manipur with special reference to the gender of the students, the locality, and the type of school management. The results demonstrated that mathematics anxiety is a widespread emotional phenomenon among students with most of them showing average to above the average levels of anxiety as opposed to extreme cases. There were considerable variations among the demographic variables. Male students indicated that they experienced more mathematics anxiety than female students, and the performance pressure and social expectations are some of the contributors. Moreover, the students in the rural regions had reported a great level of anxiety as compared to the students in urban regions, and this observation was associated with inequality in access to learning facilities, support and exposure to good learning practices. School management differences were also observed, where students of a private school reported more anxiety about mathematics, which may have occurred because they are subjected to competitive school environments and performance-based assessment.

Overall, the results prove that mathematics anxiety is a complex phenomenon which is determined by the combination of psychological, social, and institutional influences instead of



personal ability itself. The research adds value in terms of region-specific data on the context of Manipur which is underrepresented in the existing literature on mathematics anxiety. The research identifies the necessity of positive, inclusive, and anxiety-sensitive pedagogical approaches to teaching mathematics by emphasizing the importance of contextual variables. Not only in providing better academic success but also in enhancing emotional comfort in students and guaranteeing fair access to learning in various educational institutions, mathematics anxiety at the secondary level and its prevention must be addressed.

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