International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

# Numbers, Nerves, and Nature: Mathematics-Phobia in Connection with Learning-Styles Among the School Students

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**Abstract**

The primary objective of this study is to explore the level of mathematics-phobia in connection with learning-styles among the school students. Furthermore, the research seeks to determine the extent to which mathematics-phobia impacts these attributes within a specific demographic: students from Government-Aided and Government-Sponsored schools in the North 24 Parganas district of West Bengal. Cluster sampling followed by stratified random sampling technique was applied to collect data by administering two sets of standardized scales concerning different variables. By nature, the data were quantitative and analyzed through ANOVA and Pearson Correlation. The study revealed that the importance to consider and thereby essential address learning-styles individually to reduce issues like mathematics-phobia among the school students and while considering that parental involvement and its interaction with learning-styles may not play a crucial role. The study revealed that the essential to consider and thereby address the learning-styles and teaching method independently to mitigate issues like mathematics-phobia; on the other hand, as the study observed, its interaction between two factors may not play a crucial role. The study revealed that both 'mathematics-phobia' and 'learning-styles' are important factors and play critical role in studying mathematics among the school students.

**Keywords:** Learning-styles, mathematics-phobia and school students

## 1. Introduction

Mathematics is a basic survival skill, which is essential in our various walks of life. A person lacking of numeracy is greatly handicapped in the struggle for survival. Mathematics holds a pivotal position in the field of knowledge; it enriches every branch of knowledge by its sophisticated tools and techniques. Furthermore, it approaches towards accuracy.

It is the numerical and calculative part of human life and knowledge. It helps the human being to provide exact interpretation to establish exact interpretation of their ideas and conclusions. It deals with quantitative facts and relationship as well as with problems involving space. Mathematics can also be called as the science of logical reasoning in which the human being tends to move towards everything with a question mark in our mind.

Ramachandran, (2014); Gbolagade et al., (2013) found that there is remarkable impact on students for mathematics-phobia. Factors like, strictness of mathematics teacher, incompetence on the part of mathematics teacher, absence in instructional material during mathematics teaching, laziness on the part

of mathematics teacher, overcrowded mathematics classroom, learning mathematics in afternoon period, poor implementation of policies by Government, absence of ICT facilities and mathematics laboratory in school, absence of counselors in school, too heavy mathematics curriculum and incessant strikes of teachers are the major factors of mathematics-phobia.

Poor performance in mathematics may also be related to the teaching-styles of the teacher, since prolonged mismatches between the teaching-styles in the classroom and the learning-styles of most learners can contribute to poor academic achievement and negativity towards a subject (Breckler, Teoh & Role, 2011; Naik, 2013; Orhun, 2007). If the learners are taught in accordance with their learning-styles, and when they consider their own styles while studying, their academic achievements seem to improve.

Yahya, et al. (2012) found that fear of mathematics happens in the classroom due to lack of consideration of different learning-style of the students by the teacher, and persistent failure in mathematics contribute pathological fear in mathematics. The research paper explores various aspects of mathematics-phobia in connection with learning-styles among the school students.

## 2. Rationale of the study

It is worth noting to mention from the forgoing discussion that the area is worthy of research that might deals with students' learning-styles and the impact on mathematics-phobia on their mathematics learning through academic performance concerning 'parental involvement' and 'teaching method' of the North 24 Parganas district of West Bengal. It is also essential to focus on its historical background and the present scenarios through several qualitative studies as well as several quantitative works related to the area of investigation.

## 3. Review of related research literature

Prior to initiate the study, the authors carried out a detailed review on the related studies conducted in India and abroad over learning-styles and its effect on mathematics-phobia among the school students, some of which are presented for a clear theoretical understanding of the area of research and will also justify the present research.

### 3.1. Studies related to mathematics-phobia

Manikandan, S. et al. (2022) carried out a study on 'Math Phobia among School Students: A Comparative Design.' Data analysis was done by using Descriptive and Inferential statistics. The study was to compare the level of mathematical anxiety between Government and Private High School students. The results of this study revealed that the mean mathematical anxiety score among Private High School students are significantly higher than the mean mathematical anxiety score among Government students at $p < 0.01$ level. Therefore, it was concluded that the level of mathematics-phobia among Private School students is significantly higher than the Government School students.

### 3.2. Studies related to learning-styles

Sindhwani, A. (2021) studied the impact of figural learning-style on academic achievement of senior secondary school students. The study sample consisted of 600 senior secondary school students from five districts of Haryana state. Cluster random sampling technique was used to select these subjects from the population. Learning Style Inventory by Mishra (2012) and Achievement Test in English constructed

by investigators were used for data collection. Descriptive statistics like Mean, Standard Deviation and t-test was used to compare the groups. The findings of the study revealed that statistically, there are significant differences in academic achievement of students with respect to figural learning-styles i) students having high figural learning-styles have better academic achievement than the students having average figural learning-styles, ii) students having average figural learning-styles have better academic achievement than the students having low figural learning-styles and iii) students having high figural learning-styles have better academic achievement than the students having low figural learning-styles.

### 3.3. Studies related to mathematics-phobia and learning-styles

Sur, S. and Roy, R. (2025) conducted a study to explore the level of mathematics phobia in relation to learning-style with their categorical variables gender and locale of schools and how mathematics phobia has an impact over the above spelt attributes in school level over a sample group of students in the North 24 Parganas district of West Bengal. Cluster sampling technique followed by stratified random sampling technique was applied to collect data by administering two sets of standardized scales concerning different variables. By nature, the data were quantitative and analysed through ANOVA. The analysis reveals that it is vital to address the learning-styles and gender differences individually to reduce issues like mathematics phobia among the school students. The analysis reveals that the importance of considering learning-styles individually to mitigate issues like mathematics phobia, while the locale of schools and its interaction with learning-styles may not play a crucial role. The study reveals that both learning-styles and mathematics phobia are important factors and play critical role in studying mathematics at elementary school level.

## 4. Defining key attributes

The key attributes, on which the present study hinging-on, are as follows:

### 4.1. Mathematics-phobia

Tillfors (2003) defined phobia as learned emotional responses and it causes frequent severe and intense anxiety. Mathematics-phobia can be defined as a feeling of anxiety that hinders one from efficiently tackling mathematical problems. Many students have negative attitude towards mathematics which influences their approach to solving mathematics problems which may result to phobia and subsequent poor performance in the subject area.

In the present study, mathematics-phobia refers to the uneasiness, apprehension and fear, the students feel while doing and studying mathematics. In this study it is measured by the total score obtained by the students on mathematics-phobia scale.

### 4.2. Learning-styles

According to the Dunn model (Bosman & Schulze, 2018); recognizing a student's learning-style is better than discussing how it occurs as their emotions and sociological, environmental, and physical preferences will collectively affect the final form of learning.

In the present study, learning-styles refer to the way one represents experiences and recalls the processes of information to overcome from mathematics-phobia.

### 4.3. School students

In present study, school students refers to the students of academic institutions having a Class grade VIII in the schools affiliated to West Bengal Board of Secondary Education (WBBSE) or, West Bengal Council of Higher Secondary Education (WBCHSE) during the academic session 2023-'24.

## 5. Objectives of the study

The objectives of the present study are as follows:

1. To find out the mathematics-phobia in connection with learning-styles among the school students in relation to parental involvement.
2. To find out the mathematics-phobia in connection with learning-styles among the school students in relation to teaching method.
3. To study the relationship between mathematics-phobia and learning-styles among the school students.

## 6. Methodology of the study

The study was conducted following a descriptive survey method.

### 6.1.Sample

The sample for the present study was drawn from a group of students studying in VIII$^{th}$ standard of Bengali medium schools, which are either financially controlled or aided by the Government of West Bengal. Firstly, cluster sampling technique was adopted to draw the sample in terms of clusters like location of the schools, viz., Rural, Urban, and Schools with management structure, i.e., Government-Aided or, Government-Sponsored. Stratified random sampling technique was further implied to draw the sample from the clusters and stratification was done in terms of strata like age and gender (male and female) of the students.

### 6.2.Tools

To explore the level of mathematics-phobia among the school students in connection with learning-styles, two sets of standardized scales were used. The mathematics phobia scale for elementary school learners (MPSESL) was developed and standardized by the author and was used to collect data pertaining to mathematics-phobia of the sample. On the other hand, the translated version of Cynthia's Learning Style Preference Inventory (LSPI) was adopted for the study for collection of data pertaining to learning-styles of the respondent group.

#### 6.2.1. MPSESL

To measure the level of mathematics phobia of the sample respondents of the study, validated and standardized MPSESL scale was administered. The Scale was developed in statement pattern including 32 items with a scale range from 32 to 96 and a midpoint is 64. This scale is three point Likert Scale. Each of the items was scored as Often-3, Sometimes-2, and Never-1, developed by the author. The reliability coefficient of the scale was found to be 0.823.

#### 6.2.2. LSPI

For this study, Learning Style Preference Inventory (LSPI) adopted from Conquering Math Anxiety, by Dr. Cynthia A. Arem. The learning style inventory was translated into Bengali language for a better

understanding of students. The reliability coefficient of the learning-styles questionnaire was found to be 0.782.

### 6.2.3. Data

Data for the present study were collected from the respondents by administering the scales. By nature, collected data were quantitative; and were analyzed through ANOVA and Pearson Correlations.

## 7. Findings

Findings of the study are presented as follows:

**7.1.** The very first objective of the present study was to find out the mathematics-phobia in connection with learning-styles among the school students in relation to parental involvement. To reach this objective, inferential statistics with respect to major and categorical variable was computed. The result of the same is presented below:

**Table no. 1. Analysis over comparison of mathematics-phobia in connection with learning-styles among the school students in relation to parental involvement**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-Value | p-Value |
|---|---|---|---|---|---|
| Main Effect (Learning-styles) | 212.50 | 3 | 70.83 | 5.25 | 0.002 |
| Main Effect (Parental involvement) | 48.00 | 2 | 24.00 | 1.80 | 0.171 |
| Interaction (Learning-styles × Parental involvement) | 35.50 | 6 | 5.92 | 0.45 | 0.833 |
| Within Groups (Error) | 680.00 | 94 | 7.23 | | |
| Total | 976.00 | 105 | | | |

The ANOVA table depicted for finding out parental involvement related significant differences in mathematics-phobia in relation to learning-styles among the school students. It evaluates the independent impact as well combined effect of parental involvement and learning-styles. The variance related to learning-styles difference is indicated by the sum of squares for the main effect which is 212.50 and the mean square is 70.83, whereas the calculated F value is 5.25, which is statically significant by calculated p value i.e. 0.002, is less than 0.05 (5% level of significance). It suggests that variation in learning-styles have a significant impact over mathematics-phobia.

For considering the effect of parental involvement over mathematics-phobia, results of ANOVA table no. 1, revealed that the variance related to parental involvement for calculated sum of squares is 48 and mean square is 24 which is statistically not significant for its calculated p value i.e. 0.171, greater than 0.05 (5% level of significance). It showing that parental involvement independently does not affect to variation in data.

For finding out the interaction effect between learning-styles and parental involvement the results indicates that the combined variation caused by the interaction between learning-styles and parental involvement for its sum of squares value i.e. 35.50, mean square value i.e. 5.92 and the calculated F value i.e. 0.45 which does not possess any statistical significance at calculated p value (0.833), greater than 0.05. Therefore, it reveals that there is no significant correlation between learning-styles and parental involvement for having impact over mathematics-phobia among the school students.

The results indicate that the main effect of learning-styles is statistically significant ($p = 0.002$), suggesting that differences in learning-styles significantly impact the dependent variable mathematics-

phobia. However, the main effect of parental involvement is not significant (p = 0.171), indicating that parental involvement does not independently contribute to variations in the dependent variable. Additionally, the interaction effect between learning-styles and parental involvement is not significant (p = 0.833), implying that their combined influence does not significantly affect the dependent variable.

**7.2.** The second objective of the present study was to find out the mathematics-phobia in connection with learning-styles among the school students in relation to teaching method. To fulfill the above objective the inferential statistics with respect to major and categorical variable was computed. The result thereof is given below:

**Table no. 2. Analysis over comparison of mathematics-phobia in connection with learning-styles among the school students in relation to teaching method**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-Value | p-Value |
|---|---|---|---|---|---|
| Main Effect (Learning-styles) | 165.00 | 3 | 55.00 | 4.10 | 0.010 |
| Main Effect (Teaching method) | 120.00 | 2 | 60.00 | 4.50 | 0.015 |
| Interaction (Learning-styles × Teaching method) | 45.00 | 6 | 7.50 | 0.56 | 0.751 |
| Within Groups (Error) | 425 | 94 | | | |
| Total | 755 | 105 | | | |

The ANOVA table depicted for finding out teaching method related significant differences in mathematics-phobia in relation to learning-styles among the school students. It evaluates the independent impact as well combined effect of teaching method and learning-styles. The variance related to learning-styles difference is indicated by the sum of squares for the main effect which is 165 and the mean square is 55, whereas the calculated F value is 4.10, which is statically significant by calculated p value i.e. 0.010, is less than 0.05 (5% level of significance). It suggests that variation in learning-styles have a significant impact over mathematics-phobia.

For considering the effect of teaching method over mathematics-phobia, results of ANOVA table no. 2, revealed that the variance related to teaching method for calculated sum of squares is 120 and mean square is 60 which is statistically significant for its calculated p value i.e. 0.015, less than 0.05 (5% level of significance). It shows that teaching method independently affect to variation in data.

For finding out the interaction effect between learning-styles and teaching method the results indicates that the combined variation caused by the interaction between learning-styles and teaching method for its sum of squares value i.e. 45, mean square value i.e. 7.50 and the calculated F value i.e. 0.56 which does not possess any statistical significance at calculated p value (0.751), greater than 0.05. Therefore, it reveals that there is no significant correlation between learning-styles and teaching method for having impact over mathematics-phobia among the school students.

The results indicate that the main effect of learning-styles is statistically significant (p = 0.010), suggesting that differences in learning-styles significantly influence the dependent variable mathematics-phobia. Similarly, the main effect of teaching method is also statistically significant (p = 0.015), indicating that variations in teaching methods independently impact on the dependent variable. However, the interaction effect between learning-styles and teaching method is not significant (p = 0.751), implying that their combined influence does not substantially affect the dependent variable.

**7.3.** The third objective of the study was to explore the relationship between mathematics-phobia and learning-styles among the school students. To attain this objective, the inferential statistics with respect to major variables was computed. The result of the same is given follows:

**Table no. 3. Analysis over relationship of mathematics-phobia and learning-styles among the school students**

| Correlations | | | |
|---|---|---|---|
| | | **Learning-styles** | **Mathematics-phobia** |
| **Learning-styles** | **Pearson Correlation** | 1 | **.067** |
| | **Sig. (2-tailed)** | | .122 |
| | **N** | 541 | 541 |
| **Mathematics-phobia** | **Pearson Correlation** | **.067** | 1 |
| | **Sig. (2-tailed)** | .122 | |
| | **N** | 541 | 541 |

It is clear from the table no. 3, Pearson correlation coefficient (r) between mathematics-phobia and learning-styles of the school students is 0.067. This indicates a low and positive relationship between these two variables. As per concerned with the association between learning-styles and mathematics-phobia at the school level, the findings indicate that the estimated p value, 0.122, is greater than 0.05 (5% level of significance), implying that the null hypothesis is accepted. So, based on the evidence, it appears that a relationship between learning-styles and mathematics-phobia does not exist or persist. Following graph (see Figure 1) also satisfy the relationship between these two variables clearly.

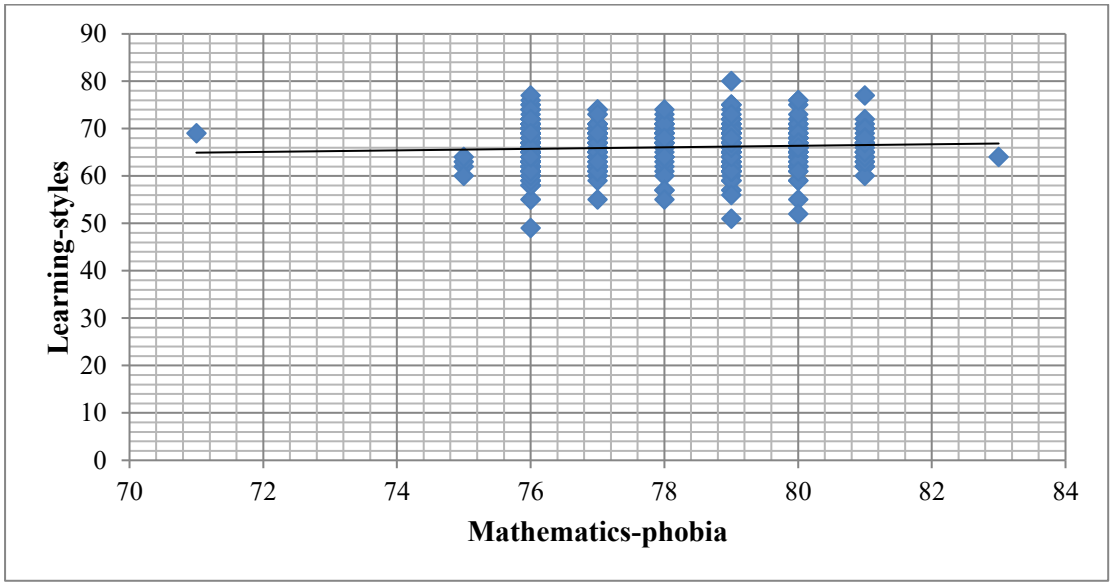


**Figure 1: Scatter plot sows the correlation between mathematics-phobia & learning-styles of the school students**

## 8. Discussion and Conclusion

The first objective of the study was framed to explore the level of mathematics-phobia in connection with learning-styles in relation to parental involvement among the respondent group. The analysis reveals that the importance of considering addressing learning-styles individually to manage issues like

mathematics-phobia while considering that parental involvement and its interaction with learning-styles may not play a substantial role in this context.

The second objective was framed to explore the level of mathematics-phobia in connection with learning-styles in relation to teaching method. The analysis reveals that the importance of considering both learning-styles and teaching methods independently in educational interventions to address issues like mathematics-phobia, as their interaction does not appear to play a significant role.

The third objective aimed to explore the relationship between mathematics-phobia and learning-styles among the school students. The study revealed that the learning-styles have no significant relationship with the mathematics-phobia.

Therefore, supporting teaching practices are employing, engaging, student-centred approaches that focus on understanding concepts rather than memorizing procedures. Encouraging students view mistakes as learning opportunities rather than failures. Fostering a supportive classroom culture where students feel safe to ask questions and explore solutions. Offering emotional and academic support to reduce stress and build confidence. Incorporating visual aids, games, and interactive platforms make learning mathematics enjoyable and less intimidating. 'Numbers, nerves, and nature: discovering zero mathematics-phobia climates' should be strived for in educational setting by adopting appropriate learning-styles.

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