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Mathematics Attitude of Secondary School Students in relation to Problem Solving Ability of Uttar Dinajpur District of West Bengal

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ABSTRACT

The impact of secondary school student's concepts, emotions, and attitudes toward mathematics on their problem-solving skills is evident through various assessments. A student's attitude includes interest in mathematics, curiosity, confidence in problem-solving and perceptions of the application and usefulness of mathematics in everyday life. The study goals to find out the Mathematics Attitude of Secondary School Students in relation to Problem Solving Ability of Uttar Dinajpur District of West Bengal. The sample comprised 200 students of Secondary Schools of Uttar Dinajpur District of West Bengal. They were selected by stratified sampling procedure. The data was obtained by using Problem Solving Ability Test by Dubey and Mathur and Mathematical Attitude Scale by Ali Imam and Tahira Khatoon. In order to test the hypothesis formulated for the study, both descriptive and inferential statistics were adopted. In inferential statistics, 't' was computed to ascertain significant differ between the means of subsamples in relation to Gender and Locale. The obtained data was analysed using Persons' correlation of relationship between Problem Solving Ability and Mathematics Attitude. For this study, data analysis was performed using

IBM SPSS Statistics (version 22). The major findings were there existing negative relationship between Problem Solving Ability and Mathematics Attitude; there exists significant difference between male and female students of Mathematics Attitude and there was significant difference in the Problem Solving Ability of rural and urban groups.

INTRODUCTION

Mathematics constitutes an integral part of the school curriculum and plays a pivotal role in the cognitive development of students. It is not only essential for academic success but is also indispensable for fostering logical reasoning, creative thinking, critical analysis, and problem-solving skills. However, student proficiency in mathematics often varies significantly due to the influence of several factors; chief among these are their attitudes toward the subject and their socioeconomic backgrounds. Students' attitudes toward mathematics can profoundly impact their learning outcomes. These attitudes encompass students' feelings, beliefs, levels of commitment, and behavioral tendencies regarding the subject. A positive attitude can lead to greater student engagement and enhanced academic performance, whereas a negative attitude can significantly impede the learning process. Equally important is students' problem-solving ability, which reflects their comprehension, retention, and practical application of various mathematical concepts.

Problem-solving is a critical component of mathematics education. Fundamentally, it involves applying acquired knowledge, practical skills, logical reasoning, and critical thinking to devise solutions for unfamiliar or complex situations. Students who possess strong problem-solving abilities typically demonstrate superior proficiency in mathematics and tend to hold a more positive attitude toward the subject.

This study investigates the interrelationship between secondary school students' attitudes toward mathematics and their problem-solving abilities. By gaining insight into this relationship, educators can formulate strategies designed to cultivate positive attitudes toward mathematics among students and enhance their problem-solving skills; ultimately, this will lead to improved overall academic success and proficiency in mathematics, while simultaneously helping to alleviate students' fear of the subject.

REVIEW OF RELATED LITERATURE

Hussain and Unnisa (2025). Problem Solving Ability in Mathematics Among Secondary School Students: A study. The aim of the study was to find out the problem-solving capability in mathematics among students based on schools, level, and gender. Descriptive survey method was used in this study. Secondary schools of the Samastipur district were included as the population, and one hundred students of class IX from two Government and two private schools of Shahpur Patory were selected as the sample, and convenience sample was adopted in the sampling technique. t-test were used as the statistics in this study. Data obtained from secondary school students were analyzed using SPSS. Conclusion revels that there is no significant difference between males and females in solving problems in mathematics among secondary school students and no significant difference in solving problems in mathematics between students in private schools and public schools.

Devi and Reddi (2023) conducted a comprehensive study titled A Study on Mathematical Attitude of Secondary School Students in Srikakulam, Vizianagaram and Visakhapatnam Districts. The objectives of the study were to examine the level of mathematical attitude among secondary school students with respect to gender The researchers adopted a descriptive survey method and selected a large sample of 6,360 students from 212 secondary school in Srikakulam, Vizianagaram and Visakhapatnam through random sampling. A standardized Mathematical Attitude Scale was developed and used as the research tool and data were collected via questionnaires. Statistical analysis included mean scores, standard deviations, t-tests to interpret the data. The findings indicated that mathematical attitudes were significantly influenced by the variables studied that was gender.

Ramulu (2023) A study was conducted in the Adilabad district focusing on the mathematics problem-solving skills of secondary students in relation to their attitudes toward mathematics. The researchers employed a 'normative survey' method. For the purpose of data collection, a total of 30 schools were selected using a random sampling technique. From among the secondary school student population, a sample group comprising one thousand students was selected through random sampling for this inquiry. The 't-test' was utilized as the statistical method in the present study. The findings of the study revealed that the mathematics problem-solving skills of secondary school students are slightly above average. The results of the study indicated that secondary school students tend to view the subject of mathematics through a negative lens.

Singh (2023) Conducted study on a study on Mathematical Problem-Solving Ability among Secondary School Students in relation to Mathematical Aptitude and Mathematics Self-Concept. Most of the secondary students hold average level of Mathematical Aptitude. The Mathematical Aptitude of Female students was higher than Male secondary students. CBSE-Board students hold higher Mathematical Aptitude than the UP Board students. Rural students hold higher Mathematical Aptitude than Urban secondary students. The present study is a quantitative approach. Descriptive survey (Co relational method) was used in this study. In the present study, a multistage cluster sampling technique was used to select the secondary school students. The sample of the study comprised of 482 secondary school students of CBSE Board and UP Board of Varanasi district. The following tools were used for the purpose of data collection MPSA, MAT and MSC Scale used.

Khan and Agrawal (2021) conducted a study on mathematical attitude of secondary school students in Anantnag district, Jammu and Kashmir. The study aimed to assess attitudes across eight dimensions: wider applicability, skill development, reasoning, objectivity, intellectual and non-intellectual development, individual outlook and universal outlook Using a descriptive survey method, they selected a sample of 200 students with equal gender representation. The tool used was the "Attitude Towards Mathematics Scale" developed by Dr. S.C. Gakhar and Rajani. The data were analyzed using descriptive and comparative statistical techniques. Results showed that male students had a significantly more favorable attitude toward mathematics than female students across all dimensions.

Nayal and Pandey (2018) conducted a study on Mathematical attitudes of Class X students in secondary schools in Bageshwar District of Uttarakhand. The objectives of the study were to analyze the mathematical attitudes of secondary school students in Bageshwar District of Uttarakhand, focusing particularly on differences related to gender. Using a **descriptive survey method**, the researchers selected a **random sample of 243 students** from government and private secondary schools across the district. The research instrument used was a standardized tool developed by **Dr. Ali Imam and Dr. Tahira Khatoon**. For data analysis statistical technique and **t-tests** were applied. The findings revealed that male students exhibited a significantly more positive attitude toward mathematics than female students.

Hydeetal (2008) Gender differences in attitudes and problem-solving abilities have also been investigated. Some studies suggest that boys exhibit higher confidence in mathematics, while girls may show higher levels of anxiety. However, recent findings indicate that these differences are diminishing with equitable teaching practices.

Farooq and Shah (2008) conducted on the study was students' attitude towards mathematics. The objective of the study was based on a survey of high school students about their attitudes towards mathematics. Sample of the study was 685 students of 10^{th} grade selected conveniently from 10 private and public sector schools. A questionnaire was used to examine the attitudes of male and female students towards mathematics at secondary school level. Descriptive statistics and t-test were used for data analysis. The finding of the study was there is no significant effect of gender on student's attitude towards mathematics at secondary school level.

OBJECTIVES OF THE STUDY

The following objectives have been formulated for present study

- To study the relationship between Mathematics Attitude and Problem Solving Ability of secondary school students of Uttar Dinajpur District of West Bengal.
- To study the Mathematics Attitude of secondary school students of Uttar Dinajpur District of West Bengal in relation to gender variation.
- To study the Problem Solving Ability of secondary school students of Uttar Dinajpur District of West Bengal in relation to locale variation.

STATEMENT OF HYPOTHESES

The following research hypotheses were constructed to achieve the objectives of the study

HO_1: There is no significant difference between Mathematics Attitude and Problem Solving Ability of secondary school students of Uttar Dinajpur District of West Bengal.

HO_2: There is no significant difference between Male and Female secondary school students in their Mathematics Attitude of Uttar Dinajpur District of West Bengal.

HO_3: There is no significant difference between Rural and Urban secondary school students in their Problem Solving Ability of Uttar Dinajpur District of West Bengal.

RESEARCH METHODOLOGY

RESEARCH DESIGN

This study employed a descriptive survey method to explore the relationship between mathematics attitude and problem-solving ability among secondary school students.

➢ SAMPLE AND SAMPLING TECHNIQUE

The population included secondary school students in Uttar Dinajpur District from both government and private schools. A sample of 200 students was selected using stratified random sampling to ensure representation from different types of schools.

➢ INSTRUMENTS USED

The tools used by the investigator for the present study were-

1. **Mathematics Attitude Scale** – The standardized tool was 'Mathematical Attitude Scale' Developed by Dr. Ali Imam and Dr. Tahira Khatoon
2. **Problem Solving Ability Test** – The standardized tool was '**Problem Solving Ability Test'** Developed by Prof. L. N. Dubey and Dr. C.P. Mathur

➢ DATA COLLECTION PROCEDURE

At first necessary permissions to all school heads, the tools were administered during regular school hours. Students were assured of confidentiality and encouraged to respond reliably.

➢ TECHNIQUE USED FOR DATA ANALYSIS

The data were analysed using descriptive statistics (Mean, SD) and inferential statistics (correlation, t-test) to examine the relationship between groups. Pearson's correlation coefficient to examine the relationship between mathematical interest and problem-solving ability.

ANALYSIS AND INTERPRETATION OF DATA

HO_1: Test of significant difference between Mathematics Attitude and Problem Solving Ability Test of secondary school students of Uttar Dinajpur District of West Bengal. Correlation was adopted and the results were presented in the below table:

Table 1

Correlation			
Mathematics Attitude	Pearson Correlation	1	-0.074
	Sig. (2-tailed)		0.297

	N	200	200
Problem Solving Ability Test	Pearson Correlation	-0.074	1
	Sig. (2-tailed)	0.297	
	N	200	200

The correlation analysis indicates a statistically not significant and negative relationship between Mathematics Attitude and Problem Solving Ability Test (r=-0.074, P> 0.05). The negative sign usually suggests that as one thing goes up and the other goes down.

Gender wise Differential Analysis on Mathematical Attitude of Secondary School Students of Uttar Dinajpur District of West Bengal.

In the present sample 100 students were female and 100 were male. Their score on MAS scale was calculated for determining the significance of difference between the means. The 't' test was adopted and the results were presented in the below table:

Table 2

HO_2: Test of significance of difference between mean scores and SD in relation to gender variation on MAS

Gender	N	Mean	SD	SE_D	df	t	Remarks
Male	100	72.92	13.48	1.85	198	3.95	Significant
Female	100	80.22	12.66				

The calculated value of 't' is 3.95 is much higher than the table value that is 1.97 at 0.05 level of significance and at 198 df, so it is significant. Therefore, the null hypothesis (HO_2) is rejected. Thus, we can conclude that there is significant differ between male and female secondary school students in their mathematics attitude of Uttar Dinajpur District of West Bengal.

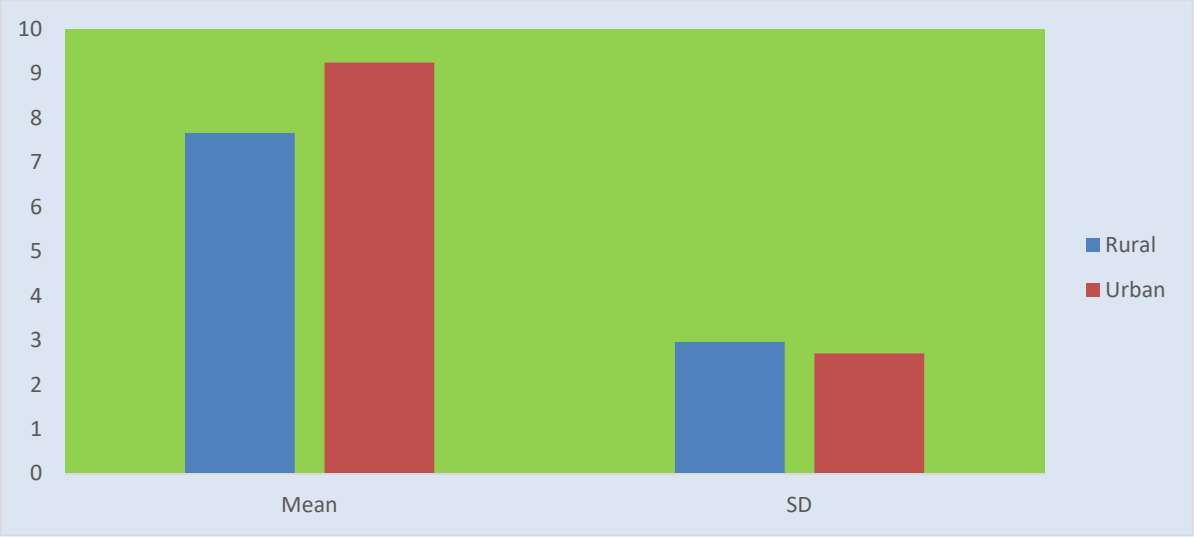

Fig.1: Difference between mean scores and SD in relation to gender variation on MAS

Locale wise Differential Analysis on Problem Solving Ability Test of Secondary School Students of Uttar Dinajpur District of West Bengal.

In the present sample 100 students were rural and 100 were urban Their score on PSAT scale was calculated for determining the significance of difference between the means. The 't' test was adopted and the results were presented in the below table:

Table 3

HO_3: Test of significance of difference between mean scores and SD in relation to locale variation on PSAT

Locale	N	Mean	SD	SE_D	df	t	Remarks
Rural	100	7.66	2.96	0.401	198	3.93	Significant
Urban	100	9.24	2.70				

The calculated value of 't' is 3.93 is much higher than the table value that is 1.97 at 0.05 level of significance and at 198 df, so it is significant differ. Therefore, the null hypothesis (HO_3) is rejected. Thus, we can conclude that there is significant differ between rural and urban secondary school students in their Problem Solving Ability Test of Uttar Dinajpur District of West Bengal.

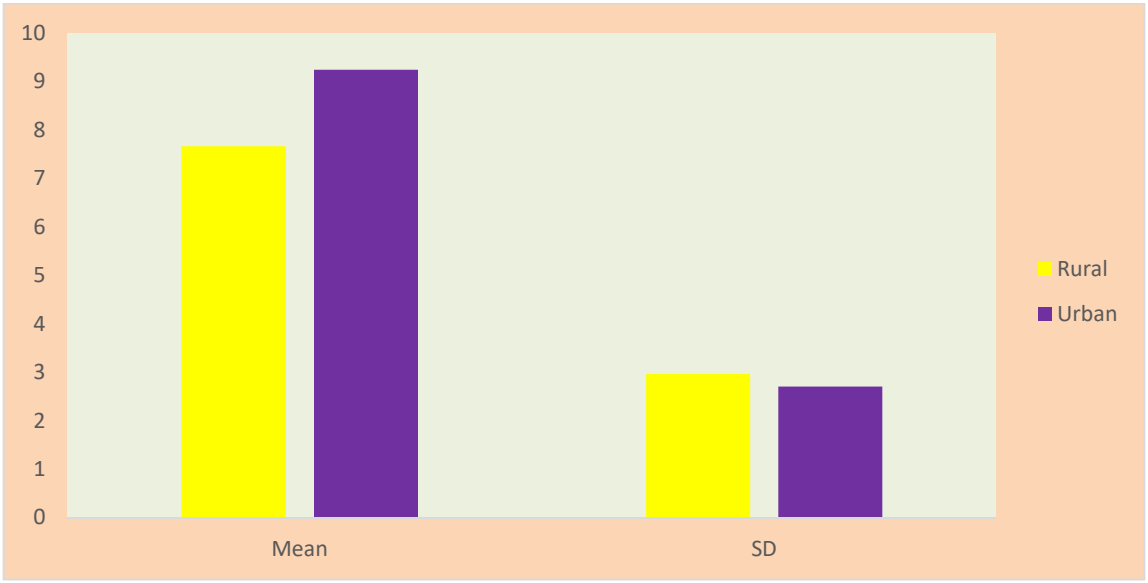

Fig.2: Difference between mean scores and SD in relation to locale variation on PSAT

Conclusions:

- There exists a not significant and negligible negative relationship between mathematics attitude and their problem-solving ability. which states that no relationship exists between these two variables in the population.
- It is significant. Therefore, the null hypothesis is rejected. Thus, we can conclude that there is significant differ between male and female secondary school students in their mathematics attitude of Uttar Dinajpur District of West Bengal. This suggests that gender plays a role in shaping the affective disposition of students toward mathematics.
- The analysis revealed a significant difference between rural and urban secondary school students in their Problem Solving Ability Test scores. Therefore, the null hypothesis is rejected, highlighting a performance gap based on geographical location.

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