

A STUDY ON THE RELATIONSHIP BETWEEN ATTITUDE TOWARDS MATHEMATICS AND MATHEMATICAL ABILITY OF HIGHER SECONDARY SCHOOL STUDENTS

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ABSTRACT

Attitude Toward Mathematics (ATM) is the student's organized tendency to think, feel, perceive, and behave toward mathematics (Jovanovic and King 1998). ATM is a collective measure of "a liking or disliking of mathematics, a affinity to engage in or avoid mathematical activities, a idea that one is useful or useless" (Neale 1969). ATM Scale measures an individual's feelings, interests, and predispositions toward mathematics (Askar 1986). The present study has been conducted to find the relationship between attitude towards mathematics and mathematical ability of the higher secondary school students in Puducherry region, India. It is sought to understand the relationship between attitude towards mathematics and mathematical ability, influence of gender and locality of school with respect to the attitude towards Mathematics. Out of a population of 12,294 students studying at the higher secondary school in the Puducherry region, a sample of 772 students was selected through the Stratified Random sampling technique. Eight Government and seven Private schools were selected based on the purposive sampling technique. The study revealed that the Mathematical ability of the students at higher secondary level depends on the attitude towards mathematics. Further attitude towards the mathematics of the girl students at the higher secondary level was more than that of their boys' counterparts whereas no significant difference was found between rural and urban school students in the Puducherry region.

Keywords: Attitude, Mathematics, Puducherry Region, Higher Secondary Students and Ability

INTRODUCTION

Mathematics has occupied almost all spheres of human life and living. The National Policy on Education (NPE 1986) says, "Mathematics should be visualized as the vehicle to train a child to think reason, analyze and articulate logically". Also, The National Council for Teaching Mathematics (NCTM, 2000) states that developing a positive attitude toward learning mathematics is an important aspect of a student's learning experiences. Attitude towards mathematics plays an important role in the teaching and learning processes of mathematics. The Mathematical attitude also plays a crucial role in shaping a child's character and in selecting a career deciding course in Mathematics. So, every student of school education should possess a good mathematical attitude. It affects Students' achievement in Mathematics. The teaching method, the support of the structure of the school, the inhabited background and student's attitude towards school, affect the attitude towards mathematics so, Attitude towards mathematics is a very significant concern of the process of mathematics education.

ATTITUDE TOWARDS MATHEMATICS

Attitude towards mathematics plays an essential role in the teaching and learning of mathematics. It affects students' performance in mathematics. The attitude toward mathematics is a topic that creates interest

on the part of researchers due to the influence it has on student learning and performance in this subject (Pekrun et al., 2017; Sanchal and Sharma, 2017). In the scientific literature (Han and Carpenter, 2014), the attitude toward mathematics is formed by cognitive, affective and behavioral components that interact with each other.

The success of students in mathematics depends upon their attitude towards mathematics. It also influences the student's rate of learning. Attitude towards mathematics subject can be seen as more or less positive. A positive attitude towards mathematics reflects a positive emotional nature in relation to the mathematics subject and, in a similar way, a negative attitude towards mathematics subject relates to a negative emotional nature. These emotions have an effect on an individual's behavior, as one is likely to achieve better in a mathematics subject that one enjoys, has confidence in, or finds useful. For this reason, positive attitudes towards mathematics are very much required as they probably influence one's eagerness to learn and also the benefits one can acquire from mathematics instruction.

REVIEW OF LITERATURE

The various studies reviewed are broadly classified under the following heads:

Attitude towards Mathematics

Nurashikin et al. (2019) in the study on Assessing Pre-University Students' Attitude Towards Mathematics showed that, there was no statistically significant difference between gender, school categories, academic achievement and program for pre-university students.

Davadas et al. (2020) has conducted a study on contributing Factors of Secondary Students' Attitude towards Mathematics. The study implied that factors affected students' attitude towards mathematics in rural and urban secondary students are different.

Millicent et al. (2021) in the study on attitude towards Mathematics of Pre-Service Mathematics Teachers in Selected Colleges of Education in Ghana has reported there was no statistically significant difference in attitudes towards mathematics between male and female pre-service teachers

Mathematical Ability:

Annemie Desoete, Ghent University, Belgium (2021) investigated the role of motivation, temperament, personality and well-being as predicting propensity factors for mathematical abilities in 30 adults. Results indicated significant interrelations between the propensities, pleading to integrate them in math research. Furthermore, the relationship propensities and mathematics was dependent on the specific investigated math task, which is in line with the componential nature of mathematics

Anastasia Kourti and Meesha Warmington (2021) studied to identify whether there is a relationship between phonological awareness (PA) and mathematical skills in monolingual Greek 1st Graders. Correlation The analysis showed that there is a significant correlate between mathematical abilities and PA, and Rapid Automatized Naming (RAN). In addition, mathematical skills correlate to reading abilities and age of the participant. Regression analysis also revealed a correlation between mathematical abilities and PA, and RAN.

NEED AND IMPORTANCE OF THE STUDY

The study on the attitude of students towards learning Mathematics and its relationship with mathematical ability may help us to find out the learning gaps as well as the personal factors associated with students. From this study, it can be able to understand the role played by the attitude towards mathematics among the students for learning Mathematics. This will help the teaching group to understand the phobia associated with the subject Mathematics and take remedial measures to overcome the same.

STATEMENT OF THE PROBLEM

The present problem is titled: “**A study on the relationship between Attitude towards Mathematics and Mathematical ability of higher secondary school students**”

DEFINITION OF KEY TERMS

Mathematical Ability

It is the ability, whether learned or perceived as a natural capability to process numerical data and conclude a mathematical calculation based on that data.

Attitude towards Mathematics

Attitude toward mathematics (ATM) is the student's organized predisposition to think, feel, perceive, and behave toward mathematics

OBJECTIVES OF THE STUDY

1. To find out the level of attitude towards mathematics of higher secondary school students
2. To find out if there is any significant difference between boys and girls with respect to attitude towards Mathematics
3. To find out if there is any significant difference between rural and urban school students with respect to attitude towards Mathematics
4. To find if there is any correlation between mathematical ability and attitude towards mathematics ability among higher secondary students.

HYPOTHESIS

The researcher has raised the following research questions in this study:

1. The attitude towards mathematics among higher secondary students is average.
2. There will be no significant difference between mean scores of attitude towards the mathematics of boys and girls of class
3. There will be no significant difference between mean scores of attitude towards mathematics with respect of locality of the school of higher secondary students.
4. There is no significant relationship between mathematical ability and attitude towards mathematics among higher secondary students of Puducherry region.

DELIMITATIONS OF THE STUDY:

1. The study is delimited to the Puducherry region.

2. The data is collected only from the Higher Secondary students of class 12th std with mathematics as one of the subject.

RESEARCH METHOD

POPULATION:

The population of the study has been defined as the students studying at higher secondary schools in the Puducherry region with mathematics as one of the subject. The total population of the study is 12,294.

SAMPLE:

The purposive sampling technique has been used for selecting the schools. Eight Government and seven Private schools were selected for the study. 772 students studying in the higher secondary second year are selected through the Stratified Random sampling technique.

STATISTICAL TECHNIQUES

The following are the statistical techniques used in the study

Descriptive Analysis	- Mean and Standard Deviation
Differential Analysis	- Independent sample 't' test and
Correlation Analysis	- Person's Product Moment Correlation (r)

RESEARCH TOOLS

- Mathematical ability test has been constructed and validated by **S.B.SRIDARAN and Dr. S KULASEKARAPERUMAL PILLAI (2021)**.
- Attitude towards Mathematics Scale (JATMS) developed by **Dr. S. C. Gakhar and Dr. Rajni**, Department of Education, Punjab University, Chandigarh (Punjab) in 2012.

SCORING PROCEDURE OF THE TOOLS

The Mathematical Ability tool is used to measures one's Mathematical Ability. This includes 40 items. The scoring procedure of this test is very simple. In this choose the best answer method. For the right answer, one is given and the wrong answer zero is given.

Attitude towards Mathematics Scale: The five points were calculated by giving scores ranging from the positive statements. Strongly disagree (1), Disagree (2), Undecided(3), Agree (4) and Strongly agree (5) and Negative statements. Strongly disagree (5), Disagree (4), Undecided (3), Agree (2) and Strongly agree (1). Z score norms have been developed for interpretation purposes.

Sl.No	Range of Z score	Grade	Levels of attitude towards Mathematics
1	+2.01 and above	A	Extremely Favourable
2	+1.26 to +2.00	B	High Favourable
3	+0.51 to +1.25	C	Above Average Favourable
4	-0.50 to +0.50	D	Average/Moderate Favourable
5	-0.51 to -1.25	E	Below Average Favourable

6	-1.26 to -2.00	F	Highly Unfavourable
7	-2.01 and below	G	Extremely Unfavourable

VARIABLES OF THE STUDY

In the present study, while establishing the relationship between the attitude of students towards Mathematics and their mathematical ability. Mathematical attitude has been considered as an independent variable and mathematical ability as the dependent variable.

The demographical variables are

Gender of the students (Boys/ Girls).

Locality of School (Rural/Urban)

RESULTS AND ANALYSIS

Hypothesis 1: The attitude towards mathematics among higher secondary students is average.

Table 1:

Z score analysis of attitude towards mathematics score among higher secondary students

Variables	N	Mean	SD
Attitude towards Mathematics	772	164.48	17.818

Sl.No	Range of Z score	Grade	Levels of attitude towards Mathematics	No. of students	Percentage
1	+2.01 and above	A	Extremely Favourable	35	5
2	+1.26 to +2.00	B	High Favourable	101	13
3	+0.51 to +1.25	C	Above Average Favourable	183	24
4	-0.50 to +0.50	D	Average/Moderate Favourable	259	34
5	-0.51 to -1.25	E	Below Average Favourable	105	14
6	-1.26 to -2.00	F	Highly Unfavourable	66	9
7	-2.01 and below	G	Extremely Unfavourable	23	3
Grand Total				775	100%

The obtained value of the mean and standard deviation of attitude towards mathematics is 164.48 and 17.818.

It is evident from Table 1, that 5 % of higher secondary students are extremely favourable in the level of attitude towards mathematics, 13 % students have high favourable, 24 % have above average favourable, 34 % have average/ moderate favourable, 14 % have below average favourable, 9 % have highly unfavourable and 3% have extremely unfavourable in the sample selected for the study.

It may be concluded from the above table more students are in the above average favourable, average/moderate favourable and below average favourable levels of attitude towards mathematics.

Hypothesis 2: There will be no significant difference between mean scores of attitude towards the mathematics of boys and girls of class.

Table: 2
Significance of difference between the mean of attitude towards mathematics score among higher secondary level boys and girls

Gender	N	Mean	S.D	t-Value	Level of significance at 0.05 level
Boys	316	158.61	17.956	7.916	Significant
Girls	456	168.54	16.561		

The significant difference of Attitude towards Mathematics scores of boy and girl students, the mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of boys Attitude towards Mathematics scores is 158.61 and 17.956 and Girl students Attitude towards Mathematics scores is 168.54 and 16.561 The obtained 't' value is 7.916 From the table it can be concluded that there is a significant difference between Attitude towards Mathematics scores with respect to boy and girl higher secondary students (+2), so null hypothesis is rejected. Because the calculated value is less than the table value 't' at 0.05 level

Hypothesis 3: There will be no significant difference between mean scores of attitude towards mathematics with respect of locality of the school of higher secondary students.

Table: 3
Significance of difference between the mean of attitude towards mathematics score among rural and urban higher secondary school students

Gender	N	Mean	S.D	t-Value	Level of significance at 0.05 level
Urban	392	164.69	17.964	.334	Not Significant
Rural	380	164.26	17.687		

The significant difference of Attitude towards Mathematics scores of Urban and Rural school students, the mean, standard deviation and 't' scores were computed. The obtained value of mean and standard deviation of Urban school students Attitude towards Mathematics scores is 164.69 and 17.964 and rural school students Attitude towards Mathematics scores is 164.26 and 17.687 The obtained 't' value is .334 From the table it can be concluded that there is no significant difference between Attitude towards Mathematics scores with respect to the Urban and Rural school higher secondary Plus two students, so null hypothesis is accepted. Because the calculated value is more than the table value 't' at 0.05 level.

Hypothesis 4: There is no significant relationship between mathematical ability and attitude towards mathematics among higher secondary students of Puducherry region.

Table: 4

Significance of correlation between scores obtained in the Mathematical ability test and attitude score towards mathematics with respect to higher secondary students of class 12th

VARIABLES	N	Correlation value 'r'	Level of significance at 0.05 level
Mathematics Ability	772	.277**	Significant
Attitude towards Mathematics			

The Pearson's product-moment correlation was computed to find the relation between the Mathematical ability and Attitude towards Mathematics scores. It is found to be, the obtained correlation value is higher than the table value at 0.05 level. Hence the null hypothesis is rejected, there is a positive high significant relation between the Mathematical ability and Attitude towards Mathematics scores of higher secondary school students.

FINDINGS

Some important facts emerged during the course of the study:

1. From the study, we can say that the mathematical ability of the students depends on the attitude towards the mathematics of higher secondary plus two students.
2. Girls students show a better attitude towards mathematics when compared to Boys students
3. There is no difference between attitude towards Mathematics with respect to the locality of schools of higher secondary plus two students
4. It is found that there is a positive high significant relation between the Mathematical ability and Mental Ability of higher secondary plus two students.

CONCLUSIONS

On the basis of the findings, it may be concluded that the mathematical ability of the students at higher secondary level depends on the attitude towards mathematics. Further, girls students have a more positive attitude towards mathematics than boys students. Students should make a competitive environment, coordinate and exchange their knowledge from one another in mathematics teaching and learning. Boys students should be informed of the importance of mathematics and it is the basic tool for further education. Mathematics teaching and evaluation strategies should be unbiased. By this way, both the genders will tend to see themselves as equals, capable of competing and collaborating in classroom activities. There are no differences between the attitude towards mathematics with respect locality of the school.

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