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RESEARCH ARTICLE

STUDENTS' ATTITUDES TOWARDS THE MATHEMATICS LABORATORY AT THE SECONDARY SCHOOL LEVEL IN WEST BENGAL

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ABSTRACT

Mathematics is erroneously regarded as a abstract to understand meant only for persons of higher mental ability. It arouses fear among many students which in turn creates resistance to learning at and result in adverse effect on their attainment. But actually school mathematics is within the reach of any average students. What is needed is to create the right ambience of learning mathematics in every school. Mathematics needs to be learnt with senses of joy and delight. It needs to be related where possible to life oriented activities to create interest in the subject. Mathematical faculty and intuition develop not only through theory and problems given in mathematics text books but also through a variety of activities involving concrete objects. Activities can be engaging as well as instructive. The main purpose of this study is to find out the students' attitude towards mathematics laboratory. The researchers collected data using questionnaires and analyzed it using descriptive statistical tables, t-test and column charts.

INTRODUCTION

Teaching of mathematics should deal with the process and not just confine to transferring the knowledge from the mind of the teacher to notebooks of students through the tip of a pen for such a phenomenal change in teaching of mathematics, a right ambience is required and it is definitely the mathematics laboratory. It is because mathematics laboratory can act like a concomitant between teacher and students and provides an opportunity to understand and discover the beauty, important and relevance of mathematics as a discipline. It can be expected to enhance the pupils understanding of the subject as taught at the school and also provide a glimpse of what is beyond. UNESCO, S main activities in the mathematics education puts emphasis on raising public awareness and interest especially that of young people in mathematical concepts and application in daily life on attracting youth into mathematics related studies and carriers and showing that current curricula can be improved by hand mathematics experiments which develop scientific thinking as well as practical capabilities in mathematics and related science. The N.C.F (2005) for school education developed by NCERT strongly recommended setting up a mathematics laboratory in every school in order to assist in exploration of mathematical concepts through activities and experimentation. Alshafey *et al.* (2021), choose random sample was by the research community that includes female teachers and female students in the secondary stage in Jubail city.

The research sample consisted of (58 students and 12 teachers) divided into two groups, the first group involve 28 students who studied geometrical proof by employing the mathematics laboratory and the second group involve 29 students who studied geometrical proof without applying the mathematics lab. The results conclude that the reality of employing the mathematics laboratory from the point of view of the secondary school teachers (Jubail city) was generally moderate. Asiksoy *et al.* (2017), conducted a study on "The Impact of the Virtual laboratory on students Attitude in general physic Laboratory" In this study researcher try to find out the determine participant's views on the virtual laboratories in the physic laboratories course. This study was conducted using a mixed method. Research data were obtain via the (physics laboratory attitude scale) and semi structure interviews. The result of this study demonstrates that the virtual laboratory experiences had positive effects on student's attitudes. Ebele *et al.* (2008), study was inducted on "Effect of using mathematics laboratory in teaching mathematics on the achievement of mathematics students" In this study researcher investigate the effect of using mathematics laboratory in teaching on students achievement in junior secondary school mathematics. A total no of students were involved in the study. The study was a quasi experimental research. The result was showed that no significant difference exists in the achievement of male and female mathematics student taught with mathematics laboratory. Farooq *et al.* (2008), conducted a study on "Students Attitude Towards Mathematics". In this study researcher try to find out the effect of gender on students attitude towards mathematics at secondary school level.

To find out the difference between males and females students about the attitudes towards the mathematics at secondary level school. Survey method was used for data collection. The result of the study was no significant effect of gender on students attitude towards mathematics at secondary school level is accepted at 0.05 level of significance. Sneddon *et al.* (2013), "The attitude towards and experiences of laboratory teaching in year 1 chemistry and physics University Courses." The main purpose of the studies was to compare the attitude to their laboratories experiences of students in two science subject. Survey method was used for data collection. The picture that emerged has been found to be broadly consistent across those discipline.

Significance of the study:- Some of the way in which activities in a mathematics laboratory could contribute to learning of the subject are

- It provides an opportunity to students to understand and internalize the basic mathematical concepts through concrete situation. It lays down a sound base for more abstracts thinking.
- The laboratory gives greater scope for individual participation. It encourages students to become autonomous learners and allows and individual student to learn at his or her own pace.
- It helps build interest and confidence among the students in learning the subject.
- It provides opportunity to students to repeat an activity several times. They can revisit and rethink a problem and its solution. This helps them develop meta-cognitive abilities.
- It widens the experimental base and prepares the ground for better learning of new areas in the subject.

Objective of the study

- O₁:** To find out the difference between boys and girls secondary students attitude towards mathematics laboratories.
- O₂:** To find out the difference between urban and rural secondary students attitude towards mathematics laboratories.

Hypothesis

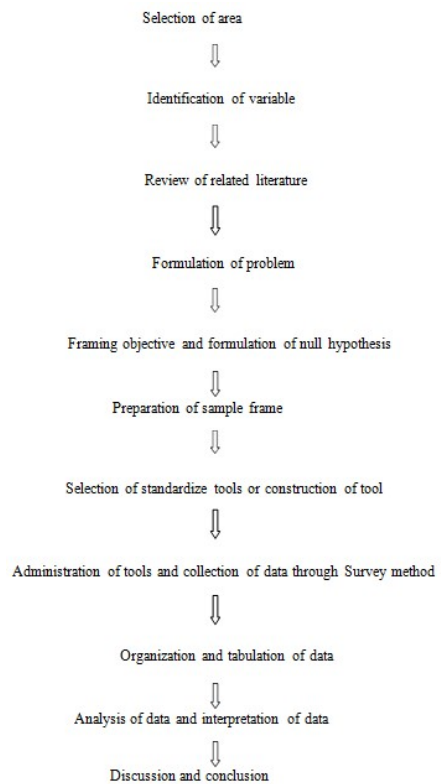
- Ho.1:-** There is no significant difference between boys and girls secondary students attitude towards mathematics laboratories.
- Ho.2:-** There is no significant difference between urban and rural secondary students attitude towards mathematics laboratories.

Statement of the problem: - In this present study researcher willing to find out the attitude of students towards mathematics laboratories in students of class IX. Hence this problem may be stated as "Students' attitude towards the mathematics laboratory at the secondary school level of West Bengal".

RESEARCH METHODOLOGY

Research methods play the pivotal role in the research process. It steers the research by influencing the steps starting from problem formulation up to the process of drawing inference and generalization. According to Howell K.E (2013) "the methodology is the general research strategy that outlines the way in which research is to be under taken and among other things, identifies the methods to be used in it. Means or modes of data collection or sometimes how a specific result is to be calculated are described in methodology.

Design of the study: The present study was done through descriptive survey study i.e., it was a quantitative study. Survey research design was employed under descriptive design which is as follows.



Variables:- The present research had identified two types of Variables.

Major variable - Attitude towards mathematics laboratory of secondary school students.

Categorical Variable – Gender (boys & girls), Area (rural & urban).

Population: The study was conducted on the area of South 24 Parganas . Four Bengali medium schools affiliated by WBBSE were selected in this study. The students of the government aided school of class IX were selected as the target population.

Sample frame

Location	Number of school	Genders		Number of students
		Boys	Girls	
Rural	2	50	50	100
Urban	2	50	50	100
Total	4	100	100	200

Sample and Sampling procedure: To constitute the sample, at first two schools were purposively selected. One of which is choose from the rural area and the other from the urban area of West Bengal. The sample was selected from the different school of South 24 Parganas. All the schools wear aided Government of west Bengal and academically controlled by west Bengal Board of secondary education (WBBSE). The sample has randomness in nature.

Tools of the study: Researcher had used one type of tools; was self-made attitude scale (Appendix-1) to measure the student's attitude towards mathematics laboratory.

Validity and Reliability of the tools: The scale was constructed by the present researchers. The total items of the scale were 20. The categories of responses were "strongly agree; agree; not decided; disagree; strongly disagree" and 5;4;3;2;1 were the respective scores awarded for these responses. Some items were negative in nature and scoring was done in reverse order i.e., 1;2;3;4;5. Content validity was done by two experts. The items were modified according to their suggestion. Few items were rejected and to avoid the ambiguity of items language of few items were modified by them. Reliability of the scale was computed by using Cronbach's Alpha through SPSS 20.0 version and was found 0.679 and it has a good alpha value and it was acceptable.

Cronbach's Alpha	Number of item
0.679	20

Procedure of data collection: Data related to the student's attitude towards mathematics laboratory was collected by researchers themselves, by personally visiting the Government aided schools.

Data analysis and interpretation:

Presentation of data: All the raw data were tabulated in MS Excel and further analyses were done in SPSS 20.0 version by importing data from Excel.

Descriptive statistics of attitude towards mathematics laboratories

Table no-3.1. Descriptive statistics of attitude towards mathematics laboratories

Mean	70.765
Standard Error	0.584084453
Median	69
Mode	64
Standard Deviation	8.26020155
Sample Variance	68.23092965
Kurtosis	-0.325711449
Skewness	0.582627173
Range	38
Minimum	55
Maximum	93
Sum	14153
Count	200

Table no 3.1 represents the descriptive statistic of attitude towards mathematics laboratories of Govt. school students. From descriptive analysis the mean score of attitude towards mathematics laboratories was 70.765, standard deviation was 8.26, skewness was 0.58, kurtosis -0.325.

Interpretation

Software Used:-The raw data were tabulated in MS Excel 2007 and analyses of data done through SPSS 20.0 version.

Objective-1

O₁: To find out the difference between boys and girls secondary students attitude towards mathematics laboratories.

Table-3.2 Mean & st. deviation of score genderwise

Gender	N	Mean	Std. Deviation
boys	100	70.01	7.105
Girls	100	71.41	9.23
total	200	70.71	8.26

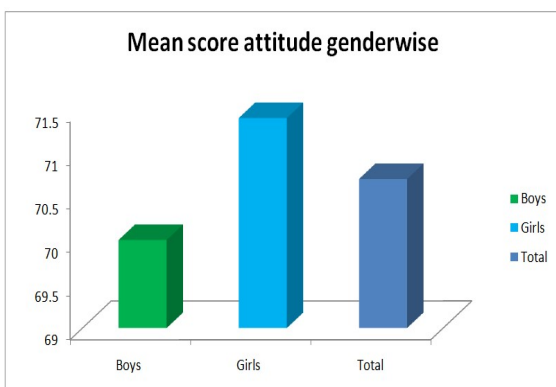


Figure 1. Column chart of mean attitude score (genderwise)

From the above data, it has been found to be 70.71 and the standard deviation value is 8.26 (table-3.2). Attitude score towards mathematics laboratories scale may range from 55 to 93. So it can be said that Govt. school Students of West Bengal possess moderate positive attitude towards mathematics laboratories.

Testing of null Hypothesis

H_{0.1}- There is no significant difference between boys and girls secondary students attitude towards mathematics laboratories.

Table 3.3. Group statistics and Independent samples test of attitude towards mathematics laboratories –Boys and Girls

Gender	Group statistics				t-test for Equality of Means		
	N	Mean	Std Deviation	Std Error mean	df	t	Sig.(2-tailed)
Boys	100	70.01	7.105	0.71	198	1.97*	0.19
Girls	100	71.41	9.23	0.58			

(*not significant at 0.05 level of significance)

From the analysis in table- 3.3, it is seen that in case of comparing students attitude towards mathematics laboratories between boys and girls WBBSE schools the calculated t(198) value is 1.97 and P value is 0.19 (p>0.05) Hence t is not significant at 0.05 level. So H_{0.1}- is accepted and it can be safely said that boys of Govt. school are not significantly different from girls of Govt. schools in respect to their attitude towards mathematics laboratories.

Objective-2

O₂: To find out the difference between urban and rural secondary students attitude towards mathematics laboratories.

Table-3.4. Mean & st. deviation of score locationwise

Location of school	N	Mean	Std. Deviation
Rural	100	75.1	8.567
urban	100	66.38	5.08
total	200	70.74	8.26

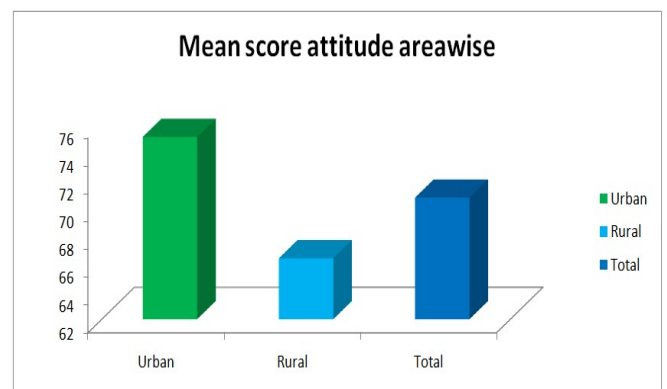


Figure 2. Column chart of mean attitude score (locationwise)

From the above data, it has been found to be 70.74 and standard deviation value is 8.26 (table-3.4). Attitude towards mathematics laboratories scale the secondary range from 55 to 93. So it can be said that Govt. school students of West Bengal possess moderate positive attitude towards mathematics laboratories.

Testing of Null Hypothesis

H_{0.2}- There is no significant difference between urban and rural secondary students attitude towards mathematics laboratories.

Table-3.5: Group statistics and Independent samples test of attitude towards mathematics laboratories –Rural and Urban

location	Group statistics				t-test for Equality of Means		
	N	Mean	Std Deviation	Std Error mean	df	t	Sig.(2-tailed)
Rural	100	75.1	8.567	0.85	198	1.97*	1.238
urban	100	66.43	5.08	0.51			

(*not significant at 0.05 level of significance)

From the analysis in table no 3.5. it is seen that in case of comparing students attitude towards mathematics laboratories between rural and urban Govt.

Schools the calculated (t-198) value is 1.97 and p value is 1.238($p>0.05$). Hence it can be safely said that rural Govt. school students are not significantly different from urban Govt. school students in respect to their attitude towards mathematics laboratories.

DISCUSSION

While to search and compare the attitude towards mathematics laboratories among the Govt school students of west Bengal (WB) under different categorical variables it has been found from the study that secondary school students of west Bengal Govt school posses a moderate positive attitude towards mathematics laboratories. Both the work of Asiksoy, S & Islec, D (2017) support this result that secondary level students had favorable attitude towards mathematics. While comparing the attitude towards mathematics laboratories it was found that rural students are not significantly different from the urban students. Higgins, J. L. (1970) find out more positive attitude towards mathematics. Osuafor, A.M.(2008) works revels that rural students have better attitude towards mathematics than urban students. While comparing the attitude towards mathematics laboratories it was found that Boys students are not significantly different from the girls students. Kannan, B. S., Sivapragasam, C., & Senthilkumar, R. (2015) works also support this finding that Boys students have better attitude towards mathematics than Girls students.

Major findings: In the light of objectives after completion of data analysis and interpretation several points have come out and the major findings are as follows.

- The mean score of the attitude scale among 200 students in four govt. schools was found 70.76 which is above the average [scoring range from 20 to 100] .Thus, from the statistics it may assume that the secondary school students of west Bengal schools posses a moderate positive attitude towards mathematics laboratories.
- Rural students mean score 75.1 of attitude towards mathematics laboratories was slightly higher than urban students mean score 66.38. It means that rural students in significantly posses a positive attitude towards the subject mathematics laboratories than the urban among W.B.B.S.E school.
- Girls students mean score 71.41 of attitude towards mathematics laboratories was slightly higher than Boys students mean score 70.01. It means that girls students in significantly posses a positive attitude towards the subject mathematics laboratories than the boys among W.B.B.S.E school.
- No significant difference between boys and girls secondary students attitude towards mathematics laboratories.
- No significant difference between rural and urban secondary students attitude towards mathematics laboratories.

Limitation of the study: Studies related to humanities are not always flow less. This present study had some limitations which are as follows:

- The study was limited only among the govt schools.
- The schools were selected mainly from southern part of west Bengal.
- The number of schools were only four Bengali medium school in South 24 Parganas.
- The selection of school students for this study was class IX only.

CONCLUSION

The analysis of the data clearly indicates that there is a positive correlation of the student's attitude towards mathematic laboratories in secondary school level in west Bengal. It was also found that there is no significant difference between boys and girls and there is no significant difference between rural and urban students attitude towards mathematics laboratories in secondary school.

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