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ATTITUDE OF HIGH SCHOOL STUDENTS TOWARDS IMPACT OF MATHEMATICS LABORATORY IN LEARNING

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ABSTRACT

The main objective of this study was to survey the extent of the use of laboratory approach to mathematics instruction in secondary schools of Amravati Division .Seven hundred high school students of VIII Standard were purposively sampled from various granted schools. The instrument used for the study was attitude scale of use of Mathematics Laboratory in learning . Major results showed that Mathematics laboratories are virtually non-existent in our secondary schools, and the laboratory approach to mathematics instruction is hardly used by mathematics teachers.



This study was based on a survey of high school students about their attitudes towards Mathematics laboratory use in learning . Students of both the gender constitute the population of this study. Sample of the study was 700 students (male = 350 and female = 350) of 8th Class selected conveniently from 10 government granted schools. Descriptive statistics and t-test with $P < 0.05$ level of significance were used for data analysis.

Based on the findings, state governments are advised to provide funds to schools to enable the establishment of mathematics laboratories.

KEY WORDS: Attitude , Impact, Mathematics Laboratory, Learning, High School Students .

INTRODUCTION

Mathematics Laboratory is a place where students can learn and explore mathematical concepts and verify mathematical facts and theorems through a variety of activities using different materials. These activities may be carried out by the teacher or the students to explore, to learn, to stimulate interest and develop favourable attitude towards mathematics. That is, a mathematics laboratory is a place where we find a collection of games, puzzles, teaching aids and other materials for carrying out activities. These are meant to be used both by the student by their own and together with their teacher to explore the world of mathematics, to discover, to learn and to develop an interest in mathematics.

Mathematics is the bedrock of all scientific technological investigations and has provided the route to modern world of science and technology. In order to understand the subject matter, teachers and researcher have developed problem solving models and strategies to consequently, improve the performance of learners (Adaramola & Onwoiduoikit, 2010).

Students have different intellectual capacities and learning styles that favor to knowledge growth. As a result, teachers are interested in ways to effectively cause students to understand better and learn.

Teachers want to bring about better understanding of the matter. It is the responsibility of the educational institutions and teachers to seek more effective ways of teaching in order to meet individual's and society's expectations from education. Improving teaching methods may help an institution meet its goal of achieving improved learning outcomes.

LEARNING BY DOING:

There are several ways of learning, viz., Learning by seeing and Learning by doing. "Learning by Doing" is one of the most effective ways of learning. It is in this context that mathematics experiments play a vital role in not only arousing the interest of the learner but also in making the learning of mathematics more meaningful. In the process of "Learning by Doing", students also learn some applications of Mathematics in real life situations, Hence the use mathematics experiments ensures better understanding among the students.

MATHEMATICS LABORATORY:

Mathematics Laboratory is a place where students can learn and explore mathematical concepts and verify mathematical facts and theorems through a variety of activities using different materials. These activities may be carried out by the teacher or the students to explore, to learn, to stimulate interest and develop favorable attitude towards mathematics.

Laboratory method is based on the principles of "learning by doing" and "Learning by observation" and proceeding from concrete to abstract. Students do not just listen to the information given but do something practically also. Principles have to be discovered, generalized and established by the students in this method. Students learn through hands on experience. This method leads the student to discover mathematical facts.

NEED AND PURPOSE OF MATHEMATICS LABORATORY:

Dr.N.M.Rao (2009) explained some of the ways in which a Mathematics Laboratory can contribute to the learning of the subject are:

1. It provides an opportunity to students to understand and internalize the basic mathematical concepts through concrete objects and situations.
2. It enables the students to verify or discover several geometrical properties and facts using models or by paper cutting and folding techniques.
3. It helps the students to build interest and confidence in learning the subject.
4. The laboratory provides opportunity to exhibit the relatedness of mathematical concepts with everyday life.
5. It provides greater scope for individual participation in the process of learning and becoming autonomous learners.
6. The laboratory allows and encourages the students to think, discuss with each other and the teacher and assimilate the concepts in a more effective manner.
7. It enables the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters, etc.

Taking into consideration the national aspirations and expectations reflected in the recommendations of the National Curriculum Framework developed by NCERT, the Central Board of Secondary Education had initiated a number of steps to make teaching and learning of mathematics at school stage activity-based and experimentation oriented. In addition to issuing directions to its affiliated schools to take necessary action in this regard, a document on „**Mathematics Laboratory in Schools – towards joyful learning**’ was brought out by the Board and made available to all the schools. The document primarily aimed at sensitizing the schools and teachers to the concept of Mathematics Laboratory and creating awareness among schools as to how the introduction of Mathematics Laboratory will help in

enhancing teaching- learning process in the subject from the very beginning of school education. The document also included a number of suggested hands-on activities.

Objectives: The following objectives have been formulated related to the study:

- i) To develop the attitude scale towards impact of mathematics laboratory in learning for high school students.
- ii) To find out the difference between students attitude towards confidence in use mathematics laboratory in learning patterns.
- iii) To find out the difference between Government and Government - aided high school students attitude towards use of mathematics laboratory for learning.
- iv) To find out the difference between urban and rural high school students attitude towards use of mathematics laboratory for learning.
- v) To find out the difference between English and Marathi medium high school students attitude towards use of mathematics laboratory for learning.

NULL HYPOTHESES

There is no significant difference between Government and Self-finance secondary school students attitude towards mathematics.

HO1: There is no significant difference between Government and Government aided high school students attitude towards impact of mathematics laboratory for learning..

HO2: There is no significant difference between male and female high school students attitude towards impact of mathematics laboratory for learning.

HO3: There is no significant difference between urban and rural secondary students attitude towards impact of mathematics laboratory for learning

HO4: There is no significant difference between English and Marathi medium high school students attitude towards impact of mathematics laboratory for learning.

METHOD AND PROCEDURE

Method of the Study: Considering the objectives and hypotheses of the study, the investigator had selected the normative survey method for the present study.

The following methods and procedures were adopted to conduct this study.

POPULATION AND SAMPLE

The random sampling technique was adopted the present study. The investigator selected only 8th standard students for the sample 700 students from Amravati Division, India.

Students of both the genders constitute the population of this study. Sample of the study was 700 students (male = 350 and female = 350) of the 8th Class from government and aided schools selected conveniently from Amravati Division.

TABLE -1

Type of school	Medium	Students	Gender		AREA	
			M	F	U	R
Government School	Marathi	200	100	100	100	100
Government aided school	Semi -Eng	500	250	250	350	150

INSTRUMENT FOR THE STUDY

Attitudes were measured by using researcher designed Attitude of students towards impact of math laboratory Scale consisted of 25 statements. This instrument was developed for measuring attitude of male and female students towards use of mathematics laboratory in learning. It consisted of four subscales: a confidence about mathematics learning ,to develop understanding of self learning patterns of mathematics, easiness in understanding subject mathematics laboratory method , enhancement mathematical interest .Some of them measured a positive attitude and some measured a negative attitude. This instrument was based on five point Likert scale. By adding the score for each scale, the total for that attitude was obtained. The highest possible score for each scale was 125 points. This adapted form of instrument was pilot tested and self prepared.

Statistical Used: The mean, standard deviation and t- test were used for analyzing the data.

Testing of Hypotheses:

Hypothesis: 1H01 There is no significant difference between Government and Government aided high school students attitude of impact of mathematics laboratory for learning.

TABLE -2

Variables	N	M	S.D	t-value	Level of significance
Type of school					
Government School	200	87.48	6.88	1.66	Not significant At 0.05 level
Aided school	500	88.40	6.18		

It is inferred from the above table: 2 that the calculated t- value (1.66) is lesser than the table value (1.96). Hence the hypothesis is accepted. Thus, there is no significant difference between government and aided high school students attitude towards impact of mathematics laboratory in learning.

Hypothesis: 2 H02: There is no significant difference between male and female high school students attitude towards impact of mathematics laboratory for learning.

TABLE -3

Variables	N	M	S.D	t-value	Level of significance
Gender					
male	350	87.73	6.62	1.67	Not significant At 0.05 level
female	350	88.54	6.16		

It is inferred from the above table: 2 that the calculated t- value (1.67) is lesser than the table value (1.96). Hence the hypothesis is accepted. Thus, there is no significant difference between male and female students attitude towards impact of mathematics laboratory in learning.

Hypothesis: 3 H03: There is no significant difference between urban and rural secondary students attitude towards impact of mathematics laboratory for learning.

TABLE -4

Variables	N	M	S.D	t-value	Level of significance
area					
Urban	450	87.68	6.62	2.61	significant

Rural	250	88.96	5.98		At 0.05 level
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It is inferred from the above table: 4 that the calculated t- value (2.61) is greater than the table value (1.96). Hence the hypothesis is rejected . Thus, there is significant difference between urban and rural secondary students attitude towards impact of mathematics laboratory in learning.

Hypothesis: 4 HO4: There is no significant difference between English and Marathi medium high school students attitude towards impact of mathematics laboratory for learning.

TABLE -5

Variables	N	M	S.D	t-value	Level of significance
Medium					
Marathi	200	87.83	6.88	1.00	Not significant At 0.05 level
Semi -eng	500	87.27	6.18		

It is inferred from the above table: 5 that the calculated t- value (1.00) is lesser than the table value (1.96). Hence the hypothesis is accepted. Thus, there is no significant difference between medium high school students attitude towards impact of mathematics laboratory in learning.

CONCLUSION :

Mathematics involves thinking logically and reasonably so as to understand how formulae are derived and their applications. In order to enhance learners' mastery and meaningful learning of mathematics, it is necessary to reduce to the bearable minimum its level of abstraction with the use of instructional materials used in mathematics laboratory activities. Mathematics laboratory provide opportunities to handle instructional materials that facilitate effective teaching and pleasant learning that is teaching aids through which learning process encourage and motivate student under the classroom situation. Thus laboratory enhances the quality of teaching learning process. Although mathematics is not an experimental science in the way in which physics, chemistry and biology are, a mathematics laboratory can contribute greatly to the learning of mathematical concepts and skills. After discovering something by own efforts, the student starts taking pride in his achievement, it gives him happiness, mental satisfaction and encourages him towards further achievement.

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