



ORIGINAL RESEARCH PAPER

Education

EFFECTIVENESS OF MATHEMATICS LABORATORY ON ACHIEVEMENT OF 7TH STANDARD STUDENTS

KEY WORDS: Learning Material, Mathematics Laboratory, Mathematisation.

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ABSTRACT

Mathematics is the cradle of all creations, without which the world cannot move an inch. According to NCF-2005, "Children learn to enjoy mathematics rather than fear it. Mathematics Laboratory is place where set of activities, puzzles and games based on mathematical concept introduced to students. Present study is concerned with the development and implementation of Learning Material for Mathematics Laboratory which will produce above benefits to the students. The major objective of the study was to measure the effectiveness of Mathematics Laboratory on achievement of 7th Standard Students. Quasi Experimental method was adopted for the present study. In this study, non-randomized two group pretest-posttest design was used. Achievement test is prepared to find the achievement of the 7th Standard Students on use of Mathematics Laboratory. The data collected from achievement test was analyzed by employing Mann Whitney U test. The major finding of study was Mathematics Laboratory facilitates in improving achievement of the 7th Standard Students in mathematics subject.

INTRODUCTION

"Mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true". ---Bertrand Russell

In day-to-day life, an individual comes across many situations, to deal with such situation where s/he needs to apply knowledge of mathematics. Since, waking up in morning till going to bed at night, everyone uses mathematics at different stages. Be it a cook or farmer, a carpenter or a mechanic, a shopkeeper or a doctor, an engineer or a scientist, a musician or a magician, everyone needs mathematics in their day-to-day life (Ningrum, H, 2015). Mathematics is continuously becoming more important in all walks of life. Thus, Mathematics is indispensable in human life!

According to NCF 2005, "Mathematics being a compulsory subject of study, access to quality mathematics education is every child's right. We want mathematics education that is affordable to every child, and at the same time, enjoyable.

Mathematics Laboratory

NCF (2005) suggested 'mathematisation of learner's thought processes' as one of the major goals of mathematics teaching. NCFSE (2000) and NCF (2005) have suggested Mathematics Laboratories to enable special emphasis on experimentation and exploration.

Mathematics Laboratory was known as "a special room containing manuals, computers, games and commercial books required to promote the development of perception in mathematics, and used by teachers in many ways; some teachers use it to teach a particular lesson or to complete a particular perception".

Mathematics Laboratory is a place where once can find a collection of learning materials, games, puzzles, materials, aids for learning mathematical concept. It is a place where students are provided with environment in which they learn mathematical concepts through set of activities. Adenegan (2003) enlisted functions of Mathematics Laboratory include the following:

- 1) Permitting students to learn abstract concepts through concrete experiences & thus increase their understanding of those ideas.
- 2) Enabling students to personally experience the joy of discovering principles & relationships.
- 3) Arousing interest & motivates learning.
- 4) Cultivating favorable attitude towards mathematics.
- 5) Encouraging & developing creative problem-solving ability.

- 6) Allowing for individual differences in manner & speed at which students learn.
- 7) Making students to see the origin of mathematical ideas & participating in "Mathematics in the making".
- 8) Allowing students to actually engage in the doing rather than being a passive observer or recipient of knowledge in the learning process.

Mathematics Laboratory provides opportunity to the students to explore concept by gaining hands on experience. The laboratory is one of the modern strategies for teaching mathematic, transforming the role of the teacher from an instructor to a facilitator and mentor of the teaching and learning process.

Review of Related Literature

Alshafey & Aldosary (2021) conducted a study on the reality of employing the mathematics lab and its relationship to developing geometrical proof skills among high school students. The results indicated that the obstacles of the mathematics lab mostly regarding materials as there is a lack of labs, equipment and tools.

Kategari & Samaleti (2021) conducted a study on A Study on Effectiveness of Math Laboratory Activities for Enhancing the Performance of Students in Mathematics. The finding of the study was indicated that the intervention programme has helped in increasing the performance of the students in mathematics through Math laboratory activities for standard eighth.

Malik et al. (2021) conducted a study on Effect of Usability of Mathematics Laboratory Facilities on the Achievement of Junior Secondary School Students in Number and Numeration. It was recommended that Mathematics Laboratory should be established, and laboratory approach of teaching mathematics should be adopted in our schools.

Objectives of the Study

- 1) To develop Learning Materials for Mathematics Laboratory for 7th Standard Students.
- 2) To implement Learning Materials of Mathematics Laboratory on 7th Standard Students.
- 3) To measure the effectiveness of Mathematics Laboratory on achievement of 7th Standard Students.

Hypothesis of the Study

H₀₁: There will be no significant effect of Mathematic Laboratory on achievement score of 7th Standard Students of control group and experimental group.
Variables of the Study

Table 1 Types of variables

Sr. No.	Types of Variables	Variable
1.	Independent Variable	Learning Materials of Mathematics Laboratory
2.	Dependent Variable	Student Achievement
3.	Control Variable	Ȳ Medium of Instruction: English Ȳ Standard 7th Ȳ Subject: Mathematics

Explanation of the key terms

Mathematics Laboratory

Rathod (2020) defined Mathematics Laboratory as "The Mathematics Laboratory is a place where anybody can experiment and explore pattern and ideas. It is a place where one can find a collection of games, puzzles, and other teaching and learning material".

Learning Materials

Hasibuan (2019) defined Learning Materials as "various activities, puzzles, games, etc. which facilitate student's learning in mathematics and improving students' math skills, especially the ability to understand mathematical concepts and student self-learning".

Type of Research

Present study was conducted to measure effectiveness of a Mathematics Laboratory on achievement of standard 7th students, so present research was classified in to applied research type.

In the present study, researcher want to find out the effect of Mathematics Laboratory on achievement of students. So, the study measures the cause- effect relationships. Therefore, the study is Experimental in nature.

Method of Research

Quasi Experimental method was adopted for the present study. In this study, non-randomized two group pretest-posttest design was used.

Population of the Study

In the present study, population comprised of student studying in academic year 2021-22. The population consisted of Standard 7th of English medium schools following NCERT syllabus in Gandhinagar district.

Sample and Sampling Technique

In present study, researcher adopted convenience sampling technique for selecting two English medium schools following NCERT syllabus as an experimental and a control group. All students of 7th Standard were selected as sample for the study.

From the selected sample, the students who appeared in both pre-test and post-test & secured 80% attendance during treatment implementation were considered as final sample. 26 of experimental group and 25 of control group were the final sample size.

Table 2 Final Sample

Sr. No.	Group	School Name	Sample
1	Experimental Group	Shree Ved International School	26
2	Control Group	Radiant school of science	25

Research Tool

In present study, researcher has prepared tool for data collection. Achievement test is prepared to find the achievement of the 7th Standard Students on use of Mathematics Laboratory.

Achievement test

For the present study, researcher constructed an achievement test to measure the achievement of 7th Standard Students after the use of Mathematics Laboratory in their learning.

Based on the data collected and observations from pilot testing, researcher has calculated difficulty value and discrimination value of all items involved in the test. Items having difficulty value more than or equal to 0.20 and less than or equal to 0.80 were considered as appropriate for involving in final test based on difficulty value while item having discrimination value more than 0.40 were considered as appropriate for involving in the test based on discrimination value. The final form of Achievement test consists of 11 questions of 30 marks.

Data Collection

Firstly, pre-test was administered on both the groups (Control and Experimental) on the same day. Then, the students were oriented regarding all the instruction of the tool. Afterwards, the learning materials based on Mathematics Laboratory was implemented only on experimental group by the researcher. The duration for the implementation of learning material of Mathematics Laboratory was of 6 days. After 6 days, the posttest was administered on both the groups (Control and Experimental) on same day.

Data Analysis Techniques

The data collected from achievement test was analyzed by employing Mann Whitney U test.

Data Analysis & Interpretation

Testing of Hypothesis

In present study, the researcher has collected data as Achievement score using Achievement test. For analysis of data computer software MS-Office was utilized.

Ho₁: There will be no significant effect of Mathematics Laboratory on achievement score of 7th standard students of control group and experimental group.

For the testing of hypothesis researcher used Mann-Whitney U test and Z test. Results obtained by the test are presented in table.

Table 3

Group	N	Rank Average	Sum of Ranks	U value	Z value	Significance level
Experimental	26	38.38	998	3	6.07	0.01
Control	25	13.12	328			

Calculation of Mann Whitney U test & Z test for control group and experimental group

As the observed Z value is 6.07 is greater than the critical Z value 2.58 at 0.01 significance level. Hence the hypothesis 'There will be no significant effect of Mathematics Laboratory on achievement score of 7th Standard Students of control group and experimental group' is rejected. That indicates that the achievement of 7th Standard Students in experimental group improved as a result of learning with Mathematics Laboratory as compare to learning of 7th Standard Students in control group. It indicates that learning with the Mathematics Laboratory facilitates in improving achievement of the 7th Standard Students in mathematics subject.

Findings of Study

There is significant effect of Mathematics Laboratory on students' achievement in experimental group and control group. It indicates that learning with the Mathematics Laboratory facilitated in improving achievement of the 7th standard students in mathematics subject.

CONCLUSION

The present study problem is useful to school education and improving quality of education. NEP, 2020 emphasis on numeracy and development of mathematical skills among school students. Mathematics Laboratory facilitate in gaining understanding about the mathematical concepts. It also facilitates in developing interest among the students for the mathematics learning. The present study concludes that school education should emphasize the mathematics learning with the use of Mathematics Laboratory.

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