



Effectiveness of teaching learning material in learning of selected topics of mathematics for the students of Standard-IX

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1. Introduction

Education is the integral part of one's life. Education teaches the human being how to live life and how to be happy in life. In the teaching learning process child is at the Centre and the teacher is just facilitator, guide. But in the present education system, teachers are at the Centre and students are taught using normal methods. Sometimes students are getting bored by this normal method and so many students are giving disrespect to Mathematics and they don't have interest in Mathematics subject just only due to the Conventional Mathematics teaching in classroom.

So there is need of using different methods in classroom which can boost the interest of the students in Mathematics. One or two line methods can be used effectively for solving divisions, reciprocals, factorization, HCF, squares and square roots, cubes and cube roots, algebraic equations, multiple simultaneous equations, quadratic equations, cubic equations, bi-quadratic equations, higher degree equations, differential calculus, Partial fractions, Integrations, Pythagoras theorem, Apollonius Theorem, Analytical Conics and so on. Whole Teaching-Learning Material Mathematics is one method of teaching Mathematics which makes the teaching of Mathematics interesting and will boost the interest of the students.

2. Importance of Teaching-Learning Material Mathematics:

The importance of Mathematics lies in the fact that any type of complex and critical multiplication or division can be done with simplicity. Through this system, students can resort to their own methods, without sticking to any one particular process. Teaching-Learning Material Mathematics presents in front of us a rational and unified structure of mathematics, with harmonizing, easy methods, at par with what most mathematics teachers of today are perhaps looking for - something better to make geometry and calculus easier for pupils. He realized only sixteen sutras cover all branches of mathematics – arithmetic, algebra, geometry, trigonometry, physics, plain and spherical geometry, conics, calculus, both differential and integral, applied mathematics of various kinds, dynamics, hydrostatics, static, kinematics and all.

3. Statement of the Problem

The title of the present study was verbalized as:

Effectiveness of teaching learning material in learning of selected topics of mathematics for the students of Standard-IX

4. Objectives of the study

The following are the objectives of the study. These objectives are divided into two sections.

1. To study the text book of Mathematics of class IX of Gujarati Medium School prescribed by GSEB, Govt. of Gujarat, Gandhinagar in order to select for Teaching Mathematics through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques.
2. To prepare teaching material accordingly plan of teaching Mathematics and to develop for Conventional Mathematical Techniques and gets its significance by experts.

3. To prepare teaching material accordingly plan of teaching Mathematics and to develop for Learning with teaching-Learning Material Mathematical Techniques and gets its significance by experts.
4. To prepare the test to measure achievement in Mathematics.
5. To study the effectiveness of learning through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques in relation to mathematical skills in teaching Mathematics among the students at class IX.

5. Operational Definition of terms

5.1 Effectiveness

The UNESCO definition of Effectiveness (educational) is: An output of specific review/analyses (e.g., the WASC Educational Effectiveness Review or its Reports on Institutional Effectiveness) that measure (the quality of) the achievement of a specific educational goal or the degree to which a higher education institution can be expected to achieve specific requirements.

In the present study effectiveness implies the impact measured by student achievement in Mathematics with reference to Teaching-Learning Material Mathematical teaching approach.

5.2 Conventional Mathematical Techniques

Conventional Mathematics technique means the present teaching of mathematics in the classroom by the teacher as the traditional method of teaching in the classroom i.e. oral work, drill work, written work, assignment technique, programme learning, computer assisted instruction technique.

5.3 Method

According to Cambridge International Dictionary, method means 'a particular way of doing something.' A 'method' is a set of procedures of a collection of techniques used in a systematic way which it is hoped will result in efficient learning. A method consists of a number of techniques probably arranged in a specific order.

5.4 Experimental Group

Group of students taught through Learning with teaching-Learning Material Mathematical Techniques experiment considered as experimental group.

5.5 Control Group

Group of students taught through conventional teaching method during experiment was considered as control group.

5.6 Mathematics Achievement

Score on Mathematics achievement test developed by Investigator, was considered as the Mathematics achievement.

5.7 Achievement Test

After the teaching work of six unit of Mathematics subject for Standard IX has been accomplished a teacher-made-test on related content was administered in order to ascertain the effect of Learning with teaching-Learning Material Mathematical Techniques. This achievement test was of 60 marks contains objective as well as subjective type of items. Here, achievement test was considered as Post-test.

5.8 Questionnaire

In the present study researcher has constructed the Questionnaire to know the opinion of the students of experimental group on the developed Learning with teaching-Learning Material Mathematical Techniques. After the treatment through Learning with teaching-Learning Material Mathematical Techniques to the students of experimental group, the feelings and experience of a student's were collected. These reaction and experience of the students during experiment were termed as opinion.

6. Variables of the Study

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. The following variables were considered in the present study.

6.1 Independent Variables

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his attempt to certain their relationship to observed phenomena.

In the present study, the investigator wanted to measure the effect of Conventional Mathematical Techniques, Learning with teaching-Learning Material Mathematical Techniques and Gender on students' achievement in Mathematics. So the following independent variables were considered for the present study.

- Conventional Mathematical Techniques
- Learning with teaching-Learning Material Mathematical Techniques
- Gender: Male and Female
- Habitat: Urban and rural

6.2 Dependent Variables

The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces removes or change independent variables. In the present study the effectiveness of learning with teaching-Learning Material Mathematical Techniques and Conventional Mathematical Techniques was measured on students' achievement in Mathematics' so the dependent variable was Achievement in relation to Mathematical skills of Speed, Accuracy and Interest.

6.3 Control Variables

Some independent variables not included in the study may affect the dependent variable. The Investigator has controlled to maintain the validity of research work. In present study two types of control variables will be involved. One is subject related control variables and second is student's personal domain related control variables. The following variables will be controlled during the implementation of the treatment.

Subject related control variables are:

1. Standard 3. Subject
2. Medium 4. Content

7. Hypothesis

Ho₁: There will be no significant difference between mean scores among the total sample students of class-IX after learning through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills.

Ho₂: There will be no significant difference between mean scores among the total sample of male students of class-IX after learning through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills.

Ho₃: There will be no significant difference between mean scores among the total sample of female students of class-IX after learning through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills.

Ho₄: There will be no significant difference between mean scores among the total sample of rural students of class-IX after learning through Conventional Mathematical Techniques and Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills.

8. Limitations of the study

Due to limitations of time, the present study was limited to the following aspects:

- The research tool developed by the researcher himself.
- The nature of present research work is being experimental in nature is restricted only to Ahmedabad city of Gujarat State.

- The research was restricted only to Std. IX of Gujarati Medium schools of GSEB, Gandhinagar.
- Present research study deals with comparisons of conventional Mathematics Techniques and Learning with teaching-Learning Material Mathematics Techniques only.

9. Research Methodology and nature of the Study

Research design is an important part of research. The choice of research design depends upon purpose of the study, the resources available and the kind of data that the problem entails. Post-test Experimental research design is preferred when the researcher wants to observe the effects of independent variables on the dependent variable within certain controlled situations. In the present study the researcher has used post-test experimental research method.

Experimental method provides much control and therefore, establishes a systematic and logical association between manipulated factors and observed effects. The researcher defines a problem and proposes a tentative answer or hypotheses. The researcher tests the hypotheses and accepts or rejects it in the light of the controlled variable relationship that he has observed. Post-test Non Equivalent True Experimental Control Group Design has been used in experimental situations in which it is not possible for the experimenter to assign subjects randomly to groups or exercise full control over the scheduling of experimental conditions. This design is often used where experimental and control groups are naturally assembled groups as intact classes which may be similar. Analysis of co-variance is used to compensate for the lack of equivalency between the groups. The researcher discussed with different subject experts and with the research experts about the design of the study. One experimental and one control group only posttest design can be diagrammed.

10. Population of the study

“Population is the aggregate of all units possessing certain specified characteristics on which the sample seeks to draw inferences”. All the students of IX standard of Gujarati Medium Secondary Schools of Ahmedabad city for the academic year 2018-2019 following the Gujarat text Board syllabus constitutes the population for the present study.

11. Sample of the study

“The representative proportion of the population is called a sample”.

A sample is a small proportion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it is drawn. The present study was experimental in nature. Researcher purposively selected Secondary Schools from Ahmedabad city for control group. In the present study, from the available different sampling methods, the researcher has selected the following sampling methods:

1. Purposive Sampling
2. Random Sampling

From the above two methods of sample selection, samples were selected easily from the population.

12. Research Tools

12.1 Mathematics Achievement

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12.2 Achievement Test

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12.3 Questionnaire

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13. Data Analysis and Interpretation

In the present study, the researcher studied the effect of independent variable. As an independent variable, the teaching method has two categories: Learning with teaching-Learning Material Mathematical Techniques and Conventional Mathematical Techniques. As dependent variable, academic achievement in Mathematics was covered. It was to be examined, "by using Learning with teaching-Learning Material Mathematical Techniques, whether the academic achievement in Mathematics of the students could be affected or not. This study constitutes the analysis and interpretation of data collected from two schools of Ahmedabad city City.

The analysis of data was done by applying the following statistical techniques mean, standard deviation and t-test and Chi-Square test. Graphical representation of data was done as an aid to the understanding of phenomenon under study.

The Teacher Made Test was administered as posttest and the data was collected as per the scoring key. Raw scores obtained from posttest were presented in tabular form for the purpose of interpretation. Mean, SD, F – test and ANOVA was counted for each group. Significant of difference between the mean scores of two groups were tested at 0.05 and 0.01 level and found out applying ANCOVA test. In the present study true-experimental research design was selected Independent variable was teaching methodology which had two levels:

1. Teaching through Learning with teaching-Learning Material Mathematical techniques
2. Teaching through Conventional Teaching Mathematical Techniques.

Academic achievement in Mathematics was dependent variable. Measurement of academic achievement of the students was done with the help of teacher made post-test which covered 6 topics of Arithmetic and Algebra portion of Mathematics subject. In post-test objective type answer, very short answer type and short answer type were included. Limitation of the marks was zero to fifty. Time duration was of one and half hours.

Besides this, to get the opinion of the students regarding developed VMT an opinionnaire was constructed. Opinionnaire was given in the students or experimental group only was given to the students of experimental group only who were taught through VMT. Scores obtained were computed by Chi-Square test.

In the present study, scores obtained in the post-test and opinionnaire were collected by the researcher and were saved in data file prepared in MS Excel 2007. These scores were analyzed with the help of MS Excel and SPSS computer programmer Version 17.

Descriptive statistics is used to describe the basic features of the data in a study. To know the statistical features of the data of distribution table is prepared by using SPSS programme. For each group mean, median, mode, standard deviation, skewness, kurtosis, descriptive statistical measures were calculated. In the present study, after completion of treatment, post-test was administered on the students of both the group and answer sheets were evaluated according to marking scheme. After evaluation, obtained scores were saved in data file and were utilized for knowing statistical features of scores of both the groups. Frequency distribution table was prepared for each group and mean, median, mode, standard deviation, skewness, kurtosis, t-test, Chi-Square test and effect size were calculated.

14. Findings of the Study

Major findings of the study are as follows.

A.Major findings with reference to post-test of the experiment.

B.Major findings with reference to perceptions towards Learning with teaching-Learning Material Mathematics teaching experiment with reference to Interest.

A.)Major findings with reference to post-test of the experiment.

1. Mean score of Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills found significant on the sample of total students. Thus, it has been observed that the mean score of the Experimental group of Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills were found significantly higher than the control group on the sample of total students.
2. Mean score of Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills found significant on the sample of total male students. Thus, it has been observed that the mean score of the Experimental group of Learning with teaching-Learning Material Mathematical Techniques in relation to Mathematical Skills were found significantly higher than the control group on the sample of total male students.

B.)Major findings with reference to perceptions towards Learning with teaching-Learning Material Mathematics teaching experiment with reference to Interest.

Null hypothesis that, there will be no positive response of the students of the experimental group towards Learning with teaching-Learning Material Mathematical Techniques was rejected. Therefore, on the basis of observed frequency of all the statements data can be interpreted as:

1. Frequencies for strongly agreement were higher than for agreement, undecided, disagreement and strongly disagreement responses for Learning with teaching-Learning Material Mathematics technique. It clarifies that majority of the students enjoyed with the Learning with teaching-Learning Material technique of Mathematics.
2. Frequencies for strongly agreement were higher than for agreement, undecided, disagreement and strongly disagreement responses for Learning with teaching-Learning Material Mathematics technique. Majority of the students accepts the present statement with strongly agree perception that difficult problems of the mathematics become easier through Learning with teaching-Learning Material technique of Mathematics.

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