

CHAPTER-3

METHODOLOGY

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3.1 Introduction

Accuracy of the results of any research work depends on the suitability of the procedure, use of appropriate tools, collection of relevant data, and on the correct statistical techniques employed for data analysis.

Methodology is concerned with the design of the study, sample of the study and the tools employed for testing of variables. This chapter is devoted to the description of sample of studying design of the study tools that were used to test the variables employed in the study, procedural details of data collection and statistical techniques used.

3.2 About the Study

Mathematics is one of the important subjects in the school curriculum. Everyone in all walks of life, be it a coolie or a scientist, faces the need to apply his basic mathematical knowledge to matters of daily life. Therefore, it is imperative that a pupil studying mathematics should attain the competency to apply what he has studied in various life situations.

In order to make school children attain the expected mathematical competencies, the teaching learning process should be focussed on the knowledge, understanding, and application component of each unit and the level of achievements in various teaching strategies adopted by the mathematics teacher.

Through this experimental study the investigator intends to develop innovative and effective teaching strategies for teaching mathematics in the classroom in order to enhance the level of achievement of primary children in mathematics. Hence, the problem for the present study has been stated as follows:

"Effect of Activity Based Teaching Strategies In Learning Mathematics: A Study".

Objectives of the Study

To study the effectiveness of activity based teaching learning strategies on achievements in mathematics of Class 7th students.

3.3 Assumptions Based on the Objectives of the Study

The following assumptions were made:

- Achievement in Mathematics depends on teaching strategies.
- Activity based teaching strategies can be effectively used to enhance the level of achievement in Mathematics.

- Activity based teaching strategies could be effectively used to help the children to acquire knowledge and to understand the concept and to apply it in various situations
- Activity based teaching strategies would help the children to solve the objective type, very short answer, short answer and long answer questions.

3.4 Procedural Set-up for Execution of Research

The research design gives the conceptual structure of the design, the type of design to be selected, advance planning of methods to be adopted, tools to be used, collection of relevant data and techniques to be used in analysis, in relation to the objectives of the research and availability of staff, time and money.

3.4.1 Design for present study

Before starting any work or investigation planning is must which enables the research investigator to proceed in a sequential and systematic way. The present study was quantitative in nature, quasi-experimental design was used. Experimental design employed in the present study was **two group - post-test only design** with non-equivalent purposive sample.

The present study involves the study of Activity-based methods of teaching in Maths and the investigator has made an attempt to find out the differences in the Academic Achievement among the students.

Experimental research study requires the construction of two different types of groups for experimentation. Accordingly control group and experimental group were constituted and the individuals were randomly selected and groups were constituted. Then Activity-based method of teaching was employed to teach 7th standard experimental group students in Mathematical Sciences. The effect was thus recorded to know the impact and also to compare it with that of conventional method of teaching. Control group was taught by traditional method means reading text book and communicating information give lecture to the student in the classroom in a group generally the teacher teaches in the class.

This design is stronger than single group pre-test- treatment- post-test design. In the single group design, the children get exposure to both the methods of teaching, which would affect the effect of the experiment. After gaining knowledge through the literature related to the methods of teaching and the problem under study, the experimental procedure was executed. The experimental factor i.e., activity based teaching strategy was applied to the experimental group and the traditional method was applied to the control group.

3.4.2 Steps in Experimental Research

Main steps in the experimental study four main steps were involved in the Experimental Research

- i. Surveying the literature relevant to the problem
- ii. Identifying and defining the problem
- iii. Formulating a problem hypothesis, and defining the basic terms and variables
- iv. Constructing an experimental plan which would involve:
 - Identifying all the non experimental variables that might contaminate the experiment and determining how to control them
 - Selecting a research design
 - Selecting a sample of subjects to represent a given population, assigning subjects to groups and assigning experimental treatments to the groups.
 - Selecting or constructing and validating instruments to measure the outcomes of the experiment.
 - Outlining procedures for collecting the data and possibly conducting a pilot or trial run test to perfect the instruments or design and stating the statistical or null hypotheses.

3.4.3 Importance

A research design is very important for the experiment, because a well developed design provides the structure and strategy that controls the investigation and extracts dependable answers to the questions raised by the problem hypothesis for reaching valid conclusion. Experimental design is the blue print of the procedures that enable the researchers to test conclusions about relationships between independent and dependent variables.

Experimental method was employed in the present study with **two group - post-test only design** with non- equivalent purposive sample.

Table 3.1: Design of the Study

Characteristics	Control Group	Experimental Group
Early Status	Class-VIIA	Class-VIIB
Treatment	Traditional Approach	Activity Based Approach
Terminal Status	Post Test	Post Group

3.5 Sample of the Study

The present study is an experimental study concerned with the role of activity based teaching strategies in enhancing the level of achievement in mathematics. Purposive sample technique was used for the present study. The researcher selected children of two sections belonging to the seventh standard of **SHASKIYA MADHYAMIK SHALA GARHI, RAISEN** as sample. It is a Hindi medium school. Since it was not possible to employ randomisation, which would upset the class schedule that is why the class as a whole in its natural setting was considered for the study.

Section A and Section B were selected as control group and experimental group respectively. There were 30 students in the experimental group and 28 students in the control group. Both the groups were taught by the researcher only.

Table3.2 Details of sample

Group	Section	No. Of Students
Control Group	VII A	30
Experimental Group	VII B	30

3.6 Variables

The present investigation is an attempt to determine the effectiveness of activity based teaching strategies in enhancing the level of achievement in Mathematics among children at the elementary level.

The variables involved are:

- a) **Independent variables:** The activity based teaching strategies and traditional method involved in the teaching of Mathematics were taken to be the independent variable in the present investigation.
- b) **Dependent variables:** The achievement scores of students in solving problems in Mathematics were treated as the dependent variable in this study.

3.7 Experimentation in Phases

Phase 1.

- a) Identifying suitable areas in the Mathematics Text book for the application of appropriate activity based teaching strategies for the study
- b) Understanding the terminology of 'Activity based teaching strategies' for instruction.

Phase 2.

Developing a systematic model of teaching for the application of activity based teaching strategies as well as for traditional method.

Phase 3.

- a) Developing instructional materials for the enhancement of the level of achievement in Mathematics among children through activity based teaching strategies.
- b) Preparation and validation of tools to measure the scores exhibited by the children in mathematics .

Phase 4.

Grouping the students into two groups with equal number of children in both the groups, namely, the Control group and the Experimental group through statistical techniques.

Phase 5.

Teaching of the children through two methods. The children of the control group to be taught through the traditional method and the experimental group to be taught through the activity based strategies of teaching.

Duration of the treatment would be eight days.

Phase 6.

- a) Administering the post-test after the completion of instructions through traditional method for the children of the control group and through activity based teaching strategies for the experimental group of students.
- b) Entering, categorizing and analyzing the post-test scores.

3.8 Tools

Through the review of related literature the investigator identified that the teaching strategies effectively change the pupils attitude towards Mathematics. Therefore, the investigator developed the achievement test to measure the achievement scores.

The following tools were used:

- Achievement test in Mathematics
- Lesson plans based on both the methods

All the two tools have validated by the Supervisor of the study.

3.9 Achievement test in Mathematics

An achievement test in Mathematics was constructed and validated by the investigator, in order to measure the level of achievement in Mathematics. The question paper covered whole unit of "CONGRUENCE" of NCERT Text book of Mathematics of standard VIIth. Total number of question were 6 .The test comprises of 30 marks and 20 minutes were given. Test was administered on both the groups.

3.9.1 Development of the Test

The test covers the topic "CONGRUENCE". Research Supervisor's opinion was taken into consideration while developing the tool.

Table 3.3 : Description of the Achievement Test in Mathematics

S.No.	Type of Question	No. of Questions	Marks allotted
1	Make pairs	1	2.5
2	Fill in the blanks	1	2.5
3	Short Answer	8	15
4	One word answer	1	3
5	Multiple choice	1	2
6	True/False	1	5

The test includes 12 questions, out of which:

- First question was making of congruent pairs from the following figures carrying 2.5marks for 5 pairs (half mark for each pair).
- Second was 'filling the blanks' type of question carrying 4 marks including three questions.
- Third was 'short answer type' question carrying 15 marks for 8 questions (2+2+3+2+1+2+2+1)
- Fourth question was 'answer in one word type' carrying 3 marks including 6 questions
- One multiple choice question carrying 4 marks including 4 questions, 1 mark for each
- State 'True or False' questions carrying 5marks including 5 questions of 1 mark each.

Achievement Test is attached in appendix-B.

3.9.2 Administration of the test

After giving the treatment of 8 days to the experimental group and teaching through traditional methods to the control group. Both groups were subjected to the post test and the scores of the post-test were collected.

3.9.3 Duration of Treatment

After selecting the two groups i.e. the Control group and the Experimental group, the investigator conducted the experiment. The students of the Control group were taught by the traditional method. The Experimental group was taught through activity based teaching strategies. The duration of the treatment was eight days.

3.10 Procedural Details of the Study

3.10.1 Development of Instructional Material

In this study is rational material was developed on the lines of teaching activity based teaching learning approach the steps followed in the development of instructional material were:

1. analysis of the content
2. breaking unit into topics
3. development of the lesson plans

3.10.1.1 Analysis of the Content

For the seventh standard a Textbook of Mathematics has been published by NCERT prescribed by the school selected was used by the researchers from the several chapters of the book ,single unit ‘**congruence**’ was selected and content analysis was done to identify necessary concepts principles and generalization.

3.10.1.2 Breaking of Units into Topics

After the content analysis the unit was divided into several topics and each topic have a specific behavioural outcome. To avoid the flow of subject matter while teaching and learning on the basis of the categories the instructional material in the form of lesson plans was produced.

3.10.1.3 Development of lesson plan

The lesson plans were prepared on the lines of activity based teaching method. While delivering the content various activities an integrated in the content so that the students can enjoy the mathematics with the activities.

Similarly, lesson plans for traditional approach were also be developed by the researcher.

3.10.2 Development of Tool

After the development of instructional material for assessing the achievement in mathematics an achievement-test was developed by the researcher. Weightage of marks given for various type of questions from the topic unit congruence is given in the table.

3.10.3 Procedure for Data Collection

The present study was conducted in two stages;

The initial stage: the instructional material and the tools were prepared and in the final stage implementation on the group of 58 students of class 7th as mentioned under the heading sample was

taken for experimentation. Out of 58 students 30 were in the experimental group and the remaining 28 were in the control group.

After designing of groups, the first lesson was taught to the experimental group, through the material developed on the lines of activity based teaching method. Activities given in the classroom, individual and group activities were given. Teaching to the experimental group was simultaneously observed by the teacher in the class-room and recorded. Before teaching the students of experimental group were told that a teaching will be done through the new procedure that is activity based method.

On the other hand, same lessons were taught to the control group through the traditional method on the same day in the next period.

After all the lessons of unit were completed, the post-test was administered immediately after 7 days. Scoring was done by the scoring key. Scoring key is provided in the appendix B.

3.10.4 Techniques Used for Data Analysis

In the present study, the relevant data obtained from the test scores of the post-test was analyzed using different statistical techniques.

Mean and standard deviation of the sample were calculated for comparing them.

Analysis provides inferences involving determination of statistical significance of difference between groups with reference to selected variables.

To compare the difference between the means of the small samples t- test is applied.

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