

Chapter III

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Chapter III

REASERCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents in detail the plan and procedure of the present study. Experimental research design is founded on the assumptions that the world works according to casual laws. The goal of experimental research is to establish this cause and-effect law by isolating causal variables. Some (if not all) important questions are about what causes what. Experimental research designs are the tools used for these questions. According to John Davis, "The goal of experimental research method is to establish cause and effect relationship between variables we hypothesize, that the Independent Variables cause the change in the Dependent Variables. The purpose of experimental designs is to eliminate alternative hypotheses. If we can successfully eliminate all alternative hypotheses, we can argue – by a process of elimination – that the Independent Variable is the cause".

If any experiment is well planned, below mentioned benefits can be achieved:

- Research work becomes easy and fast
- Proper directives are obtained.
- During experiments, one can perceive any problem which can arises.
- Wastage of time, memory and energy can be curtailed.

The research work is an organized endeavor. Like any other organized work research requires proper planning. To decide well in advance is planning. If research is not properly planned then the solution to any problem will lead in wrong direction. The primary purpose of the present study is to see the effect of Vedic Mathematical Techniques on Mathematical skills at class VII. For this, it was necessary to construct a suitable research design for the testing of the hypotheses. This chapter discusses the methodology and procedure adopted and the experimental design followed for the verification of the hypotheses formulated to achieve the objective of the present study.

3.2 Outline of the study

Out-line of the present study was as follows:

- Origin of Problem
- Population of the Study
- Sample Selection
- Selection of Experimental Design
- Content Selection
- Content Analysis of Selected Chapters

- Development of the Vedic Mathematical Techniques Tool
- Implementation of the Experiment
- Evaluation of the developed VMT Tool
- Data Collection and Analysis

3.3 Origin of the Problem

Before taking up any kind of research, the selection of the study subject becomes an essential element for a researcher. The selection of the problem is the first step in research. The term “problem” means a question or an issue to be examined. Vision of selection is totally based on the researcher’s preference.

Based on the researcher’s personal experience, as a mathematics teacher for three months of internship at JNV Raipur of Chhattisgarh district, the researcher found that the traditional way of teaching was insipid and non attractive. Also researcher found most of students have a fear of studying mathematics in maximum schools. Mostly the students of standard VII, find it difficult and uninteresting to understand and learn mathematics, especially chapters related to arithmetic and algebra. This has been discussed earlier in chapter two. Hence the researcher took up the challenging task of making the subject more attractive and lucrative in his study. After through analysis the research decided on students’ achievement.

3.4 Population

“Population is the **aggregate of all units** possessing certain specified characteristics on which the sample seeks to draw inferences”.

The population is the group of interest to the researcher, the group to which she or he would like the results of the study to be generalizable. Being an experimental study by nature, Students of std. VII studying in **15 Odiamediumschools of BhadrakTown** of Bhadrak district of Odisha state were included in the population. List of schools of Bhadrak Town is attached in Appendix – E

3.5 Sampling

“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 **60** students of class VII of Baulimani M.E School, Kodagambhira, Bhadrak of Odisha. Where 30 students were selected for experimental group and 30 students were selected for control group.

In the present study, from the available different sampling methods, the researcher has selected the following sampling methods:

- **Purposive Sampling**
- **Random Sampling**

From the above two methods of sample selection, samples were selected easily from the population. In the present study, from 15 the Odia medium Upper primary schools of Bhadrak was selected purposively and randomly. School selected for the sample is

- **Baulimani M.E School, Kodagambhira, Bhadrak of Odisha.**

3.6 Research Design

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. **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 **Quasi-experimental research method**.

3.6.1 Selection of Experimental Design

The present study is experimental in nature. For this purpose, Experimental and Control group (Pre-test, Post-test) design will be formed. The design of the study was as follows:-

Stage	ControlGroup	ExperimentalGroup
1. Pre-test	Measurement of achievement in Mathematics	Measurement of achievement in Mathematics
2.Treatment	Teaching problems of Mathematics through TraditionalMethod	Teaching problems of Mathematics through Vedic Mathematical techniques.
3.post-Test	Measurement of achievement in Mathematics	Measurement of achievement in Mathematics

Research design is the blue print of the research. Choice of a exact design is depend upon the intention of the experiment, the type of variables to be manipulated and the situations or restrictive factors under which it is to be conducted. The intend plan deals with such practical problems as how subjects are to be manipulated and restricted, and the type of statistical analysis to be used in interpreting data relationships. The design of an experiment has the purpose of giving the collection of details in such a manner that inferences of a casual relationship between the dependent and independent variables can

be drawn while framing an experimental design some important aspects should be kept in mind such as the method of **selecting experimental and control groups**, **measurement of dependent and independent variables**, **time** of measurement, **pattern** of controlled groups used and number of **possible casual** variables.

The purpose of an experimental design is to obtain maximum information with the minimum of cost and labour. For this purpose, two groups are chosen in such a manner that they do not differ from each other in significant respects except by chance. The experimental group is exposed to the independent variable while the controlled group is not. The two groups are then compared in terms of the assumed effect.

3.6.2 Content Selection

Contents are very important in research. Contents were selected according to the research problem. It's **validity** and **reliability** were tested by subject experts.

Arithmetical operations inlike **multiplication, division, square and square root** were selected for pilot teaching of traditional method and **Anurupena, NikhilumNavatascaramDasatha, yavadunum, Paryabartya, UrdhwaTriyak**were selected for Vedic method.

3.7 Research tool

In the present research, researcher used total two research tools to collect data from sample which are as under:

1. Pre – achievement test (**Pre-test**).
2. Mathematics Achievement test (**Post Test**) .

Out of two tools, first tool was Pre – achievement test of std. VII, second tool of Mathematics Achievement test was prepared by the researcher herself .

The details of the tools are given as follow:

3.7.1 Pre-Achievement test

The use of a pre-test at the beginning of a study may sensitize individuals by making them more aware of concealed purpose of the researcher and may serve as a stimulus to change. In the present study pre-test was taken **before** any **treatment** given.

3.7.2 Mathematics Achievement Test – Post Test

The post-test was prepared by the researcher herself keeping in mind the four basic objectives, knowledge, understanding, application and skills. The weightage of the post test was kept 30 marks. In the present study the researcher has prepared posttest to examine

the effect of Vedic Mathematical Techniques and Traditional method. The details of the development of the achievement in Mathematics are represented as under:

The researcher had followed the following process:

1. Discussing with the subject experts.
2. Deciding the objectives of the test.
3. Reviewing the materials and getting help and suggestions from subject experts.
4. Preparing blue print.
5. Writing of the test items.
6. Expert opinion on the test
7. Final form of the test

3.7.3 Discussing with subject Experts

Before to construct the Mathematics achievement test researcher discussed with the subject experts and got basic information about the construction of the test.

3.7.4 Deciding the objectives of the test

In the present study, the objective of development of achievement test was to know the Mathematics achievement after teaching of Vedic mathematical techniques and traditional method.

3.7.5 Reviewing the materials

The researcher had gone through the different materials of Mathematics teaching. Researcher had discussed with subject experts about the tests and finally the test was prepared for four objectives of Mathematics teaching. In the test researcher had decided to include objective questions, understanding questions, application type of questions and skill based questions.

3.7.6 Writing the test

The following points were kept in mind for writing the test.

1. Objectives of the questions
2. Weight age for the content
3. Formation of item under each objectives
4. Difficulty value and discrimination value of the item

3.7.7 Experts Opinions on the Test

The post test was sent to the experts for getting their suggestions with the design of the programme.

3.7.8 Final Form of the Test

After getting suggestions on Mathematics Achievement test experts, final form of test was written. Final form was consisting of the introductory page and test item pages. A copy of final Post Test is presented in **Appendix-B**.

The test was prepared based on 4 skills of Mathematics Teaching. Total 5 items in **knowledge**, 5 items in **understanding**, 10 items in **application** and 10 items in **skills** were included in the post – test.

Table 3.2

Weight age of Marks According to the Objectives

NO.	TYPE OF QUESTION	NO. OF QUESTIONS	MARKS ALLOTTED	PERCENTAGE
1	Knowledge	5	5	16.6%
2	Understanding	5	5	16.6%
3	Application	10	10	33.3%
4	Skill	10	10	33.3%
	Total	30	30	100%

The items form was very short answer and short answer type. The time limit for the test was 30 minutes.

3.8 Treatment

The researcher made the contact with the principal of Baulimani M.E school, kodagambhira, Bhadrak ,Odisha and finalized the schedule for pilot testing. The researcher also made contact with students and subject teachers. The researcher made a draw to finalize the teaching method and school. Due to covid – 19 pandemic situation and also a challenging condition to teach online basis the researcher decided to teach offline mode but outside the classroom with following the covid-19 guidelines. The pilot teaching was continued for **15 days** from 26-03-2021 to 14-04-2021

Table 3.3
Pilot Teaching Schedule of the Programme

Days	Date	Day	Topic (Experi. Grp)	Topic (Conv. Grp)	Experi. Group Time	Conv. Group Time
1	26/3/2021	Friday	Basic Mathematics (Multiplication)	Anurupena (Multiplication)	8 a.m-9 a.m	9 a.m-10am
2	27/3/2021	Saturday	Basic Mathematics (Multiplication)	Nikhilun Nave-TascaramDasath	8 a.m-9 a.m	9 a.m-10am
3	30/3/2021	Tuesday	Basic Mathematics (Multiplication)	Nikhilum Nava TascaramDasath	8 a.m-9 a.m	9 a.m-10am
4	31/3/2021	Wednesday	Basic Mathematics (Division)	Nikhilum (Division)	8 a.m-9 a.m	9 a.m-10am
5	01/4/2021	Thursday	Basic Mathematics (Division)	EkadhikenaPurvena	8 a.m-9 a.m	9 a.m-10am
6	03/4/2021	Saturday	Basic Mathematics (Division)	Paryavarta	8 a.m-9 a.m	9 a.m-10am
7	05/4/2021	Monday	Basic Mathematics (Division)	UrdhwaTriyak (Square)	8 a.m-9 a.m	9 a.m-10am
8	06/4/2021	Tuesday	Square based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
9	07/4/2021	Wednesday	Square based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
10	08/4/2021	Thursday	Square based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
11	09/4/2021	Friday	Square based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
12	10/4/2021	Saturday	Square root based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
13	12/4/2021	Monday	Square root based Examples	Yavadunum (Square root)	8 a.m-9 a.m	9 a.m-10am
14	15/4/2021	Thursday	Square root based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am
15	16/4/2021	Friday	Square root based Examples	Yavadunum	8 a.m-9 a.m	9 a.m-10am

3.9 Implementation of the programme

For implementation of the programme, the researcher made contacts with the Principal regularly during the programme. A good rapport was established with the subject teachers and students to create proper environment for the experiment in the school. The researcher made draw for deciding school. Then it was finalized that Baulimani M.E school would be taken as the research sample.

3.10 Procedure of Data Collection

Pre – achievement was considered as covariates in the present study. So the data regarding these variables were required. Hence, after selecting two group's result sheet of Mathematics subject of annual exam of std. 6 was collected from the school principal. After a over view of those result sheets researcher took a **pre-achievement test** before implementing the programme (Teaching in both method). After implementing the programme, the **post test** was administered to all the two groups. Both post-test content were same but the instructions are different. After administration of each of the tool, the responses of the subjects of each tool were scored.

3.11 Data collected

After the experiment and scoring of each subject, final data were Collected. Both the groups control and experimental were scored in both pre-test and post-test. The scores are given in **Appendix – C** and **Appendix -D**.