Chapter – 3

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Chapter – 3

Research Design and Procedure

3.1 Introduction

In chapter–2 related literature and review of Past researches along with significance of the present study is discussed.

In this chapter–3, a detailed discussion of origin of the problem, population and sampling, research design, selection and construction of tool, data collection, and statistical analysis is presented.

3.2 Origin of the Problem

21st century is the century of science and technology. There is progress in every sphere of life because of it. Technology also contributes a lot to the field of education too and as a result there are so many gadgets and one of them is calculator that uses for calculation. The use of calculator makes Maths learning a mechanical; or it works as barrier in developing mental abilities by learning Maths. Maths subject develops mental ability and problem solving skill in students. In our Indian culture Vedic maths is the fruit of four Vedas that develop higher order thinking skill in students. Swami Bharti Krishna Tirthji Maharaj has invented this Vedic maths. The students can calculate in a very fast in a short time. This study conducted with aim to create motivation among students to study or learn Vedic maths.

3.3 Population and Sample

Population

Population of this study is all the students of Std. 8 of 26 higher primary schools of Daman district.
Sample

In this study purposive sampling method was employed to select Government Higher Secondary School Dabhel of Daman district. In this school there were 2 classes of Std. 8 in which 32 students in A division and 32 students in B division. The two groups: experimental group and controlled group were selected by cluster sampling method. Thus, there were 32 students in experiment group and 32 students in controlled group. The following table describes sample of the present study.

Table – 3.1
Detail of Sample

<table>
<thead>
<tr>
<th>Name of School</th>
<th>Grade</th>
<th>Experimental Group</th>
<th>Controlled Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Higher Secondary School, Dabhol</td>
<td>8</td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

In table – 3.1 the details about the subject of experiment included as sample is presented. It is clear from the table that investigator has selected 32 in experimental group and 32 in controlled group. Thus, total 64 students were included in sample.

3.4 Research Method and Research Design

The present study was of experimental type research study.

Experimental Design

The selection of research design is developed on the objectives of the study. In the present study “Pre – Test – Post – Test controlled group design” was selected. The chart of research design is as below.
3.5 Clarification of Variable of the Study

Investigator has presented the detail of included variables in the present study in table – 3.2
# Information and Clarification of Variables of the Study

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variable Selected Variable in Present Study</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Independent Variable Teaching Methods (A) Conventional Method (B) Vedic maths Method</td>
<td>Variables that affects dependent variables. Control can be done of innovative teaching method</td>
</tr>
<tr>
<td>2.</td>
<td>Dependent Variable Score of Post test</td>
<td>Variable that shows response. Measure effect of independent variable.</td>
</tr>
<tr>
<td>3.</td>
<td>Co-variable Score of Pre-test</td>
<td>Variable remain during the whole experiment and affects dependent variables.</td>
</tr>
<tr>
<td>4.</td>
<td>Intervening variables Students’ grasping power, interest towards subject, enthusiasm, physical state, curiosity</td>
<td>Direct relation with experiment but can not measure though affects dependent variables.</td>
</tr>
<tr>
<td>5.</td>
<td>Controlled Variables Grade – 8 Maths Subject, Chapter(Unit)</td>
<td>This variable is that controls by investigator. This variable affects different effect on relation between independent and dependent variables.</td>
</tr>
</tbody>
</table>

Table – 3.2 indicates that investigator has taken teaching methods and vedic Maths method as independent variables, score of post –test were taken as dependent variable, score of pre-test were taken as co –variable, students’ grasping power, interest towards subject, physical state, curiosity were taken as intervening variable or Class – 8, Maths subject and Expansion unit were taken as controlled variable.

## 3.6 Selection and Construction of Tools

The selection and construction of tool for data collection having importance in research process. Tools are selected and constructed according to nature of objectives and necessity.
In this study selection and construction of tool was divided mainly into two parts.

1. Research Tool
2. Tool for Data Collection

3.6.1 Research Tool

Investigator has followed the below mentioned points to study effectiveness of Vedic maths of “Expansion” unit of 8th standard maths.

I. Selection of Unit
II. Analysis of Content
III. Sequence of Content
IV. Outline for the Content

I. Selection on Unit

Investigator has decided to select anyone unit of Maths subject of Grade–8 of Upper Primary school and in this context according to opinion of subject experts ‘Expansion’ unit of Maths textbook of Grade-8 was selected in this study.

II. Analysis of Content

Analysis of content was done as given in table – 3.2.
III. Sequence of Content

In this study investigator has selected sums according to the nature of Polynomial for maintaining sequence of content.

IV. Outline for the Content

Investigator took the advice of Maths subject teachers and experts after preparing the first form of the outline or frame of the content and made necessary changes in it according to suggestions of subject teachers and experts in it.

3.6.2 Tool for Data Collection

Investigator has developed two tools for data collection in this study and that is as under.

I. Target Test

II. Opinionnaire

3.6.2.1 Target Test

Investigator has developed a target test on ‘EXPANSION’ in Maths subject and the main aim of this test was to assess the knowledge of students before and after the test. Target test was used as pre – test or post – test.
This test was developed according to Blue print and it is classified as following.

**Table – 3.3**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Question</th>
<th>Number of Questions</th>
<th>Question wise Mark</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Maths the Pair</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Do Short Sums</td>
<td>4</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>8</td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

Table – 3.3 shows the structure of Post test and it is clarify from the table also that Post test was of 24 marks in which Maths the Pair and Short Sums types question were included.
3.6.2.2 Opinionnaire

An opinionnaire was developed with aim to know students’ opinion about Vedic maths and it was developed in simple language that students’ can understand easily and give their responses. There were 10 items in it and there were three points agree, neutral, not agree for each item and put ‘✓’ on any one of these. The main objective of this opinionnaire was to know effectiveness of teaching by Vedic maths. (Opinionnaire – Appendix – 3)

3.7 Pilot – Study

Generally pilot study is in two types.

1. Pilot-study by Experts
2. Pilot-study by Schools

1. Pilot- study by Experts

Experts were asked for pilot-study to maintain consistency and quality of experiment in which language experts, content experts were included.

According to suggestion of language experts changes made in sentence pattern/structure and spelling in Post test or even instruction in target test were also changes according to experts’ suggestion.

Subject experts were suggested to add more sums in frame for Vedic maths or suggested to made changes in some sums and made changes accordingly.

Thus, suggested changes were made and given final form of tool.

2. Pilot study in School

The pilot-study was carried out on Grade – 8 students of government secondary school, Varkund of Daman district. These students were selected on the bases of the marks of Maths subject in first test in which 4 – 4 students
having high, average or low achievement level were included and that is
given in table – 3.4.

Table – 3.4
Sample included in Pilot – Study

<table>
<thead>
<tr>
<th>Level</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>4</td>
</tr>
<tr>
<td>Lower</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

As shown in table – 3.4 four students having high, average and low
achievement level were selected for pilot-study.

In the beginning of the experiment, pre-test was given to the students
and then the students were taught by Vedic maths. After teaching by vedic
method post test was given to the students lastly opinion of all the students
about vedic maths method were taken by an opinionnaire. The time taken by
students during pilot study is given in table – 3.5.

Table – 3.5
Time Duration in Pilot Study

<table>
<thead>
<tr>
<th>Sr. No. of Students</th>
<th>Achievement Level</th>
<th>Time taken for Pre-pilot study</th>
<th>Teaching by Vedic Maths</th>
<th>Time taken for Post-test</th>
<th>Time taken for Opinionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High</td>
<td>24 minute</td>
<td>60 minute</td>
<td>25 minute</td>
<td>8 minute</td>
</tr>
<tr>
<td>2</td>
<td>High</td>
<td>24 minute</td>
<td>60 minute</td>
<td>24 minute</td>
<td>9 minute</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>26 minute</td>
<td>60 minute</td>
<td>26 minute</td>
<td>10 minute</td>
</tr>
<tr>
<td>4</td>
<td>High</td>
<td>25 minute</td>
<td>60 minute</td>
<td>25 minute</td>
<td>9 minute</td>
</tr>
<tr>
<td>Sr. No. of Students</td>
<td>Achievement Level</td>
<td>Time taken for Pre-pilot study</td>
<td>Teaching by Vedic Maths</td>
<td>Time taken for Post-test</td>
<td>Time taken for Opinionnaire</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------</td>
<td>--------------------------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Average</td>
<td>30 minute</td>
<td>60 minute</td>
<td>31 minute</td>
<td>10 minute</td>
</tr>
<tr>
<td>6</td>
<td>Average</td>
<td>31 minute</td>
<td>60 minute</td>
<td>30 minute</td>
<td>11 minute</td>
</tr>
<tr>
<td>7</td>
<td>Average</td>
<td>29 minute</td>
<td>60 minute</td>
<td>29 minute</td>
<td>11 minute</td>
</tr>
<tr>
<td>8</td>
<td>Average</td>
<td>30 minute</td>
<td>60 minute</td>
<td>30 minute</td>
<td>9 minute</td>
</tr>
<tr>
<td>9</td>
<td>Low</td>
<td>34 minute</td>
<td>60 minute</td>
<td>35 minute</td>
<td>12 minute</td>
</tr>
<tr>
<td>10</td>
<td>Low</td>
<td>35 minute</td>
<td>60 minute</td>
<td>34 minute</td>
<td>11 minute</td>
</tr>
<tr>
<td>11</td>
<td>Low</td>
<td>36 minute</td>
<td>60 minute</td>
<td>36 minute</td>
<td>10 minute</td>
</tr>
<tr>
<td>12</td>
<td>Low</td>
<td>35 minute</td>
<td>60 minute</td>
<td>35 minute</td>
<td>10 minute</td>
</tr>
</tbody>
</table>

Table – 3.5 describes the time duration for the pre-plot, pilot, pre-test, teaching by Vedic maths, post-test or opinionnaire.

Time of Pre-Test = 30 minute

Time of Post–Test = 30 minute

Time of Opinionnaire = 10 minute

Thus, the information about the time during pilot-study is depicted in table – 3.6.
Table – 3.6

Information about Time during Pilot-Study

<table>
<thead>
<tr>
<th>Average Time</th>
<th>Pre - Test</th>
<th>Treatment</th>
<th>Post - test</th>
<th>Opinionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 minute</td>
<td>60 minute</td>
<td>30 minute</td>
<td>10 minute</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Time : 2 hour 10 minute</td>
</tr>
</tbody>
</table>

Table – 3.6 indicates the time taken for pilot study and according to it 30 minutes for pre- test, 60 minutes for teaching, 30 minutes for post-test or for Experiment total time was 2 hours and 10 minutes.

3.8 Main Experiment Procedure

The main experimental procedure of teaching by vedic method was conducted in government high school, Dabhel of Daman district. In which 64 students of Grade – 8 were included and the students were selected by cluster method in which 32 students in experimental group and 32 students in controlled group were selected. The main experimental procedure is described in chart – 3.3
In the first phase pre-test was given to the students to assess pre-knowledge of students about ‘Expansion’ unit. That was 24 mark test. 30 minute time duration was given to the students of both groups.
In the second phase the students of experiment group was taught by Vedic method and controlled group was taught by traditional method. The time duration of both the group was 60 minute.

In the third phase, post test was given to the students of experimental group and controlled group and that was of 24 marks. Time experimental group and controlled group and that were of 24 marks. Time duration of this test was 30 minutes.

In the fourth phase, an opinionnaire consists of 10 items was given to the students of experimental group and duration of the test was 10 minute. The main aim of opinionnaire was to know opinion of students towards vedic method.

3.9 Method of Statistical Analysis

The method of statistical analysis of collected data is given in table – 3.7.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Specific Objective No.</th>
<th>Hypotheses No.</th>
<th>Method of Analyses</th>
<th>Reason of selection of Statistical Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>ANOVA</td>
<td>Selection of group is randomly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Co variable not controlled in the beginning of experiment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This technique is selected because effect of only one variable is tested.</td>
</tr>
<tr>
<td>2</td>
<td>2 3</td>
<td>2 3</td>
<td>3X2 Factorial co variance analysis</td>
<td>This technique is used because achievement level and teaching methods are respectively three and two level.</td>
</tr>
</tbody>
</table>
Table – 3.7 shows that one way co variance analysis was used for Hypothesis – 1 or $3 \times 2$ factorial co variance analysis was used for Hypothesis 2 and 3.

Even percentage was used to analyze opinionnaire in this study.

3.10 Conclusion

In this chapter investigator has discussed population and sample selection, construction of tool, main procedure of experiment or statistical analysis in detail.

In the next chapter, chapter – 4 presents analysis and interpretation of data.