

# **CHAPTER- 3**

# **METHODOLOGY**

### 3.1 Introduction

The purpose of the educational research can not be completed without detailed design of investigation. This chapter deals with the methodology employed to achieve the objectives of the study mentioned in chapter one under the following headings:

- Population
- Sample
- Variables
- Tools
- Administration of Tools
- Scoring
- Statistical Techniques

### 3.2 Population

In the study all the students of class VI studying in C.B.S.E. Schools of Bhopal district forms the population. The total number of C.B.S.E. schools in Bhopal district is 40 and the total number of students is 7105 Table-1 gives the detail of the population.

TABLE-1  
**Population of the Study**

Type →	Govt.	Private	Total
No. of Schools	4	36	40
Total no. of class-VI –Students	705	6400	7105

C.B.S.E. Schools were selected as they are generally considered best in terms of academics. The topic chosen, in general, is relevant to all the students studying mathematics subject from class V and above but in particular it is mentioned in text book of Class VI in detail. So class VI was considered for the study.

### 3.3 Sample

There are 40 C.B.S.E. Schools in Bhopal district. They were divided into two groups –Government and Private then from each group two schools were chosen at random. Finally, one section of Class-VI was taken from each of the four schools. The section taken was not selected by the researcher but it was as per the suitability of school authority. The number of students present in both the tests were finally taken as the sample size, which came out to be 166 i.e. the results of the study are on the basis of 166 students only Table-2 provides the details of the sample.

TABLE-2  
Sample of the Study

S. No.	School Name	No. of Students		Total
		Boys	Girls	
1.	K.V.-1(Govt. School)	27	20	47
2.	K.V.-2 (Govt. School)	18	25	43
3.	Jawahar Lal Nehru (Private School)	32	09	41
4.	Dr. Radha Krishan School (Private School)	17	18	35
	<b>Total</b>	<b>94</b>	<b>72</b>	<b>166</b>

### 3.4 Variables

Variables under study were as follows :

**Independent Variable:** Mathematics Achievement

**Dependent Variables :**

1. Awareness in properties of fundamental operations
2. Application of properties of fundamental operations
3. Ability in properties of fundamental operations.

**Background Variables :**

1. Gender
2. Type of School

### 3.5 Tools

Following tools were developed and *administered* by the investigator to collect data for present study:

- Awareness Test → For finding awareness of the properties of fundamental operations.
- Application Test → For finding application of the properties of fundamental operations.

For finding ability, total of marks obtained in both the tests were taken into consideration and marks obtained by the students in half yearly examination of their schools were considered to measure achievement in mathematics.

Both the tools were the test papers cum answer sheet i.e. no separate answer sheet was given to the students. Students were supposed to write the answers in the appropriate place provided for each item.

Each test had ten questions in it. But for the property wise analysis 10 questions were further divided into 51 items for Awareness test and 37 items for Application test. Table 3 and 4 shows the detailed distribution of various items with respect to various properties.

TABLE-3

#### Distribution of items as per the properties for Awareness Test

S.No.	Property	No. of Items	Percentage Weightage of marks
1.	Closure	10	18
2.	Commutative	10	22
3.	Associative	10	20
4.	Distributive	7	16
5.	Identity	14	24
	<b>Total</b>	<b>51</b>	<b>100</b>

TABLE-4

**Distribution of items as per the properties for Application Test**

S.No.	Property	No. of Items	Percentage Weightage of marks
1.	Closure	5	11.7
2.	Commutative	11	36.7
3.	Associative	6	15
4.	Distributive	8	20
5.	Identity	7	16.6
	<b>Total</b>	<b>37</b>	<b>100</b>

**3.6 Administration of Tools**

In the beginning all the four schools were visited to get two dates for conducting the two tests.

Clear instructions were given to the students before conducting the tests. Two days were assigned with each of the four schools i.e. total eight days were assigned for collecting the data. Two test papers were given alternately in the two K.V.'s and the two non-K.V.'s schools as follows:

TABLE-5

**Scheme for conducting the tests**

Schools ↓	Days→	Day-1	Day-2
	K.V.-1 (Govt. School)		Application
K.V.-2 (Govt. School)		Awareness	Application
Jawahar Lal Nehru (Private School)		Application	Awareness
Dr. Radha Krishnan (Private School)		Awareness	Application

Thus, efforts were made to reduce the influence of the two tests on each other. If there was any confusion regarding the instructions or items, students were asked to raise their hands. There was no fixed time limit for the test but ordinarily the students took 30 min. almost for completing the awareness test and almost 1 hour for completing the application test.

### 3.7 Scoring

Maximum marks for awareness test was 50 and for application test was 60 and scoring for various items of the two tests was as follows:

TABLE-6  
Scoring scheme for Awareness Test

Item No.	Marks	Item No.	Marks	Item No.	Marks	Item No.	Marks
1.	0.5	16.	1	31.	1	46.	1
2.	0.5	17.	1	32.	1	47.	1
3.	0.5	18.	1	33.	1	48.	1
4.	0.5	19.	1	34.	2	49.	1
5.	0.5	20.	1	35.	1	50.	1
6.	0.5	21.	1	36.	2	51.	1
7.	0.5	22.	1	37.	2		
8.	0.5	23.	1	38.	1		
9.	0.5	24.	1	39.	1		
10.	0.5	25.	1	40.	1		
11	2	26.	1	40.	1		
12	1	27.	1	42.	1		
13	1	28.	1	43.	1		
14	1	29	1	44.	1		
15.	1	30.	1	45.	1		

TABLE-7

**Scoring scheme for Application Test**

Item No.	Marks	Item No.	Marks	Item No.	Marks
1.	1	16.	2	31.	2
2.	1	17.	2	32.	2
3.	1	18.	2	33.	2
4.	1	19.	2	34.	2
5.	1	20.	2	35.	3
6.	1	21.	2	36.	2
7.	1	22.	2	37.	2
8.	1	23.	2		
9.	1	24.	2		
10.	1	25.	2		
11.	1	26.	2		
12.	1	27.	2		
13.	1	28.	2		
14.	1	29.	2		
15.	1	30.	2		

Scoring for awareness test was strictly as per the scheme given in Table-6 scoring for application test was also as per the scheme given in Table-7 but in few questions stepwise marks were considered as follows:

- Full correct solution → full marks.
- Partial correct solution → between zero to full marks of the item as per the appropriateness of the steps.
- Full incorrect solution → zero marks.

Detailed procedure of scoring is provided in appendix-III & IV.

### **3.8 Statistical Techniques**

The whole statistical analysis was basically divided into three sections and the related statistical techniques were used. In order to find the results pertaining to influence of achievement ANOVA was carried out. In order to find the results pertaining to relationship correlation was calculated and in order to find results pertaining to background variable t-test was used.