CHAPTER THREE

Methodology

3.0.0 INTRODUCTION

The preceding chapter has given a broad overview of the researches investigating various material developed and to test effectiveness of the material on arithmetic achievement. On the basis of these research findings, certain generalizations can be made which provide a rationale of the present study. This chapter presents that rationale and methodology of the study.

The purpose of the educational research can not be completed without detailed design of investigation. Research methodology involves a systematic procedure which starts from identification of problems to analyzing the obtained data. This chapter deals with..........

- Statement of the study
- Objectives of the study
- Hypotheses
- Sample
- Variables
- Tools
- Procedure of the study

3.1.0 RATIONALE OF THE STUDY:

1. The ultimate aim of education is to develop all round personality of an individual Mathematics learning is important not only is to achieve certain cognitive objectives but it is also instrumental in learning other subjects

2. Low achievement in Mathematics is a problem of great concern for parents, teachers and researcher for several decades and is subjected to many rigorous investigation. Review of researches on improving the arithmetic learning of low ability students of socially, economically backward and underachievers indicates that this problem has been approached from a variety of perspectives. To improve arithmetic learning a material has been developed and the effect of material has been checked in context of various variables like locale, gender, socioeconomic status, intelligence, mental and

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educational age, present educational qualification, personality adjustment and emotional intelligence.

3. Effect of material such as package of divergent product type problems, different number games, programmed learning material, Multimedia introduction material, Symbol picture logic programme (SPLP) is significant on students achievement. This material helps teacher as well as students in the process of teaching and learning.

4. After scanning the review the researcher has strongly felt the need to look into alternative material and its impact on achievement in Arithmetic.

Hence, the study is stated as below:

3.2.0 STATEMENT OF THE PROBLEM:

The present study is entitled as -

"Effectiveness of Alternative-Instructional Material (AIM) on Arithmetic Achievement of Class V Students" - A Study.

3.3.0 DEFINITIONS OF TERMS:

A number of Psychological and educational terms have been used in working on problem and in reporting the study. The important terms, very frequently used in the study are:-

1. **Instructional Material :** Any device, method or experience used for teaching purposed including text books, supplementary reading materials, audio- visual and sensory materials.

2. **Alternative Material:** The material, which provides alternative method for basic mathematical operations.

3. **Arithmetic Achievement:** Knowledge attained or skills developed in the subject, usually designating by test scores or by marks assigned by teachers or by both.

4. **Intelligence-Above Average, Average, Below Average**

Above Average Intelligence: "Definitely above the average in Intellectual capacity ", if a score lies at or above the 75 th percentile.

Average Intelligence: "Intellectually average", if a score lies between the 25 th and 75 th percentiles.

Below Average Intelligence: "Definitely below the average in Intellectual capacity ", if a score lies at or below the 25 th percentile.

3.4.0 OBJECTIVES OF THE STUDY:

Following Objectives are kept in view while conducting this investigation:-

- To measure the intelligence level of class V students.
- To study the arithmetic achievement of class V students.
- To develop Alternative-Instruction Material (AIM) on the basis of fundamental arithmetic for students of class V.
- To test the effectiveness of Alternative-Instruction Material (AIM) in classroom teaching for class V students.
- To identify the effect of Alternative-Instruction Material (AIM) in the context of variables like gender, locale and intelligence level.

3.5.0 HYPOTHESES:

The objectives stated above helped the investigation to formulate the major Hypotheses of the study. It is presented in null and directional form.

3.5.1 EFFECTIVENESS OF ALTERNATIVE INSTRUCTIONAL MATERIAL ON TOTAL SELECTED SAMPLE OF CLASS V.

- There will be significant effect of Alternative-Instruction Material(AIM) on arithmetic achievement of class V students.

Now , the researcher classified above hypothesis on the basis of gender, locale and intelligence level.

3.5.2 EFFECTIVENESS OF ALTERNATIVE INSTRUCTIONAL MATERIALAND COMPARISON OF SUB-GROUPS BASED ON GENDER(BOYS & GIRLS) :

In order to see the difference in the effect of Alternative Instructional Material (AIM) on gender following hypotheses have been formulated:
:

- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V boys.
- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V girls.
- There will not be significant difference of effectiveness of Alternative-Instruction Material (AIM) on arithmetic achievement of class V boys and girls.

3.5.2 EFFECTIVENESS OF ALTERNATIVE INSTRUCTIONAL MATERIAL AND COMPARISON OF SUB-GROUPS BASED ON LOCALE (URBAN STUDENTS & RURAL STUDENTS) :

In order to see the difference in the effect of Alternative Instructional Material (AIM) on locale following hypotheses have been formulated:

- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V urban students.
- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V rural students.
- There will not be significant difference of effectiveness of Alternative-Instruction Material (AIM) on arithmetic achievement of class V urban and rural students.

3.5.3 EFFECTIVENESS OF ALTERNATIVE INSTRUCTIONAL MATERIAL AND COMPARISON OF SUB-GROUPS BASED ON INTELLIGENCE LEVEL (BELOW AVERAGE INTELLIGENCE , AVERAGE INTELLIGENCE & ABOVE INTELLIGENCE) :

In order to see the difference in the effect of Alternative Instructional Material (AIM) on intelligence level following hypotheses have been formulated:

- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V below average intelligence level students.

- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V average intelligence level students.

- There will be significant effect of Alternative-Instruction Material (AIM) on arithmetic achievement of class V above average intelligence level students.

- There will not be significant difference of effectiveness of Alternative-Instruction Material (AIM) on arithmetic achievement of class V different level students.

3.6.0 RESEARCH DESIGN:

According to Borg & Gall (1983)," research design refers to procedure used by the researcher to explore relationship between variable to from subjects in to groups, administer the measure apply treatment conditions and analyze the data."

This study used experimental research design, the researcher used single group pre test post test design to find out the effect of alternative instructional material on arithmetic achievement among students of class V.

The design of the study is specified in table below:-

CHARACTERISTICS	EXPERIMENTAL GROUP
Entry status	Pre test
Treatment	Alternative Instructional Material
Terminal status	Post test

3.7.0 VARIABLES:

The essential feature of experimental research is that the researcher deliberately manipulates controls or observes the condition or characteristics which determine the events in which researcher is interested. These condition or characteristics are called "variables".**According to Borg & Gall(1983),**"A variable can be through of as a qualitative expression of a construct variables usually take the for of scores on a measuring instrument."

- **INDEPENDENT VARIABLES:**

The independent variables are the conditions or characteristics that the researcher deliberately, manipulates and control to determine the events in which researcher is interested and its relationship to an observed phenomenon.

- **DEPENDENT VARIABLES:**

The dependent variable is that factor which is observed and measured to determine the effect of independent variable. i.e. the factors that appears, disappears or varies , as the experimenter introduces removes or varies the independent variable.

- **BACKGROUND VARIABLES:**

The scores/ results of the study analyzed or interpreted through background variables.

In this study ,

INDEPENDENT VARIABLE	:	Alternative Instructional material(AIM)
DEPENDENT VARIABLE	:	Arithmetic achievement
BACKGROUND VARIABLE	:	Gender
		Locale
		Intelligence level

3.8.0 SAMPLE:

Data collection is an important part of the research. Data is collected from a selected sample and the sample is the representation of population. **According to Borg and Gall(1983),** "The larger group we wish to learn is called population, whereas the smaller group we actually study is called sample." Thus sample is a portion of the population which represents the population".

A good sample must be as nearly the representative of the entire population as possible and ideally it must provide the whole of the information about the population as from which the sample has been drawn.

In urban school, there are four sections of class V and each section has the strength of 35 students. The researcher has taken 13 students from each section by adopting random sampling technique. So, the sample of urban school consisted 52 students.

In rural school, there was only one section of class V. so, All the 42 students of that class consisted the sample.

3.8.1 CLASSIFICATION OF THE SAMPLE:

Thus, the total sample of 95 students was classified into sub-sample on the basis of criterion variables such as Gender, Locale and Intelligence level. The resultant classification of the final sample is summarized in table below:

TABLE: Classification of the final sample into sub sample (N=95)

NO.	CRITERION VARIABLE	SUB-SAMPLE	NO. OF STUDENTS	TOTAL
1	GENDER	BOYS	57	
		GIRLS	38	95
2	LOCALE	URBAN	52	
		RURAL	43	95
3	INTELLIGENCE LEVEL	ABOVE AVERAGE	27	
		AVERAGE	37	95
		BELOW AVERAGE	31	

3.9.0 RESEARCH TOOLS:

Tool is a device through which data is collected. It is always better to used standardized tools because their reliability and validity is established by the tool makers .So, in this study the researcher used standardized tool Coloured Progressive Matrices developed by

J. C.RAVEN to measure intelligence of the students.

In order to find a suitable standardized achievement test, various books were searched but no suitable achievement test was obtained for the purpose of this study therefore the researcher developed an achievement test according to the study.

3.9.1 RAVEN'S COLOURED PROGRESSIVE MATRICES (RCPM):

- **INTRODUCTION:**

The Coloured Progressive Matrices (CPM) consists of 36 items in 3 sets of 12;   A, Ab, and B . It is designed for use with young children and old people. The three set are arranged to assess the chief cognitive processes of which children under 11 year of age are usually capable. The item of Coloured Progressive Matrices (CPM) are arranged to assess mental development.

Presenting the test as Coloured illustration printed in a book or as boards and moveable pieces, makes the problem to be solved obvious, with the list possible verbal explanation.

* Children are first able to distinguish identical figures from different figure.
* Sometime after this, they are able to appreciate figures orientations with respect to themselves and other subjects in the perceptual field.
* Later they are compared analogs changes in the character perceived and adopt this as a logical method of reasoning.
* Subsequently they are able to analyzed the perceived whole into its constituent elements, or"characters" and distinguished between what is gives and what they themselves contribute.

Finally , they able to apprehend two or more discrete figure as forming a whole or organized individual identity.

- **ADMINISTRATION:**

    CPM tests are extremely easy to administer. In contrast to many other tests, it is not necessary to stick rigidly to any particular wording. The key requirement are first, to make sure that those taking the tests understand what they are to do and the method of through required to solve the problems. Second, to ensure that the tests are administered as same way to all who are to be tested and that the procedure adopted corresponds to that used when collecting any reference data with which the results will be compared.

    The test can be administered in two ways:

    1. Individual administration

    2. Group administration

- **SCORING, INTERPRETATION AND REPORTING:**

Coloured Progressive Matrices (CPM) can be easily scored. Score one point given for each correct answer.

The most satisfactory method of interpreting the significance of a person's total score is to considered .It in terms of percentage, frequency with which a similar score is to found to occur amongst people of the same age. For practical purposes it

scores accordingly. In this way it is possible to classify a person according to score obtained. For class 5 "intellectually impaired" if a scores lies at or below the 5 th percentile for that age group.

3.9.2. CONSTRUCTION OF ACHIEVEMENT TEST FOR PRE –TEST:

While planning about the test items in the test Bloom's Taxonomy of cognitive domain i.e. Knowledge, Understanding, Application and Skill was kept in mind. Accordingly the researchers prepared the test items and discussed with teachers and experts. Pre test is used to measure the achievement of learners before the interaction.

The sub topics included in the test are given below:

* Four basic operations (+, -, ×, ÷)

* Place value of a number

* Factors, Multiples, Prime numbers, Composite number

* H.C.F., L.C.M.

Before starting the treatment for the experimental group Pre-test was administered. The test consists of true and false statements, multiple choice questions, fill in the blanks and short calculation. The relative weightage of the text-items is as under:

Table: Distribution of test items and their weightage

NO.	TYPES OF ITEMS	NO. OF ITEMS	WEIGHTAGE
1	Multiple choice	10	10 marks
2	Fill in the blanks	10	10 marks
3	True\ False statement	10	10 marks
4	Short calculation	15	30 marks
5	Total	45	60 marks

3.9 3. CONSTRUCTION OF ACHIEVEMENT TEST POST-TEST:

After the treatment of the materials the test was again administered as the Post-test for Experimental group.

The main purpose of the Post-test was to know the effect of alternative-Instructional material (AIM) on arithmetic achievement of students. Format and difficulty level of the test was same as the Pre-test.

3.10.0 PROCEDURE OF THE STUDY:

The study took place in four phases:-

1. FIRST PHASE:-

In this phase, the researcher selected the school one each from urban and rural locale. During discussion principals and the teachers expressed that learning and teaching Mathematics is been difficult and boring , This difficulty , it is observed, is due to faulty pedagogy Therefore, the researcher informed and requested the principal to permit the researcher to teach arithmetic with alternative pedagogy.

2. SECOND PHASE:-

The researcher conducted Intelligence test to measure the intelligence of students and also administered Pre test to test the knowledge of the students in Arithmetic.

3 THIRED PHASE:-

In this phase, experimental group was given treatment of Alternative-Instruction Materials in class-room teaching. Researcher taught the students for 6 days.

4 FOURTH PHASE:-

The post test was administered to know the impact of the Alternative Instructional Material used.

3.10.1 DATA COLLECTION:

The tests were administered on school days. In the pre lunch session, RCPM's Intelligence test was administered first. After the school recess, in the post lunch session, arithmetic test was administered and treatment was given up to 6 days.

TABLE: Details of Data Collection :

NAME OF THE SCHOOL	INTELLIGENCE TEST	PRE-TEST	TREATMENT	POST-TEST
SHRI. R.S. KALARIYA PRIMARY SCHOOL,JUNAGADH	8-2-2006	9-2-2006	10-2-2006 to 17-2-2006	18-2-2006
RAMESHWAR VIDHYA MANDIR, MEJEVADI	8-2-2006	9-2-2006	10-2-2006 to 17-2-2006	18-2-2006