CHAPTER - III

METHODOLOGY

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3.0.0 INTRODUCTION

Introduction along with the objectives, hypotheses and the rationale of the study have been presented in Chapter I. The reviews of researches are presented in Chapter I. The present chapter deals with the methodology employed for the study. The purpose of the methodology chapter is to address the design and implementation of the quantitative research study. Research Design is the conceptual structure within which the research would be conducted. Its function is to provide for the collection of relevant information with minimal expenditure of effort, time and money. The preparation of a Research Design applicable for a particular research problem, involves the consideration of the following:

- Objectives of Research Study
- Methods of Data Collection to be adopted
- Source of information-Sample Design
- Tools for Data Collection
- Plan of Data Analysis

This chapter therefore deals with method, research design employed for the study along with the technique of sample collection, design of the study, tools, procedure of data collection and the statistical techniques for analysis of data.

3.1.0 METHOD

Experimental method was employed for the study.

3.2.0 DESIGN OF THE STUDY

The design employed for this research work was Post-test Control Group Design.

3.3.0 VARIABLES

In this experimental study the following variables have been identified:-

Independent Variables:

- Instructional Strategy in teaching of Chemistry
- Style of Learning and Thinking
- Gender
- Parental Profession

Dependent Variable:

- Achievement in chemistry

3.4.0 SAMPLE

In this study, the quasi-experimental design was used. The random assignment of already formed classes to experimental and control groups was employed to examine treatment effect. The size of the sample was 50 students studying in VII standard of MSB Educational Institute, Bhopal. Those 50 students consisted of two sections, i.e., A and B. Each section had 25 students. Section A was designated as Experimental group and section B was designated as Control group. Experimental group was taught through the instructional strategy developed by the investigator and the control group was taught through the Lecture cum Demonstration Method. Details of sample is presented in Table 3.1.

Table-3.1: Group-wise and Gender-wise Distribution of Sample

GROUP	BOYS	GIRLS	TOTAL
EXPERIMENTAL GROUP	11	14	25
CONTROL GROUP	9	16	25
TOTAL	20	30	50

3.5.0 TOOLS AND TECHNIQUES

In the present study, both standardized tools as well as the tool developed by the investigator were used for the collection of data. The following standardized tools were administered for the collection of data:

3.5.1 Style of Learning and Thinking-

This tool was developed by Dr. D. Venkatraman. It consists of 50 items based on

the following concepts:

Concepts for Learning Style

Verbal, content preference, class preference, learning preference, interest.

Concepts for thinking style

Logic/fractional, divergent/convergent thinking, creativity, problem solving, imagination.

The reliability coefficient of correlation for the right hemisphere function was found to be 0.89 for the left hemisphere function was found to be 0.65. The coefficient of correlation for the integrated part was 0.71 and validity correlation coefficient between the two tests was 0.82 for the right hemisphere part and 0.621 for the left hemisphere part and 0.678 for the integrated part.

3.5.2 Verbal Intelligence Test

This test was developed by Ojha and Ray Choudhary. The test is divided into 8 parts. Descriptions of the Intelligence Test was given in the Table 3.2.

Table- 3.2: Description of the Verbal Intelligence Test

PART	DESCRIPTION OF PART	NO. OF QUESTIONS	TIME ALLOTED FOR EACH PART
I	Classification	15	3 min
II	Analogies	15	4 min
III	Synonyms	20	4 min
IV	Number Test	12	5 min
V	Completion Test	13	5 min
VI	Paragraph Test	10	3 min
VII	Best Reasons	10	4 min
VIII	Simple Reasons		12 min
	Sub Part I	10	
	Sub Part II	7	
	TOTAL	112	40 min

The validity coefficient correlation is between 0.310 to 0.574 for different parts of verbal intelligence tests. The reliability coefficient by Kuder Richardson formula is between 0.68 to 0.91 and by half split method is between 0.64 to0.87 for different ability tests.

3.5.3 Multimedia Tool

The multimedia material of Edurite DigitALly version 3.6.01 from Pearson Education Services was used.

The contents used were from the topic Acid, Bases and Salts of VII standard, ICSE Board.

The following tools were developed by the Investigator.

3.5.4 Achievement Test in Chemistry

In order to measure the Achievement in Chemistry, investigator developed an Achievement Test in Chemistry. The procedures of development of the test was followed but it was not standardized. The tool was developed with the help of subject teachers of the school selected for study and also the experts in the field of teaching the subject. The test was consisted of 25 multiple choice questions based on the following topics:

- Acids
- Bases
- Salts
- Indicators
- Metal Activity series

The detailed description of the Achievement test is presented in Table 3.3.

Table – 3.3: Description of the Achievement Test in Chemistry

S.No.	Topics	No. of Questions
1	Acids	9
2	Bases	6
3	Salts	6
4	Indicators	2
5	Metal Activity Series	2
	Total	25

The maximum marks for the test was 25, i.e. one mark for each question.

3.5.5 Reaction Scale

The Reaction Scale was developed by the investigator with the help of supervisor, to study the effectiveness of the developed instructional strategy in terms of reactions of the students towards the strategy.

It consists of 16 statements. There were 5 options- Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA), and Strongly Disagree (SDA).

3.6.0 PROCEDURE OF DATA COLLECTION:

The data was collected by administering the tools described in the preceding captions.

The experimental group was taught through the developed instructional strategy, while the control group was taught through the Lecture cum Demonstration Method for 10 lessons of 30 min. each.

The Achievement test, Verbal Intelligence Test and Style of Learning and Thinking tool were administered to both the groups after completion of 10 lessons. The Reaction Scale was administered to the experimental group only.

Table - 3.4: Schematic Representation of the Experiment

<table>
<tr><th>Activity</th><th>Experimental Group</th><th>Control Group</th><th>Time</th></tr>
<tr><td>Group Formation</td><td>Students were randomly divided into two groups and the group were selected randomly</td><td></td><td></td></tr>
<tr><td>Activity</td><td>Experimental Group</td><td>Control Group</td><td>Time</td></tr>
<tr><td rowspan="3">Treatment</td><td>10 lessons were taught through the newly designed instructional strategy</td><td>10 lessons were taught through the Lecture cum Demonstration Method</td><td>Each class of 30minutes.</td></tr>
<tr><td colspan="2">Administration of Intelligence test</td><td>40 minutes</td></tr>
<tr><td colspan="2">Administration of Style of Learning and Thinking Tool</td><td>30 min.</td></tr>
<tr><td rowspan="2">Post Testing of Variable</td><td>Administration of Achievement Test in Chemistry</td><td>Administration of Achievement Test in Chemistry</td><td>30 min.</td></tr>
<tr><td>Administration of Reaction Scale</td><td>----</td><td>30 min.</td></tr>
</table>

3.7.0 STATISTICAL TECHNIQUES USED

1. For studying the effectiveness of instructional strategy in terms of
    a) Achievement of students in chemistry, and
    b) Reaction of students towards the strategy, descriptive statistics was used.
2. For studying the effect of treatment, gender and their interaction on the achievement in chemistry ANCOVA of unequal cell size was used.
3. For studying the effect of treatment, learning style and their interaction on achievement in chemistry ANCOVA of unequal cell size was used.
4. For studying the effect of treatment, parental profession and their interaction on achievement in chemistry ANCOVA of unequal cell size was used.
5. For studying the effect of gender, parental profession and their interaction on achievement in chemistry ANCOVA of unequal cell size was used.