# CHAPTER - III
# METHODOLOGY

### 3.0.0  INTRODUCTION

The first chapter deals with the introduction, conceptual framework, rationale of the study, objectives, hypotheses and delimitations of the research. The second chapter deals with the review of related literature. The methodology, sample, design, tools and procedure of data collection and statistical techniques used for the analysis of data have been presented in detail in present chapter.

### 3.1.0  METHODOLOGY

Experimental method was employed for the study. Experimental research is a scientific approach to research, where one or more independent variables are manipulated and applied to one or more dependent variables to measure their effect on the latter. The effect of the independent variables on the dependent variables is usually observed and recorded over some time, to aid researchers in drawing a reasonable conclusion regarding the relationship between these 2 variable types.

The experimental research method is widely used in physical and social sciences, psychology, and education. It is based on the comparison between two or more groups with a straightforward logic, which may, however, be difficult to execute.

Mostly related to a laboratory test procedure, experimental research designs involve collecting quantitative data and performing statistical analysis on them during research. Therefore, making it an example of quantitative research method.

### 3.2.0  DESIGN

Nonequivalent control group design was employed for the study. The Non-Equivalent Groups Design (hereafter NEGD) is probably the most frequently used design in social research. It is structured like a pretest-posttest randomized experiment, but it lacks the key feature of the randomized designs – random assignment. In the NEGD, we most often use intact groups that we think are similar as the treatment and control groups. In education, we might pick two comparable classrooms or schools. In community-based research, we might use two similar communities. We try to select groups that are as similar as possible so we can fairly compare the treated one with the comparison one. But we can never be sure the groups are comparable. Or, put another way, it's unlikely that the two groups would be as similar as they would if we assigned

them through a random lottery. Because it's often likely that the groups are not equivalent, this designed was named the nonequivalent groups design.

The design can be diagrammatically represented as follows:

<div align="center">

O X O

O X O

</div>

### 3.3.0 VARIABLES

Dependent Variable as learning progression of 9th class students in science. Independent variable or the treatment I am giving as constructive approach.

### 3.4.0 SAMPLE

Stratified random sampling technique was used for the study with the sample of 60 students, out of which 30 were considered as experimental group and rest 30 were as control group. One schools of Jajpur district that is Sharaswati Shishu Vidya Mandir, Jajpur nagar was chose for the study.

**Table – 3.1: Group-Wise and Gender-Wise Distribution of Sample**

| Group | Boys | Girls | Total |
|---|---|---|---|
| **Experimental Group** | 17 | 13 | 30 |
| **Control Group** | 20 | 10 | 30 |
| **Total** | 27 | 23 | 60 |

### 3.5.0 TOOLS

Mainly two tools, such as Achievement test in Science and Attitude towards Science were used for the study. The Achievement test in Science was developed by the investigator Miss. Nayak, 2021. Attitude towards Science was measured by administering the Attitude towards Science scale by Prof. Abinash Grewal, 1978. The descriptions of the tools are as follows.

### 3.5.1 ACHIEVEMENT TEST

Achievement tests are developed to measure skills and knowledge learned in a given grade level, usually through planned instruction, such as training or classroom instruction. Achievement tests are often contrasted with aptitude tests.

Achievement test refer to assessments which scores are often used to determine the level of instruction for which a student is prepared. High achievement scores generally indicate that a level of mastery of grade-level material has been reached, and that the student is prepared for advanced instruction. Conversely, low achievement scores can indicate the need for further remediation or repeating a course grade level.

There were six (06) questions. The Medium of Instruction was Odia. Each question had many items. But, all the items are of objective type. The maximum marks for the test was 25. Time allowed was 35 minutes. Descriptions of the test are as follows.

**Table- 3.2: Description of the Achievement Test in Science**

| Sl. No. | Name of the section | No. of Questions | Marks |
|---------|---------------------|------------------|-------|
| 1 | Multiple Choice Questions | 01 | 5 |
| 2 | Fill in the Blanks | 01 | 5 |
| 3 | Answer the Questions | 01 | 5 |
| 4 | True/False | 01 | 3 |
| 5 | Differentiation | 01 | 2 |
| 6 | Label the Diagram | 01 | 5 |
| **Total** | | 06 | 25 |

### 3.5.2  SCIENCE ATTITUDE SCALE

After the selection of sample, science attitude scale (SAS) was used as a suitable tool. The selection of tools for a particular study depends on various consideration i.e. the objective of the study, time available at the disposal of the investigator, availability of the suitable text, personal competence of the researcher to administer score and interpret the result etc. For the present work, questionnaire for SAS was used which contains 20 items. The questionnaire was researcher administered on high school students. It was seen that students did not face any ambiguity and difficultly. The SAS has accepted the definition of science attitude as an opinion or position taken w.r.t. a psychological object in the field of science (Richard W. Moore, 1970). The Science attitude has, therefore, been operationally defined as generalized attitude towards the universe of science content and being measured in terms of its favorableness or unfavorableness estimated from the scores obtained by the students on an attitude scale towards science comprising of four categories from the universe of contents 'Science Attitude'.

1) Positive intellectual

2) Negative intellectual

3) Positive Emotional

4) Negative emotional attitudes

For the construction of attitude task of SAS, the more commonly used techniques are (a) the method of paired comparisons; (b) the method of equal-appearing intervals; (c) the method of successive intervals; (d) the method of summated ratings also known as Likert method; (d) scalogram analysis and (e) the scale discrimination technique. Likert method and scale discrimination techniques were considered to be more appropriate for use in the construction of SAS. The construction of the scale was done through several procedural steps.

Each of the ten positive items of the SAS is assigned a weight ranging from 4 (Strongly Agree) to Zero (Strongly Disagree). In the case of ten negative items the scale scoring is reversed ranging from Zero (Strongly Agree) to 4 (Strongly Disagree). The attitude score of a subject is the total sum of scores on all the twenty items of the scale. For each student, a total score on the scale can be obtained by summating his scores for the individual items. Thus, a maximum of 80 scores can be obtained by a student. However, the administration of the test reveals that the scores ranged from 25 to 70. Most of the scales make use of raw scores only for the purpose of interpretation. But according to Thorndike and Hagen (1969), the raw scores can be converted into a percentile or standard score. Accordingly, percentile and standard scores were determined for use and interpretation of scale scores. Table I gives the complete norms of the scale in percentile scores (PS), standard scores and stannine. Verbal description and interpretation of the ranks obtained by a student are also given in this table.

Table - 3.3: Various Norms of SAS and Their Interpretations.

| Various norms of SAS and their interpretation. Attitude Scores | Ranges of PS and standard Scores (in brackets) | % of cases included | Stannine | Verbal Description |
|---|---|---|---|---|
| 65-69 and above | 99 and above (+2.29 to +2.85) | 1 % | 9 | Superior |
| 60-64 | -96.28 -99 (+2.29 to +2.85) | 5 % | 8 | Above Average |

| 55-59 | -84.08-89.20 (+0.89 to +1.45) | 12 % | 7 | Above Average |
|-------|-------------------------------|------|---|---------------|
| 50-54 | -60.12-72.72 (+0.18 to +0.75) | 24 % | 6 | Average |
| 45-49 | -30.24-42.40 (-0.52 to +0.5) | 30 % | 5 | Average |
| 40-44 | -10.28-25.32 (-1.22 to -0.66) | 18 % | 4 | Average |
| 35-39 | -3.18-5.50 (-1.92 to -1.36) | 7 % | 3 | Below Average |
| 30-34 | -1.16-1.96 (-2.63 to -2.06) | 2 % | 2 | Below Average |
| 25-29 | -10-0.0 (-3.33 to -2.77) | 1 % | 1 | Low |

## 3.6.0  PROCEDURE OF DATA COLLECTION

One schools of Jaipur district that is Saraswati Shishu Vidya Mandir, Jajpur Nagar was selected randomly and 60 students of class 9 of the school were selected randomly. The 60 students then divided into 2 groups, One group was designated as experimental group and another group was designated as control group. The experimental group was taught through specially designed contents in science and the control group students were taught through the traditional teaching method. Treatment of 45 days will be given to both the groups as per the respective methods mentioned above.

Before giving treatment of 45 days the attitude towards Science scale (Grewal, 1978) was administered to both the groups. Previous year Science achievement marks of the students of respective group were collected from the school register. An achievement test of 25 marks in Science was developed by the investigator and administered at the end of the treatment of 45 days to both the groups.

Both the tools were scored properly and data was analyzed using appropriate statistical technique.

## 3.7.0  STATISTICAL TECHNIQUES USED FOR ANALYSING THE DATA

- Mean
- Standard deviation

- Percentile
- Coefficient of variation
- 2 X 2 factorial designed ANCOVA of unique size will be used for the analysis of data.