CHAPTER -III

PROCEDURE OF THE STUDY
INTRODUCTION

A research work only be successful if an appropriate method is employed. The method is the gateway of the success in any investigation. If the procedure or the method is wrong, one will go to astray.

Procedure is an important phase of the research design. It is the index of whole research which gives a design to the investigator as well as to the reader. The clear and systematic statement of the procedure avoids all the difficulties in the way of research and helps the investigator to achieve aims and objectives of the study.

In fact the procedure or research design is the conceptual structure within which research is conducted. It constitute the blue print for the collection, measurement and analysis of data. Its role is to carry on the research work in a scientific, systematic and valid manner.

In planning a study, the investigator attempts to select the method or methods most appropriate to the particular problem under consideration. The quality of research depends not only on the adequacy of the research design but also on the fruitfulness of the measurement procedure employed.

The present chapter is a description of the actual procedure followed by the investigator with a view to collect and analyse the data to draw the conclusions in the light of formulated aims and objectives of the study. Description of the procedure is also important so that any researcher who wants to replicate the research can get the necessary informations from it, to replicate the work and verify the conclusions.
for future guidance.

The procedure which was followed has been discussed under the two main phases.

[3.1] Phase I - Phase of Planning

[3.2] Phase II - Phase of Execution

[3.1] PHASE I - PHASE OF PLANNING

Planning is selecting information and making assumptions regarding the future to formulate activities necessary to achieve objectives. It concentrates on setting and achieving objectives, it is an analytical thought process, it equips a person to look "within", "around", and "ahead" before he decides to take action, it is a rational activity based on foresight and knowledge. Planning is deciding in advance what, where, when, how much and by what means concerning an inquiry or a research study. Its focus is on making things happen. Visualizing the utmost importance of planning as a directional force in research work and for making her efforts economic in the sense of time, energy and expenses researcher planned her study under the following heads.

[3.1.1] SAMPLING

1. Selection of the Institutions
2. Selection of the Teachers
3. Selection of the Students.
[3.1.2] TEXT-BOOKS

1. Survey of Text-books.

2. Selection of the Text-books.

[3.1.3] TOOLS

1. Preparation of Analysis Sheet

2. Preparation of Opinionnaire

3. Preparation of Environmental Awareness Test.

[3.1.4] STATISTICAL TECHNIQUES

1. Descriptive Statistics

2. Inferential Statistics

[3.1.1] SAMPLING

A sample is a small portion of population which is selected for the purpose of the study or investigation because in educational research it is neither practising expend it, nor scientifically desirable to approach the total population. A sample is sub-set of population. The merits of concept of sampling lies in the economy of efforts, time, and money by conventional methods.

"Good results can be expected from a good sample". Hence great care was observed in the selection of the sample.

In the present study, two types of sample were required, which were drawn from the primary schools of Agra city in following manner -
[3.1.1.1] **SELECTION OF THE INSTITUTIONS**

For the selection of the institutions from which target sample was taken, the researcher first of all brought the lists of Junior high schools of Agra city of CBSE-ICSE and UP board form Joint director and BSA office, Agra respectively. From the lists 25 schools were selected through stratified random sampling technique because stratified random sampling is a refinement of simple random sampling since, in addition to randomness stratification introduces a secondary element of control as a means of increasing precision and representativeness.

![Diagram of Junior High Schools of Agra City](image)

**Fig. 3.1.1.1 Design for the Selection of Institutions**

[3.1.1.2] **SAMPLE I - SELECTION OF THE TEACHERS**

The total population of teachers (182) those who were teaching to Class III, IV & V of selected schools (25) were included in the first
sample required for seeking the opinion of teachers about the suitability of content given in the prescribed text-books of various subjects in relation to environmental concepts. Board-wise and sex-wise distribution of teachers has been given in the table below.

Table 3.1.1.2 Board-wise and Sex-wise distribution of teachers

<table>
<thead>
<tr>
<th>Sex</th>
<th>Board</th>
<th>UP Board</th>
<th>CBSE Board</th>
<th>ICSE Board</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td>59</td>
<td>31</td>
<td>18</td>
<td>108</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>37</td>
<td>24</td>
<td>12</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>96</td>
<td>55</td>
<td>30</td>
<td>181</td>
</tr>
</tbody>
</table>

[3.1.1.3] SAMPLE II- SELECTION OF THE STUDENTS

For the purpose of assessing the environmental awareness among children, the second sample was selected which constituted the children who completed their primary education (upto Class V) and were beginners of class VI. Out of 25 schools, 10 schools were selected accidentally. Among them 5 were affiliated to UP board, 3 to CBSE and 2 were affiliated to ICSE board. Total number of students 947 of class VI from 10 schools comprised the second sample. Board-wise and Sex-wise distribution of students is given below.
Table 3.1.1.3 Board-wise and Sex-wise distribution of students

<table>
<thead>
<tr>
<th>Sex</th>
<th>Board</th>
<th>UP Board</th>
<th>CBSE Board</th>
<th>ICSE Board</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>UP</td>
<td>114</td>
<td>61</td>
<td>32</td>
<td>207</td>
</tr>
<tr>
<td></td>
<td>CBSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>72</td>
<td>40</td>
<td>26</td>
<td>138</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>186</td>
<td>101</td>
<td>58</td>
<td>345</td>
</tr>
</tbody>
</table>

[3.12] TEXT-BOOKS

In the modern sense and as commonly understood text-book is a learning instrument usually employed in schools and colleges to support a programme of instruction. School text-books have commanded a great deal of attention in the years just past. In the present study evaluation of text-books of primary classes in the perspective of environmental awareness has been carried out by the researcher. To fulfil the objectives of the study, text-books prescribed by different boards of school education were selected by adopting following steps—

[3.1.2.1] SURVEY OF TEXT-BOOKS

To fulfil the major objectives of the study researcher carried out a survey of text-books of various subjects prescribed for primary classes by different boards of school education VIZ, UP., CBSE., ICSE.

[3.1.2.2] SELECTION OF TEXT-BOOKS

Survey of text-books projected the fact that the UP board has prescribed single book for each subject at primary level while CBSE & ICSE boards have more than one text books for the particular subject, but
the researcher considered only one book for each subject for content analysis. Board-wise, class-wise & subject-wise, lists of selected books are given below.

**Table-3.1.2.2.1 Class-wise and subject-wise list of prescribed text-books of UP board**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Class III</th>
<th>Class IV</th>
<th>Class V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi</td>
<td>ज्ञान भारती भाग—3</td>
<td>ज्ञानमारती भाग—4</td>
<td>ज्ञान भारती भाग—5</td>
</tr>
<tr>
<td>English</td>
<td>राष्ट्रीय इंग्लिश रीडर एंड ग्रामर भाग—1</td>
<td>राष्ट्रीय इंग्लिश रीडर एंड ग्रामर भाग—2</td>
<td>राष्ट्रीय इंग्लिश रीडर एंड ग्रामर भाग—3</td>
</tr>
<tr>
<td>Science</td>
<td>विज्ञान आओ करके करके सीखे भाग—1</td>
<td>विज्ञान आओ करके करके सीखे भाग—2</td>
<td>विज्ञान आओ करके करके सीखे भाग—3</td>
</tr>
<tr>
<td>Social Science</td>
<td>हमारी दुनिया हमारा समाज भाग—1</td>
<td>हमारी दुनिया हमारा समाज भाग—2</td>
<td>हमारी दुनिया हमारा समाज भाग—3</td>
</tr>
</tbody>
</table>
### Table 3.1.2.2.2: Class-wise and subject-wise list of prescribed text-books of CBSE board

<table>
<thead>
<tr>
<th>Subject</th>
<th>Class III</th>
<th>Class IV</th>
<th>Class V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi</td>
<td>अनुपम भारती भाग–3</td>
<td>अनुपम भारती भाग–4</td>
<td>अनुपम भारती भाग–5</td>
</tr>
<tr>
<td>English</td>
<td>Reading is Fun Book-3</td>
<td>Reading is Fun Book-4</td>
<td>Reading is Fun Book-5</td>
</tr>
<tr>
<td>Social Science</td>
<td>Candid Social Studies Part-3</td>
<td>Candid Social Studies Part-4</td>
<td>Candid Social Studies Part-5</td>
</tr>
</tbody>
</table>

### Table 3.1.2.2.3: Class-wise and subject-wise list of prescribed text-books of I.C.S.E. Board

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Class III</th>
<th>Class IV</th>
<th>Class V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi</td>
<td>नूतन सरल हिन्दी माला भाग–3</td>
<td>नूतन सरल हिन्दी माला भाग–4</td>
<td>नूतन सरल हिन्दी माला भाग–5</td>
</tr>
<tr>
<td>Science</td>
<td>The Joy of Science Part-3</td>
<td>The Joy of Science Part-4</td>
<td>The Joy of Science Part-5</td>
</tr>
<tr>
<td>Social Science</td>
<td>Primary Social Studies Part-3</td>
<td>Primary Social Studies Part-4</td>
<td>Primary Social Studies Part-5</td>
</tr>
</tbody>
</table>
Early in the planning stage of the research project, an investigator weighs the merits of various procedures for collecting evidence. After determining which approach yields the form and kind of data necessary to test his/her hypothesis adequately, examines the available tools and chooses the ones that is most appropriate for his/her purpose. Many writers have argued the superiority of the interview over the questionnaire or the use of the psychological test over the interview. The late Arvil S. Barr, University of Wisconsin teacher and researcher resolved discussions of this sort by asking "which is better, a hammer or a hand saw? Like the tools in the carpenter's chest each is appropriate in a given situation.

A researcher therefore must possess considerable knowledge about a wide variety of techniques and instruments. He/she must be familiar with the nature of the data that they produce, their advantages and limitations, the assumptions upon which their use is based and the extent of their reliability, validity and objectivity. If the existing instruments/tools do not meet his/her specific needs he/she supplements or modifies them or constructs his own. Similar was the situation of the researcher in the present study, as no tools were available to fulfil the purpose, therefore, researcher prepared three tools (Analysis sheet, opinionnaire and Environmental Awareness test) required to collect the relevant informations.

To achieve the aims and objectives of the study, three types of information: (data) were required - Firstly the suitability and coverage of the environmental concepts in the prescribed books of primary
classes of different boards, Secondly the teachers opinion about the content of books in the perspective of environmental awareness and Thirdly the level of environmental awareness among the beginners of class VI, and for the purpose, there was a need of specific tools which were not available, therefore researcher prepared her own tools. Description of the tools is as follows-

[3.1.3.1] PREPARATION OF ANALYSIS SHEET

As the prime objective of the study was to analyse the text-books of primary classes in the light of environmental awareness, first of all the researcher explained the concept of Environment and explored the components of environment.

![Components of Environment](image)

Fig. 3.1.3.1 Components of Environment
For preparing Analysis sheet, the content analysis method was adopted as the analysis of content is a central activity whenever one is concerned with the study of verbal material.

Content analysis consists of analysing the content of documentary materials such as books, magazines, newspapers and the contents of all other verbal materials which can be either spoken or printed. Content analysis prior to 1940's was mostly quantitative analysis of documentary materials concerning certain characteristics that can be identified and counted. But since 1950's content analysis is mostly qualitative analysis concerning the general import or message of the existing documents.

In order to arrive at results from the collected data, it is necessary to classify it. Content analysis is the reduction of social data into scientific and objective facts. In words of Berelson - "Content analysis is a research technique for objective, systematic and quantitative description of the manifest content of communication." Realizing the purpose and importance of content analysis, the researcher prepared the Analysis sheet and in preparing it, followed the main steps of content analysis.

![Fig. 3.1.3.2 Main Steps of Content Analysis](image-url)

[61]
In the process of content analysis for mentioning the facts, a detailed survey of text-books of primary classes prescribed by different boards of school education was done & the books were collected and categorised in tabular form.

In the study, three classes (III, IV & V) and three boards (UP, CBSE & ICSE) were under consideration, therefore the books of major subjects (Hindi, English, Science, Social Science) were taken in to account. To match the content of each subject's book with the major components of environment - Natural and Manmade environment, classes were formed in the Analysis Sheet. For the detailed analysis the columns for subjects, boards and main areas of environment, total number of units in each subject and sufficient space for mentioning the titles of chapters were given due weightage in making the design of analysis sheet. For the approval of the design of the analysis sheet, it was given to eminent professors and experienced schools teachers and researcher discussed with them. With the help of their suggestions the Analysis sheet was finally designed. Format of Analysis Sheet is shown in table 3.1.3.1.

[3.1.3.2] **PREPARATION OF OPINIONNAIRE**

An opinionnaire is a special form of inquiry used by the educational researchers to collect the opinion of a sample of population on certain facts or factors of the problem under investigation. These opinion on different facts of the problem under study are further quantified, analysed and interpreted.

The opinionnaire makes use of statements or questions on different aspects of the problem. It solicits responses on either a three point
<table>
<thead>
<tr>
<th>Subjects</th>
<th>SOCIAL SCIENCE</th>
<th>SCIENCE</th>
<th>ENGLISH</th>
<th>HINDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics Related to Natural and Man-made Environment and their Coverage Percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Number of Chapters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1.3.1 Format of Analysis Sheet
scale or a five point scale, eg-agree, undecided, disagree in case of three point scale and strongly agree, agree, undecided, disagree, strongly disagree in case of five point scale. It uses the favourable or unfavourable statements on different aspects of the problem in hand. It may be subdivided into sections. The golly poll ballots generally make use of questions instead of statements. The public opinion poll generally rely on personal contacts rather than mail ballots.

Opinionnaire are usually used in researches of the descriptive type, which demand survey of opinion of the concerned individuals. In the present study opinion of teachers was considered very important to draw the conclusions about the suitability of content in prescribed books of primary classes. Therefore the opinionnaire which was based on evaluation approach was prepared by adopting following steps-

[3.1.3.2.1] FIRST DRAFT OF OPINIONNAIRE

Opinionnaire aims to know that content given in the prescribed text-books of various subjects fulfils the objectives of Environmental Education or not. Opinionnaire was developed under five sections-Selection of Content, Organization of Content, Explanations, Illustrations and Exercises. Test items were in statement form having the responses in Yes or No. Covering all the five sections, 48 items were framed. These 48 items constituted the first draft of opinionnaire. In the end of opinionnaire, for the valuable suggestions of teachers regarding improvement in the text-book in view of environmental awareness space was provided. Number of items under each section in the first draft of opinionnaire were as follows (Vide Appendix No. 2)
### Table 3.1.3.2.1 Sections of Opinionnaire & No. of items in each section of first draft of Opinionnaire

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sections of Opinionnaire</th>
<th>Number of Items in Each Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Selection of Content</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Organization of Content</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Explanations</td>
<td>06</td>
</tr>
<tr>
<td>4.</td>
<td>Illustrations</td>
<td>07</td>
</tr>
<tr>
<td>5.</td>
<td>Exercises</td>
<td>07</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

#### 3.1.3.2.2. SCREENING OF THE ITEMS

For the screening of items, it was given to experts and experts scrutinised the test items. They pointed out few items as ambiguous and irrelevant and suggested some other items.

#### 3.1.3.2.3 TRY-OUT

Taking into considerations the experts views opinionnaire was properly reviewed and necessary modifications were made. After modification and rectification number of items in the preliminary draft were reduced to 30.

The modified opinionnaire was given to 20 teachers and further some modifications were made according to the suggestions of subject-teachers.
Final shape to the opinionnaire was given after try-out. Finally, the opinionnaire consisted of 30 items which were organised under five heads as shown in Table 3.1.3.2.2. (Vide Appendix No. 3)

Table 3.1.3.2.4 Sections of Opinionnaire & no. of items in each section of final draft of Opinionnaire

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sections of Opinionnaire</th>
<th>Number of Items in Each Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Selection of Content</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Organization of Content</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Explanations</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Illustrations</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Exercises</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

[3.1.3.5] RELIABILITY OF OPINIONNAIRE

Reliability refers to consistency of scores which is reflected in the reproducibility of scores.

There are four methods in common for computing the reliability coefficient. They are test-retest, alternative or parallel forms, split half techniques & rational equivalence. Test-retest method was employed for determining the reliability of opinionnaire. For the purpose the opinionnaire was given to 30 teachers teaching to primary classes. The opinionnaire was again given to same teachers after a period of
three months. The co-efficient of co-relation was calculated between the two sets of scores by using pearsons product moment co-relation method, which was found + .78.

[3.1.3.2.6] VALIDITY OF OPINIONNAIRE

Validity of a data gathering tools refers to the degree to which it measures what it intends to measure. It always refers to the purpose of the test. There are different kinds of validity. Validity of opinionnaire was judged by using content validity method. Content Validity of opinionnaire was determined by detailed study of related literature and experts opinion.

[3.1.3.3.] PREPARATION OF ENVIRONMENTAL AWARENESS TEST

One of the major objective of the study was to assess the environmental awareness among the beginners of Class VI. This objective was based on the assumption that after completing the primary education the knowledge about environment might throw light on the suitability or the shortcomings of the content given in the prescribed books of different boards of school education. If majority of children secure high score on the test (based on the content of different subjects) it might be inferred that the subject matter of the books, their organization & description might have played an important role in developing the environmental awareness in children.

Keeping in mind this assumption the researcher prepared the environmental awareness test and adopted the following steps-

[3.1.3.3.1] FIRST DRAFT OF ENVIRONMENTAL AWARENESS TEST

In preparing the first draft, content of text-book:of various subjects of
all the three classes (III, IV & V) was classified under two broader categories-Natural environment and Manmade environment and due importance was given to both type of environment in framing the test items.

To sustain the interest of the children, variety of items were framed and on the basis of type of items, test was divided in to three parts Viz-Multiple choice type, Fill in blanks type and True-false type.

**PARTS OF ENVIRONMENTAL AWARENESS TEST**

- **Part - I**
  - Multiple Choice type items

- **Part - II**
  - Fill-in the Blanks type items

- **Part - III**
  - True-false type items

**Fig. 3.1.3.3.1 Parts of Environmental Awareness Test**

All the three parts of the test were based on the knowledge aspect. In the first part multiple choice type questions were given to develop the thinking and reasoning, while in second part there were fill-in-the blanks type questions which reflected the accuracy of decisions. In the third part of the test true-false type questions were framed. Preliminary or first draft has been shown in the table given below. (Vide Appendix No. 4)
Table 3.1.3.3.1 Number of different types of test items under both type of environment in the preliminary draft of Environmental Awareness Test (EAT).

<table>
<thead>
<tr>
<th>Types of Test Items</th>
<th>Multiple Choice type items</th>
<th>Fill-in-blanks type items</th>
<th>True-false type items</th>
<th>Total Number of test items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Environment</td>
<td>19</td>
<td>13</td>
<td>07</td>
<td>39</td>
</tr>
<tr>
<td>Manmade Environment</td>
<td>16</td>
<td>12</td>
<td>08</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>25</td>
<td>15</td>
<td>75</td>
</tr>
</tbody>
</table>

[3.1.3.3.2] SCREENING OF ITEMS

The first draft was given to experts to screen the items. The experts in screening reviewed the accuracy of content, language ambiguity, repetition & relevance. Major suggestions of experts were to add an attitude scale and descriptive type questions in the test. A five point attitude scale having 15 items and 2 descriptive (short answered) questions were added. In suggesting these two points the assumption was to give importance to affective domain because their view was in dealing with nature heart is more important than head. Thus, in the first draft of the test, there were 5 parts instead of 3 parts to assess the knowledge as well as the attitude of the children about environment.

[3.1.3.3.3] TRY-OUT OF THE TEST

The modified test consisted of 75 items under 5 sections was administered on a group of 25 students of class VI. Researcher
enquired from the students about the difficulties of test and then the few test items were modified and improved on the basis of researchers observations and students reactions.

[3.1.3.3.4] FINAL DRAFT OF THE ENVIRONMENTAL AWARENESS TEST (EAT)

Environmental Awareness Test was given final shape by making some changes. There were total 57 items in (table 3.1.3.3.4) final draft of test out of which 42 were related to knowledge and 15 items were based on the attitude aspect. (Vide appendix No 5)

Table 3.1.3.3.4 Number of different types of test items under both type of environment in the final draft of Environmental Awareness Test (EAT)

<table>
<thead>
<tr>
<th>Types of Test Items</th>
<th>Multiple Choice Type</th>
<th>Fill-in Blanks Type</th>
<th>True-False Type</th>
<th>Attitude Scale</th>
<th>Short Answered Type</th>
<th>Total Number of Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Environment</td>
<td>10</td>
<td>06</td>
<td>05</td>
<td>07</td>
<td>02</td>
<td>30</td>
</tr>
<tr>
<td>Manmade Environment</td>
<td>10</td>
<td>04</td>
<td>05</td>
<td>08</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>15</td>
<td>02</td>
<td>57</td>
</tr>
</tbody>
</table>

[3.1.3.5] RELIABILITY OF THE TEST

The reliability of a test is its ability to yield consistent result from one set of measures to another. Reliability is not on all or non-principle. It is a matter of degree. No test is available which can be called perfectly reliable.
Reliability of the present test was determined by test-retest method. The final draft of test was administered to 25 students of class VI. The test was again administered on the same group after three weeks. The responses obtained during the test and retest were scored. The coefficients of correlation was calculated by using Pearson's Product Moment Correlation Method. The obtained test-retest reliability coefficient of correlation was found to be +.82.

[3.1.3.3.6] VALIDITY OF THE TEST

A test is a valid one if it measures what it intends to measure or that it must measure the objective or such an aspect of objective as the test claims that it is measuring. The Environmental Awareness Test (EAT) was validated by using content validity.

The content validity of the test was established by having a discussion with the experts. In the opinion of experts, the test was found to be valid because the test represented a high degree of content.

[3.1.4] STATISTICAL TECHNIQUES

Statistics may be defined as decision making in the light of uncertainty. Uncertainty does not imply ignorance, merely that an exact determination of the outcome of an experiment is not possible. A range of possible outcomes can often be determined on the basis of past experience or from observed sample data. Assuming the range or pattern of variability to be expected, a decision can be made as to whether observed data could reasonably have been taken from a population which has this assumed pattern. Statistical inference refers to the process of inferring something about a population from a sample.
drawn from that population.

In the present study both type of statistics descriptive and inferential were used to analyse the data. Following statistical techniques have been used in present study.

**STATISTICAL TECHNIQUES**

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Inferential Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>C.R. Ratio</td>
</tr>
<tr>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
</tr>
<tr>
<td>Quartile deviation</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td></td>
</tr>
<tr>
<td>Frequency polygon</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3.1.4 Statistical Techniques Used in the Present Study

[3.1.4.1] **DESCRIPTIVE STATISTICS**

Certain descriptive statistics were computed in order to describe the nature and distribution of scores obtained through various tests.

**MEAN**

The mean value was calculated as a measure of central tendency of environmental awareness scores to describe the average status of the groups as well as to compute the measures of kurtosis and skewness of the environmental awareness tests scores.

\[
M = \text{A.M.} + \frac{\sum fd}{N} \times i
\]

[72]
M = Mean
A.M. = Assumed mean
Σ = Sum Total
f = Frequencies
d = Deviation from assumed mean
N = Sum total of frequencies
i = Size of class interval.

MEDIAN

The median value of the various scores was computed to study the nature of distribution of environmental awareness tests scores & to compute the value of skewness and kurtosis.

\[
\text{Mdn.} = I + \left( \frac{\frac{N}{2} - F}{f_{m}} \right) \times i
\]

Mdn = Median
I = Exact lower limit of the class interval upon which the median lies
\( \frac{N}{2} \) = One half the total number scores
F = Sum of scores on all intervals below I.
fm = Frequency within the interval upon which the median falls
i = Size of class interval.

PERCENTAGE -

Percentage values were calculated in order to study -

1. The coverage of environmental concepts given in the text-books

[73]
of various subjects prescribed by different boards of school education.

\[
\text{Percentage} = \frac{x \times 100}{N}
\]

\(x\) = Number of chapters having environmental concepts

\(N\) = Total number of chapters

2. The opinions of teachers about the suitability of content of textbooks with reference to environmental awareness.

\[
\text{Percentage} = \frac{x \times 100}{N}
\]

\(x\) = Number of teachers showing 'yes' responses on the particular item of opinionnaire

\(N\) = Total number of teachers.

**STANDARD DEVIATION**

Standard deviation was calculated for further calculations such as standard error and 'C.R.' values.

\[
\text{S.D.} = \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2}
\]
S.D. = Standard deviation

i = Size of class interval

$\Sigma fd^2$ = Sum of the product of the frequencies and square of deviations.

$\Sigma fd$ = Sum of the product of frequencies and deviation

N = No. of scores

**QUARTILE DEVIATION**

Q.D. was computed for the values of Kurtosis and Skewness of the environmental awareness test scores.

$$Q.D. = \frac{Q_3 - Q_1}{2}$$

Q.D. = Quartile deviation

$Q_3$ = Third quartile

$Q_1$ = First Quartile

**SKEWNESS**

This statistics was calculated in order to study the amount of divergence from the normalcy as well as to ensure about the distribution of environmental awareness scores in the universe.

$$Sk = \frac{3(M-Md)}{\sigma}$$

Sk = Skewness
\[ M = \text{Mean} \]

\[ Md = \text{Median} \]

\[ \sigma = \text{Standard deviation} \]

**KURTOSIS**

Kurtosis was computed in order to study the normalcy of the distribution of environmental awareness scores and to ensure about the application of the higher sophisticated statistics.

\[ Ku = \frac{Q}{P_{90} - P_{10}} \]

\[ Ku = \text{Kurtosis} \]

\[ P_{90} = 90^{th} \text{ Percentile} \]

\[ P_{10} = 10^{th} \text{ Percentile} \]

**FREQUENCY POLYGON**

Frequency polygon were drawn to study the nature of distribution of scores as well as their scatteredness or concentration towards the mean in the sample as well as in the universe.

[3.1.4.2] **INFERENTIAL STATISTICS**

Following inferential statistics was used in the present investigation.

**Critical Ratio** - C.R. values were calculated to know the significance of difference of means of two groups.
\[ C.R. = \frac{M_1 - M_2}{\sqrt{\frac{6_1^2}{N_1} + \frac{6_2^2}{N_2}}} \]

C.R. = Critical Ratio

\[ M_1 = \text{Mean of the first group} \]
\[ M_2 = \text{Mean of the second group} \]
\[ 6_1 = \text{Standard deviation of first group} \]
\[ 6_2 = \text{Standard deviation of second group} \]
\[ N_1 = \text{Total number of frequencies of first group} \]
\[ N_2 = \text{Total number of frequencies of second group} \]

[3.2] **PHASE II - PHASE OF EXECUTION**

It is important to remember that planning process is more valuable than the plan itself. The planning process forces the research worker to mentally look ahead, while execution represents implementation of the plan and control aspect of the research work. Actions taken by the researcher to execute the plan have been explained under following heads -

[3.2.1] **ANALYSIS SHEET**

1. Application of Analysis Sheet

[3.2.2] **OPINIONNAIRE**

1. Administration

2. Scoring
ENVIROMENTAL AWARENESS TEST

1. Administration
2. Scoring

ANALYSIS SHEET

APPLICATION OF ANALYSIS SHEET

Approved design of analysis sheet was used to analyse the content of text-books prescribed by different boards of education. As the analysis sheet was meant for categorization on which basis the content was analysed from a quantitative angle. The analysis of content proceed under certain control that rendered it systematic and objective in comparison to the conventional impressionistic review of content of books. Firstly the content was analysed chapter-wise in relation to its suitability with the natural and manmade environment for the various subjects. Topics were identified and quoted in the column accordingly.

In the first column of analysis sheet subjects were mentioned and in the second column which is divided in to two parts sharing natural and manmade environment by green & pink colour respectively and identified topics have been quoted in the appropriate column.

A quantitative procedure was used in order to provide a measure of dominance and emphasis in the material of certain ideas or themes found so that the comparison with other subjects, class and board could be made. The percentage of coverage of environmental concepts in each subject has been quoted in the first part of second column &
total number of chapters were mentioned in the second part of same 
column.

Similar procedure was adopted for the analysis of content given in 
the books of other boards.

[3.2.2] OPINIONNAIRE

[3.2.2.1] ADMINISTRATION OF THE OPINIONNAIRE

Opinionnaire was administered on primary school teachers to get 
informations regarding relevance of content of prescribed text-books 
in relation to environmental concepts.

For the administration of opinionnaire, researcher approached to 
selected schools. She contacted the teachers, introduced herself, 
explained the purpose of her study and requested to give their opinion 
on the opinionnaire. She assured them that their information will 
remain highly confidential & will be used for research purpose only. 
The opinionnaires were collected from the teachers on the dates fixed 
by them.

[3.2.2.2] SCORING OF THE OPINIONNAIRE

In scoring process, the informations collected through opinionnaire, 
number of tick (✓) against each item were counted and taken as 
frequency. Percentages were calculated to find out the magnitude of 
opinions regarding the content of text-books in relation to environmental 
concepts. Suggestions given by the teachers were separately noted 
down.
[3.2.3] **ENVIRONMENTAL AWARENESS TEST**

[3.2.3.1] **ADMINISTRATION OF ENVIRONMENTAL AWARENESS TEST**

For the administration of the test, researcher sought the permission from the principals of selected schools. The test was administered in the class-rooms in the presence of their teachers. Seats were arranged considerably apart to facilitate supervision and to discourage copying. A rapport was established with students by motivating them regarding the new type of test. Doubts and fear of failure were removed from their mind through discussion. The instructions of the test were read in modulating voice according to the size of class-rooms. A bell rung before they started to answer the questions. After 75 minutes final bell was rung and test papers were collected from students.

[3.2.2.3] **SCORING OF THE ENVIRONMENTAL AWARENESS TEST**

As the test having five sections the scoring of each section was done separately according to the nature of test items. The scoring of first three sections of test items was done on the basis of correct answers to the questions. One point credit was given to each correct response. It was done in accordance with the nature of item. If the negative response was given on negative statement one mark was provided while on negative reply to positive statement zero was assigned.

The scoring of IVth section of the test VIZ. attitude scale was done in different manner. A five point scale was used to measure the reaction of students against each item of attitude scale. These five points of
The score value given to the points of the attitude scale are given below -

<table>
<thead>
<tr>
<th>Points of Scale</th>
<th>Score Value for +Ve item</th>
<th>Score Value for -Ve item</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>N/U</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>SD</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

In the fifth section, short answered questions were asked. The scoring of these questions was done on the basis of suitability and validity of answers. Each question was of five marks. If answer was supposed to fulfil the objective completely, 4 marks out of 5 were allotted. The minimum - maximum score range was found to be 1 to 4.