CHAPTER -III
PLAN AND PROCEDURE

Research is a purposive, scientific and pointed deliberation. It is not a haphazard task and it requires one to proceed in a definite direction. No research project can be undertaken successfully without proper thinking and planning. The plan and procedure basically highlights the detail of the work carried out by the investigator. It determines the destiny of research. While conducting any work, the researcher has to take many steps in a well organized manner. It is the character of the technique of the research on which the degree of prediction, objectivity, reliability and validity of results depend. The selection of adequate methods, tools and techniques is a very difficult task and must be handled with every caution, care and profound consideration in respect of the time, ability, experience and the need of investigation. Procedure for any study is decided upon before starting the project.

A well thought out plan of action in advance followed by a systematic execution brings out fruitful results. Keeping in view the nature of the present study, procedure adopted to tackle the present research problem was planned in advance.

According to Mouley, “Always there is a need for thorough understanding of all research methods with particular references to their strength, limitation, applicability and appropriateness, for an inappropriate method can only lead to unsatisfactory results”.

The more clearly and thoroughly a problem and its many ramifications are identified, the more adequately the study can be planned and carried to successful completion. Thus, the task is to synchronise the statement of the problem with the design to be used in its solution and every aspect of the study down to the last detail of execution must be planned before the study is undertaken.
Taking into consideration these facts, it is essential for the investigator to explain the research method, procedure and technique, tools used, reliability and validity of tools, methods of adopting samples, administration of the tools, collection of data, organization of the data and statistical techniques to be used for data analysis.

In the present study, the investigator consulted all the available literature which was beneficial for this study. After studying the related literature, the investigator classified the procedure of the present study as follows:-

- Research Methodology
- Design of the Study
- Population and Sample
- Identification of Variables
- Tools Employed
- Procedure Adopted for the Study
- Statistical Techniques Used

3.1 RESEARCH METHODOLOGY

It is important for any research enthusiast to be well acquainted with the methodology of educational research, and then only educational research can be conducted, selecting the appropriate method according to the problem being tackled. The method used must be in harmony with the broad scientific principles and it must lead to valid generalizations and possible conclusions.

Methodology is the sheet anchor of any research proposal. It is the procedure that has to be adopted & decided upon before starting work on it. Research methodology describes the various steps of the plan of attack to be adopted in solving a research problem, such as the manner in which the problem is formulated, the definition of terms, the choice of subjects for
investigation, the validation of data gathering tools, the collection, analysis and interpretation of data and the process of inferences and generalizations.

Research methods are of utmost importance in a research process. Method is the way of approaching the problem. A pre-planned and well described method will provide the researcher a scientific and feasible plan for attacking and solving the problem under investigation. There are mainly three types of research methods in educational research:

- Historical Method
- Descriptive Method
- Experimental Method

The investigator adopted the Experimental Method of Research for the present study because this method was considered to be more suitable and appropriate for the research problem. The study was conducted to ascertain the effectiveness of Environmental Education Programme Utilizing ICT influencing Environmental Sensitivity, Awareness, Ethics and Attitudes among Secondary School Students. For the present study, Randomized Groups, Pre-test-Post-test Experimental Design was followed by the investigator. In this design, subjects are assigned to the experimental and control groups by random procedures and administered a pre-test $T_1$ as measure of the dependent variable $Y$. The experimenter introduces the treatment only to the experimental group for a specified period of time. At the end of the experiment, the experimental and control groups are administered the post-test $T_2$ as the measure of dependent variable. The difference between the means of $T_1$ and $T_2$ is found for each group and these mean difference scores are compared with the help of an appropriate statistical technique in order to ascertain whether the experimental treatment produced a significant effect than the control condition.

An experimental method is the most classical method borrowed by social science from physical science or life science. This method in
educational research is the application and adaptation of the classical method of the science laboratory. It is the most appropriate method from the scientific point of view because it identifies the conditions underlying the occurrence of the given phenomenon.

By experiment we refer to that portion of research in which variables are manipulated and their effects upon other variables are studied. The researcher defines a problem and proposes a tentative answer or hypothesis. Researcher tests the hypothesis and accepts or rejects it in the light of the controlled variable relationship that she has observed.

Experimental method is based on highly rigorous procedures and aims at producing highly reliable and valid conclusions. By looking at the various designs and procedures used, one can formulate some essential characteristics of experimental method which distinguish it from other types of research methods like descriptive and historical. There are four essential characteristics of experimental research: (a) Control; (b) Manipulation; (c) Observation; and (d) Replication. The purpose of experimentation is to derive verified functional relationship among phenomena under controlled conditions. From the operational point of view, it is a matter of verifying the independent variable in order to study the effect of it on the dependent variable.

The experimental research has been put to various uses in solving educational problems. It is used to determine and evaluate the adequacy and effectiveness of the educational and instructional objectives through the measurement of outcomes.

The current research study is experimental in nature, with exact and powerful method for discovering and developing an organized body of scientific knowledge which attempts to provide a precise answer to a precise question.
3.2 DESIGN OF THE STUDY

Data are like raw materials without which production in research is impossible. For collection of data, the investigator has to set up the design, describe the sampling method, the nature of population and sample, the tools used for the collection of data, their tabulation, organization and statistical techniques used.

Design of the study constitutes an important part of research. No research project can be undertaken successfully without proper thinking and planning of design. Research design sets up the framework for adequate tests of the relations among variables. The plan tells us in what sense, what observations are to be made and how to analyze quantitative representation of the observations. Research design also suggests the direction of observation making and analysis.

Experimentation design is the blueprint of the procedures which enables researchers to test hypothesis by reaching valid conclusion about relationships between independent and dependent variables. Selection of a particular design is based upon the purposes of the experiment, the type of variable to be manipulated, and the conditions or limiting factors under which it is conducted.

In this study, the investigator adopted the Randomized Groups, Pre-test-Post-test Experimental Design. This design is used in the classroom experiments, when experimental and control groups are taken as regular class students. Randomized procedure was adopted for getting equivalent control and experimental groups.

A pre-test was administered to the two groups. Experimental treatment was administered to experimental group and the control group was treated with Traditional Method of Teaching i.e. Lecture Method. Then the post test was given to the two groups. The pre-test and post-test were designed to indicate students’ Environmental Sensitivity, Awareness, Ethics
and Attitudes before and after the application of the experimental treatment. The difference between the pre and post test scores was compared with the help of appropriate statistical techniques to ascertain the effectiveness of experimental treatment and traditional method of teaching. The lay out of the Design is as follows:

**THE DESIGN OF THE STUDY**

RAJASTHAN (STATE) ↓

GANGANAGAR (DISTRICT) ↓

K.V.No.1 School, Suratgarh (SCHOOL) ↓

STUDENTS (RESPONDENTS) (100) ↓

Experimental Group (G1) (50) ↓

Control Group (G2) (50) ↓

Pre-Test ↓

Exposed to ICT programme (For 50 days) ↓

Post-Test

Taught through Traditional Method (For 50 days) ↓

Post-Test

Figure 3.1

### 3.3 POPULATION AND SAMPLE

A sample is a miniature picture of the entire group or aggregate from which it has been taken. A sample, in other words, is a smaller representation of the whole. The entire group from which the sample has been taken is known as ‘Population’. The term population is used in broader sense than its commonplace meaning as a population of the people. A
population may consist of persons, objects, attributes, qualities, behaviors of people, answers to various items of a test, the behavior of inanimate objects such as throws of dice or coins, cities, families, opinions of the electorate of a nation. A population is well defined groups of these. If a population is not properly defined, a researcher does not know what units to consider when selecting the sample.

It is difficult rather impossible to include population in any research project. Generally, the investigator selects a part of the whole population to draw the conclusions and make generalization about the whole population. Many problems in educational and scientific research cannot be solved without sampling. Since most of educational phenomenon consists of large number of units, it is not always possible to interview, observe each one under conditions. So, sampling is both essential and advantageous. It saves the investigator’s time, money and energy. It enables to probe population that are too widely scattered to be approached as a whole. Cochran enlists four principle advantages of sampling i.e., reduced cost, speed, greater score and greater accuracy.

According to Stephan (1959) “All empirical knowledge is, in fundamental sense, derived from incomplete or imperfect observations, therefore, a sampling of experience.”

Sampling is a process by which a relatively small number of individuals, objects or events are selected and analyzed in order to find out something about the entire population from which it is selected. Sampling is the most important instrument for any scientific investigation. It is indispensable technique of any research study. The concept of sampling has been introduced with a view to make the research findings accurate and economical. To serve a useful purpose sampling should be unbiased. Sampling obviously reduces the expenditure, saves time and energy, permits measurement of greater scope and produces greater precision and accuracy. The adequacy of the sample would depend upon the knowledge of the
population as well as upon the methods used in drawing the sample. There are several methods of sampling but, for the present study Purposive sampling was employed in order to select the sample. The population of the present study consisted of class IX students of Secondary Schools. The sample comprised of 100 students from all the divisions of class IX of one school. The students were randomly assigned to two groups, 50 students in each group.

For the present study, the investigator selected Ganganagar district of Rajasthan state. Out of nine Tehsils of district Ganganagar, Suratgarh Tehsil was selected purposively due to convenience and easy access. The population of the present study consisted of class IX students of Secondary Schools of Ganganagar district, who were studying the syllabus/curriculum specified by Central Board of Secondary Education and text books published by the National Council of Educational Research and Training (NCERT). An important criterion while selecting the sample school was that the school should be equipped with computer facilities and having computer laboratory with sufficient number of terminals and should have large student strength in class IX. A number of schools in Suratgarh region were shortlisted on these bases. Most of the schools in Suratgarh region have excellent computer facilities but did not have enough student strength in class IX to carry out the study. Taking various factors into account, one school Kendriya Vidyalaya.No.1, Suratgarh was finally selected for carrying out the study. The school was selected on the following bases-

- Willingness of the Principal of the school to cooperate in the study and provide all sorts of facilities required for conducting the study.
- Willingness of the teachers of the school to cooperate in the study.
- Accessibility of the investigator to that school.
- The school followed text books published by the National Council of Educational Research and Training.
• Enough student strength in class IX to conduct the study.

• The population for the study was students of class IX, from the selected school. The reasons for selecting this class students and excluding other classes were following:

  • Class X and XII were not included because of their intense preparations for Board Examination, as the study would have to continue for around two months causing rescheduling of classroom teaching.

  • Class XI was not included because most of the students of class XI were involved by the school authorities in co-curricular activities and as such their attendance in regular classes was very irregular.

  • The students of secondary level were considered more suitable than the students of the primary level, as these students were able to follow the operational instructions thoroughly.

  • It was felt that students of secondary level would better understand the importance of the study and their role as sample students. They would, thus, be able to render cooperation for the successful completion of the study. Thus, the students of class IX were selected for the study.

For the present study, purposive sampling was employed in order to select the sample. The sample comprised of 100 students studying in class IX from all the divisions of class IX of one school. Hundred students of class IX were randomly assigned to two groups of fifty students each. To make two parallel groups class VIII annual academic achievement scores of the students of class IX were taken. The scores of the students lying between 51 to 90 percent were arranged in ascending order. Fifty students with score lying in range 51 to 70 percent were randomly selected and 50 students with score lying in range 71 to 90 percent were selected. 50 duplets of each group students were arranged in ascending order of their annual achievement.
scores. One student from each duple was randomly assigned to control group and other to experimental group. In this way, the two groups i.e. control and experimental were formed. Each group comprised of 50 students. A treatment of Environmental Education Programme Utilizing *ICT* was administered to experimental group only whereas, control group was taught through Traditional Method of Teaching i.e. lecture method.

### 3.4 IDENTIFICATION OF THE VARIABLES

A variable is an aspect of a testing condition that can change or take on different characteristics with different conditions. Reducing a phenomenon to variables focuses the researcher’s attention on specific events out of the many that may be related to the phenomenon (Mc Burney, 2001). Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. Three types of variables were identified by the investigator for the study. These were independent, dependent and intervening variables. Table 3.1 represents different variables identified for the study.

**TABLE: 3.1**

**INDEPENDENT, DEPENDENT AND INTERVENING VARIABLES**

<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLE</th>
<th>DEPENDENT VARIABLES</th>
<th>INTERVENING VARIABLES</th>
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</table>
| 1. Environmental Education Programme Utilizing *ICT* | 1. Environmental Sensitivity  
2. Environmental Awareness  
3. Environmental Ethics  
2. Physical Environment  
3. Grade to be Taught  
4. Subject to be Taught  
5. Instructor’s Behavior  
6. Maturation  
7. Prior Knowledge of the Subject  
8. Contamination Effect  
9. Instrumentation |
The variables given in the Table 3.1 are discussed as follows:

### 3.4.1 Independent Variable

Independent variables are the conditions or characteristics that the experimenter manipulates, or controls in his or her attempts to ascertain their relationship to observed phenomena (Best, 2006).

Environmental Education Programme Utilizing *ICT* was the Independent Variables in the present study.

### 3.4.2 Dependent Variables

The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variables (Best, 2006).

In this study, the Dependent Variables were Environmental Sensitivity, Environmental Awareness, Environmental Ethics and Environmental Attitudes of the Secondary School Students.

### 3.4.3 Intervening Variables

There are certain variables that might influence the dependent variable and whose effect may be confused with the effect of the independent variable. In the present study, such variables i.e. Academic Environment, Physical Environment, Grade to be Taught, Subject to be Taught, Instructor’s Behaviour, Maturation, Prior Knowledge of the Subject, Contamination Effect, Instrumentation etc. were identified and controlled experimentally.

### 3.4.4 Steps to Control Intervening Variables

The controls to different intervening variables are discussed as follows:

1. Academic Environment: This is one of the important factors which can affect the performance of the students. To control this, the sample was selected only from one school i.e. Kendriya Vidyalaya No.1,
Suratgarh, Ganganagar. Because the academic environment remains almost same within a school to all the students.

2. Physical Environment of the class: Physical environment was same in the entire school. In all the classes the students were made to sit in their classroom which they were oriented with so that they couldn’t feel out of place.

3. Grade to be taught: The grade level to be taught was held constant i.e. the sample of the study was the students of class IX only.

4. Subject to be taught: The subject chosen was concepts of Environmental Education and this factor was controlled.

5. Instructor’s Behaviour: The investigator conducted the experiment herself only. So, the effect of inter-teacher variation was eliminated. All the instructions were given by the investigator herself. Selection of the study material, content analysis, development of the study material, employment of the treatments, and development of the Environmental Education Programme Utilizing ICT was done by the investigator herself which helped to control the inter-teacher behavior variations.

6. Maturation: Subjects change both biologically and psychologically in many ways over a period of time and those changes may be confused with the effect of the independent variables under consideration. To control this, the experiment was conducted after the beginning of the session just in the middle of the session and was finished in 50 days and instructions to both the groups were given in III and IV periods.

7. Prior Knowledge of the Subject: Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Ethics Scale and Environmental Attitudes Scale as a Pre-test were administered to know the prior knowledge of the subject to be taught during the treatment and the improvement of the students in respect of above
variables was measured by subtracting Pre-test scores from Post-test scores. The difference between Post-test and Pre-test score was considered as improvement of the students in respect of these variables.

8. Contamination Effect: To control the contamination effect, the students were instructed separately about the concerned treatments. They were not told about what type of treatment was given to other group. The subject teacher was also requested not to teach that particular topic during the course of the experiment. Apart from the above mentioned facts, the experiment was conducted by the investigator herself.

9. Instrumentation: Unreliable instruments or techniques used to describe and measure aspects of behavior are threats to the validity of an experiment. Errors are caused if human observers are used to describe the changes in subjects. For this, tool reliability was done. The standardized tools i.e. Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Attitude Scale and Environmental Ethics Scale were administered.

3.4.5 Experimental Controls Used

There are few factors which could create a bias in the performance of the students during the experimentation. These factors were identified and controlled in the following way:

a. Throughout the experiment the conditions applied for the experimental and the control group did not vary.

b. The investigator maintained a friendly, motivating and encouraging attitude towards the students of both the groups.

c. No interference from school teacher was entertained. The whole experiment was conducted by the investigator in the absence of the class teacher.
d. Behavioural objectives of the study were well defined so as to decrease the possibility of any kind of bias due to the measuring tools.

e. An orientation setup was created by the investigator before the actual experiment to solve all the confusions of the students.

3.5 TOOLS EMPLOYED

After the population was selected for obtaining the appropriate sample, the next task was to choose suitable tools for the collection of data. For each and every type of research, one needs certain instruments to gather new facts or to explore new fields. The instrument employed for collecting data are called tools. Every researcher has to take help of some tools for the research work just like the technical person and the artist. The selection of tool is of vital importance for success of a research. It depends upon the nature of the problem and the kind of data required for the study.

Tools are means for collection of data for interpretation and to explore new fields. There are many research tools and methods but the selection of a tool is a difficult task in research and is dependent upon various considerations such as objectives for the study, hypothesis of the study, availability of time, personal competence of the investigator to administer the tests, scoring and interpretation of the results. The researchers are required to make a wise and judicious choice and should select only those tools which may be suitable to meet the requirements of the study. Each tool is suitable for the collection of certain type of information. The researcher has to select from the available tools, which will provide data one seeks for testing hypotheses.

According to Best (1986), “Like the tools in the carpenter’s box each research tool is appropriate in a given situation to accomplish a particular purpose”.

Keeping in view the requirements of the study, following two types of tools were used in the research for collection of the data from the
respondents. First was the intervention tool and second were the measuring tools.

1. **Intervention Tool**

An Environmental Education Programme Utilizing ICT was used as an intervention tool. The programme included sections on the concepts of Environmental Education.

2. **Measuring tools**

1. Environmental Sensitivity Scale developed by the Investigator herself.

The measuring tools were used as pre-test and post-test for collection of data.

For the present study two types of tools were used i.e. intervention tool and measuring tools. Development of intervention tool included the development of instructional material in the form of an Environmental Education Programme Utilizing ICT. Measuring tools included the construction and standardization of Environmental Sensitivity Scale. The investigator used Environment Awareness Ability Measure, Environmental Attitude Scale, and Environmental Ethics Scale which were already standardized. The details of the tools are given in the following section.

**3.5.1 DEVELOPMENT OF THE INTERVENTION PROGRAMME**

In this study, the investigator developed an Environmental Education Programme Utilizing ICT on the concepts of ‘Environmental Education’ in the subject of Science and Social Science for the students of class IX. Different steps were followed to develop the intervention tool which are explained under the following points -
A. Selection of the Reading Material

All effective instructions require careful planning. Teaching Environmental Education concepts utilizing ICT is certainly no exception. So, for this, selection of the reading material was very first step while planning the intervention tool. As mentioned earlier, the study material was from topics of Environmental Education in the text books of Science and Social Science for class IX students.

It was kept under consideration while selecting the topics that the topics should be useful for the students for the whole of their life and not just for that particular class. Several aspects which were kept under consideration while the selection of the study material are as follows:

1. First of all, the subject of teaching was selected as per the expertise of the investigator so that the full justice could be done by the investigator during the entire period of experiment.

2. The topics selected were according to the text material of the selected chapters, from the textbooks of Science and Social Science for class IX, published by the National Council for Educational Research and Training. Power Point Presentation slides were prepared according to their syllabus. So, many text and reference books were consulted and thus, the study material was developed by the investigator.

3. Environment Education topics are an important part of Science and Social Science subjects; these were selected for providing instructions. The text material selected for preparing slides was according to the mental age of class IX students.

4. The time of the experimentation was synchronized with the time table of the school.

5. Unambiguous, simple and precise language was used in the content of the slides. The Power Point Presentation slides were designed using audio-visual aids, pictures, animation, aimed at holding attention of
the students. Hyperlinks required for explaining the text were added to this programme.

B. Content Analysis of the Reading Material and Writing the Instructional Objectives in Behavioural Terms

Content analysis consists of analyzing the contents of documentary materials such as books, magazines and the contents of all other verbal and written material which can be either spoken or printed. After the selection of the matter and the content to be taught, the content analysis was done. The whole content which was scrutinized is explained as follows:

1. The Earth, Living and Non-living things on the Earth
   - Meaning of The Earth
   - Definitions of Living and Non-living things
   - Relationship of animals and plants on the Earth

2. The Environment
   - Meaning and Concept of The Environment
   - Environmental Pollution
   - Preservation and Conservation of Environment

3. Natural Resources and Ecological Balance
   - Meaning and examples of Natural Resources
   - Concept of Ecological Balance
   - Concept of Food Chain and Food Web

4. Major Environmental Concerns
   - Global Warming
   - Ozone Layer Depletion
   - Acid Rain
   - Population Explosion
5. Concept of Energy Conservation
   - Alternate Sources of Energy

6. Wildlife and Forests
   - Concept of Wildlife and Forests
   - Conservation of Wildlife and Forests

7. Waste Material in the Environment
   - Production of Waste Material
   - Management of Waste Material

8. Concept of Human Health and Hygiene
   - Meaning of Diseases and Health
   - Good practices to maintain Hygiene

The whole content was divided into eight sections and different behavioural objectives were identified for each of the eight sections. All the behavioural objectives for each section are as follows:

**Section-1: The Earth, Living and Non-Living things on the Earth**

The students will be able to:

**Knowledge Objectives:**
- define the meaning of earth, living and non-living things
- recognize the living and non-living things
- tell the examples of living and non-living things

**Understanding Objectives:**
- explain relationship of animals and plants on the earth
- discriminate between living and non-living things on the earth
- classify the different things present on earth as living and non-living things
Application Objectives:

- construct their own idea about relationship between living and non-living things present on the earth

- reason out the difference between various definitions of living and non-living things on the earth

Skill Objectives:

- analyze the meaning and concept of earth and living and non-living things on the earth

Section-2: The Environment

The students will be able to:

Knowledge Objectives:

- recognize the various types of environmental pollution

- define environment and environmental pollution

- recall the different ways of conservation of environment

Understanding Objectives:

- cite examples of various types of environmental pollution

- classify the various types of environmental pollution

- differentiate between different types of environmental pollution

- explain the methods of conservation of environment

- see relationship between causes and symptoms of different types of environmental pollution

Application Objectives:

- illustrate the types of environmental pollution

- reason out the difference in different ways of conservation of environment
Skill Objectives:

- analyze both the classification of the types of environmental pollution
- compare the different ways of conservation of environment

Section-3: Natural Resources and Ecological Balance

The students will be able to:

Knowledge Objectives:

- recall the different natural resources
- recognize concept of ecological balance
- define food chain and food web

Understanding Objectives:

- explain the basic idea of ecological balance
- illustrate the components of food chain and food web
- see relationship between food chain and food web
- discriminate between various natural resources
- interpret the concept of ecological balance
- cite example of food chain and food web

Application Objectives:

- apply the concept of ecological balance in various life situations
- assess the different aspects of food chain and food web
- predict the implications of depletion of natural resources

Skill Objectives:

- identify different natural resources

Section-4: Major Environmental Concerns

The students will be able to:
Knowledge Objectives:

- define global warming and ozone layer depletion
- recall the factors responsible for population explosion
- recognize effects of global warming and ozone layer depletion

Understanding Objectives:

- explain measures to reduce global warming and ozone layer depletion
- see relationship between population explosion and global warming and ozone layer depletion
- cite examples of effects of global warming and ozone layer depletion
- explain causes of acid rain

Application Objectives:

- construct their own idea about relationship between population explosion and global warming
- predict the effects of population explosion
- assess the symptoms of ozone layer depletion, acid rain and global warming

Skill Objectives:

- analyze the causes, effects and control of global warming, ozone layer depletion, acid rain and population explosion

Section-5: Concept of Energy Conservation

The students will be able to:

Knowledge Objectives:

- define energy
- recall the alternate sources of energy
- recognize different ways of conservation of energy
Understanding Objectives:

- explain the meaning of conservation
- cite examples of alternate sources of energy
- discriminate between renewable and non-renewable sources of energy

Application Objectives:

- assess the symptoms of overuse of non-renewable sources of energy
- cite relationship between use of alternate sources of energy and conservation of energy

Skill Objectives:

- compare renewable and non-renewable sources of energy
- analyze the use of alternate sources of energy

Section-6: Wildlife and Forests

The students will be able to:

Knowledge Objectives:

- recall the methods to conserve wildlife and forests
- recognize the importance of wildlife and forests

Understanding Objectives:

- explain the meaning of wildlife and forests
- explain the importance of wildlife and forests
- differentiate between different methods of conservation of wildlife and forests

Application Objectives:

- cite relationship between wildlife and forests
- illustrate the use of forests in human life
Skill Objectives:

- analyze different laws for conservation of wildlife and forests

Section-7: Waste Material in the Environment

The students will be able to:

Knowledge Objectives:

- define the meaning of waste
- recall the meaning of management
- recognize various sources of production of different types of wastes

Understanding Objectives:

- differentiate between different types of wastes
- discriminate between different methods of management of wastes
- cite examples of different categories of wastes

Application Objectives:

- cite relationship between production of waste and pollution
- assess the symptoms of waste on health of human beings
- predict the causes of improper waste management

Skill Objectives:

- identify the ways for proper waste management
- analyze the causes of production of waste in large quantity

Section –8: Concept of Human Health and Hygiene

The students will be able to:

Knowledge Objectives:

- define disease and health
- recall the healthy practices for remaining healthy
- recognize the conditions that cause diseases
Understanding Objectives:

- explain the methods for maintaining good hygienic conditions
- discriminate between different diseases

Application Objectives:

- cite relationship between health and diseases
- predict the symptoms of diseases
- assess the different aspects of health

Skill Objectives:

- analyze the causes of disease
- identify the ways to remain healthy

C. Preparation of the Environmental Education Programme Utilizing ICT

After the selection of the subject matter and content analysis done, the very important task was to prepare the power point presentations/slides. So, the investigator prepared different power point presentation slides on the analyzed content of environmental education. In these slides, investigator presented different topics and sub-topics in a logical and interesting manner.

For the preparation of the slides for various sub topics of environmental education, many things were kept in mind such as knowledge of the content, knowledge about the various formats of slides, stipulated time, effective presentation of the content, audible stimuli, hyperlinks etc.

D. Editing of the Slides

After the preparation of various slides, the next and important task was to make necessary editing in the slides. The draft slides were edited at the following levels:

1. The first editing was done by the investigator herself.
2. Secondly, it was shown to computer professional whose suggestions were incorporated in editing the slides
3. Thirdly, it was shown to the subject experts and secondary school science teachers for valuable suggestions. The subject experts ensured the information accuracy and quality of the subject matter of the programme.

4. Then the composition editing was done by the language experts. They removed inaccuracy in language usage, with respect to grammar, spellings, punctuations etc., in the slides.

   After the necessary modifications, the slides were shown to a group of ten students for their comments. In light of the suggestions given by them, the slides were finalized. Then the power point slides were ready to use for experimental treatment.

E. Validity of the Environmental Education Programme Utilizing ICT

   The validation process is logical and rational. In the present study Content Validity and Face Validity of the Environmental Education Programme Utilizing ICT was ensured.

Content Validity

   Content validity is concerned with the content of the programme. Content means the substantive constituents of materials, their factual and informational component. It was ensured that the contents were appropriate and in accordance with the mental age and exposure of the students.

Face Validity

   Face validity is a property of a programme intended to measure something. The programme is supposed to have face validity if it ‘looks like it is valid’ and ‘it is going to measure what it is supposed to measure.’

   In the present Environmental Education Programme Utilizing ICT, an attempt was made to ensure face validity and content validity through consultations with supervisor, subject experts of the secondary schools from the very beginning to the final selection of the content of the programme. On
the basis of the constructive comments by the experts, the content and information in the slides were modified/eliminated. Thus, the face validity and content validity were duly ensured.

A soft copy of the final Environmental Education Programme Utilizing ICT is appended as Appendix-I.

3.5.2 Lesson Plans for Traditional Teaching

Lesson Plans for traditional method of teaching were prepared by the investigator. A teacher's detailed description of the course of instruction, or 'learning trajectory' for a lesson, is a lesson plan. The lesson planning is virtually the pre-active phase of teaching. A daily lesson plan is the teacher's guide for running a particular lesson, and it includes the goal (what the students are supposed to learn), how the goal will be reached (the method, procedure) and a way of measuring how well the goal was reached.

In the study, the control group was taught Environmental Education concepts through traditional method i.e. Lecture Method for a period of 50 days. The content of the lesson plans was same as of Environmental Education Programme Utilizing ICT. The lesson plans adopted in the present study are appended at Appendix-II.

3.5.3 DEVELOPMENT OF THE MEASURING TOOL

Keeping in view the problem of the study, the Environmental Sensitivity Scale, Environmental Awareness Ability Measure, Environmental Attitude Scale, Environmental Ethics Scale were used as measuring tools. These scales were used as pre-test and post-test for collecting the data. Pre-test was administered before the treatment and post-test was administered after the appropriate treatment. Investigator used standardized form of Environment Awareness Ability Measure developed by Jha (1998), Environmental Attitude Scale developed by Haseen Taj (2001) and Environmental Ethics Scale developed by Haseen Taj (2001). Environmental Sensitivity Scale was developed by the investigator herself.
In designing the scale, the purpose was to obtain the required information with as little stress to the students as possible. Therefore, the Environmental Sensitivity Scale had to be simple, relevant and quick to complete. The statements had to be clear so that all the respondents could answer easily.

3.5.3.1 Environmental Sensitivity Scale

Environmental Sensitivity of class IX students was measured by using Environmental Sensitivity Scale developed by the investigator herself. It covers 5 areas of environment issues-

Wildlife and forests, environmental pollution, population explosion, health and hygiene and conservation of environment. The scale was constructed by following the usual procedure.

STEP-I. Preparation of Preliminary Draft

This was the planning stage of developing Environmental Sensitivity Scale. First of all, literature concerning Environmental Sensitivity was collected and a thorough study of that material was made. Then the next step was to ascertain specific areas in which the Environmental Sensitivity of the students was to be assessed. After discussion with the experienced teachers of the subject concerned, the Environmental Sensitivity areas were specified. Then the points related to Environmental Sensitivity of students were noted and on the basis of these points, some statements were prepared. While formulating the statements utmost care was taken that each statement depicted complete thought, double barreled statements were avoided, language of the statements was kept simple and clear, and statements were in the form of simple sentences. The first draft of the Environmental Sensitivity Scale has been appended in Appendix-III.

The list of these 115 statements was given to faculty members of Department of Education and subject experts in schools for screening and for their expert comments. On the basis of their expert comments, twenty five irrelevant statements were dropped and the vagueness and ambiguity of a few were removed.
Thus, the remaining 90 statements were ready for inclusion in the preliminary draft of the scale. The items belonged to five different areas of environment. The statements formed were mixture of positive and negative statements. Each statement had five alternatives. The instructions for filling up the scale were given with it and the respondents were required to put tick mark (√) against the appropriate alternative response. The second draft of the Environmental Sensitivity Scale has been appended in Appendix-IV.

**STEP-II. Pre-Tryout of the Scale**

For the purpose of pre-try out, preliminary draft of the Environmental Sensitivity Scale was administered on 150 school students of class IX. They were also requested to note ambiguous/unintelligible or irrelevant items. On the basis of the feedback given by the students and observation of the investigator, five statements were dropped. In this way 85 statements were retained after pre try out of the scale. The third draft of the Environmental Sensitivity Scale has been appended in Appendix-V.

**STEP- III. Try out of the Scale**

The scale with 85 statements was again administered on 100 school students of class IX and the students were requested to follow the instructions given in the scale. The responses given by the students were used for the purpose of item analysis. The items were scored on the basis of five point rating scale as the scale was designed on the lines of Likert method.

**STEP- IV. Item Analysis**

The procedure used to judge the quality of an item is called item analysis. Item analysis is carried out to eliminate inconsistency of items. The judgment for selecting an item is based up on the discrimination index of the item. To determine the discrimination index, the investigator arranged the subjects in ascending order according to the magnitude of their scores. The top 27% were selected as upper group and bottom 27% were selected as
lower group which were used for item analysis. To find out the
discrimination index of each item, test of significance was applied to both
scores. Mean, standard deviation and t-values were calculated for each of the
higher and lower group.

Thus, using the t-value, the significance for each item was tested at
0.05 level of significance. The items having value of 1.96 or more were
selected. The t-value for each of the 85 statements has been appended in
Appendix-VI.

**STEP- V. The Final Form of the Scale**

The final form of the Environmental Sensitivity Scale contained only
70 statements/items. It is Likert type five points rating scale. Each item has
five response alternatives (5) strongly agree (4) agree (3) don’t know (2)
disagree (1) strongly disagree.

It is a self-administering tool with instructions printed on the first
page of the scale. Space for alternative response is also provided in the
format against each statement. There is no time limit and there is nothing
right or wrong about these items. The final form of the scale is appended in
Appendix- VII.

**STEP- VI. Scoring of the Scale**

The Environmental Sensitivity Scale for secondary class students
contains five possible responses to each item i.e. strongly agree, agree, don’t
know, disagree and strongly disagree. The respondents were instructed to
tick mark any one of the five choices for each item. Tick mark on choices
strongly agree, agree, don’t know, disagree, strongly disagree were given
scores of 5, 4, 3, 2 and 1 respectively for positive items. In case of negative
items, scoring is reversed i.e.1, 2, 3, 4, 5 respectively. The total score
obtained by a student on scale measures his/her Environmental Sensitivity.
The range of scores is from 70 to 350 with higher score indicating the high
Environmental Sensitivity and vice versa.
Table: 3.2
Serial Number of Positive and Negative Items of Environmental Sensitivity Scale

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial Number of Items in Environmental Sensitivity Scale</th>
<th>Total No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>1,2,3,4,8,10,11,13,14,15,16,18,19,20,21,22,23,24,26,28,30,31,35,36,37,38,39,40,41,43,44,46,47,48,49,50,51,53,54,55,56,58,59,60,62,63,64,66,67,68,69,70.</td>
<td>52</td>
</tr>
<tr>
<td>Negative</td>
<td>5,6,7,9,12,17,25,27,29,32,33,34,42,45,52,57,61,65.</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

**STEP- VII. Administration of the Scale**

The Environmental Sensitivity Scale is a self administered tool. There is no time limit for the test.

**STEP- VIII. Estimating Reliability of the Scale**

The reliability of the Environmental Sensitivity Scale was estimated by split half method. First, the test was divided into two equivalent halves. One half represented performance on the odd numbered items and other half on the even numbered items. Then correlation co-efficient between the two sets of scores was calculated and after applying Spearman Brown Prophecy formula for correlation the, reliability co-efficient was found to be 0.89.

Thus, the reliability score obtained through split half method was found to be high and much faith can be placed in the results obtained through the scale.

**STEP- IX. Estimating Validity of the Scale**

The validation process is logical and rational. In the present study, Content validity and Face validity were ensured.

**Content Validity**

Content validity is concerned with the content of the scale. Content means the substantive constituents of materials, their factual and
informational component. It was ensured that the contents of the Environmental Sensitivity Scale were appropriate and in accordance with the mental age and exposure of the students.

**Face Validity**

Face validity is a property of a test intended to measure something. The test is supposed to have face validity if it ‘looks like it is valid’ and ‘it is going to measure what it is supposed to measure.’

In the Environmental Sensitivity Scale, an attempt was made to ensure face validity and content validity through consultations with supervisor, subject experts of the secondary schools, education experts from Kurukshetra University, Kurukshetra from the very beginning to the final selection of the statements. On the basis of the constructive comments by the experts, the items were modified/ eliminated. Thus the face validity and content validity were duly ensured.

**STEP- X. Norms of the Scale**

For the interpretation of the scores on Environmental Sensitivity Scale, raw norms were prepared for the total sample. Table 3.3 shows the raw norms measuring the Environmental Sensitivity.

**Table: 3.3**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Range of Raw Scores</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>301 and above</td>
<td>High ES</td>
</tr>
<tr>
<td>2.</td>
<td>281-300</td>
<td>Above average ES</td>
</tr>
<tr>
<td>3.</td>
<td>261-280</td>
<td>Average ES</td>
</tr>
<tr>
<td>4.</td>
<td>241-260</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>221-240</td>
<td>Below average ES</td>
</tr>
<tr>
<td>6.</td>
<td>201-220</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Up to 200</td>
<td>Low ES</td>
</tr>
</tbody>
</table>

(ES- Environmental Sensitivity)
3.5.3.2 Environmental Ethics Scale

Environmental Ethics refers to the responsibility to understand the environmental consequences of our consumption, and need to recognize our individual and social responsibility to conserve natural resources and protect the earth for future generations.

In the present study, the investigator administered standardized tool—the Environmental Ethics Scale standardized by Dr.(Mrs.) Haseen Taj (2001) for measuring Environmental Ethics of Secondary School Students. It includes 45 items in the form of statements. Each one is followed by responses, viz.-I agree absolutely, I slightly agree, and I don’t agree. The respondent is asked to indicate his or her response to the different statements. Out of 45 statements, 8 are positive statements and 37 are negative statements.

Scoring of the Scale

For positive statements a score of three (3) is given to ‘I agree absolutely’ response, a score of two (2) for ‘slightly agree’ response and a score of one (1) for ‘don’t agree’ response. For negative statements, the scoring is reversed. The ethics score of an individual is the sum total of scores. The range of scores is from 1 to 135 with the higher score indicating the positive Environmental Ethics and vice versa.

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial number of Items in Environmental Ethics Scale</th>
<th>Total No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>9,16,19,21,22,23,24,42</td>
<td>08</td>
</tr>
<tr>
<td>Negative</td>
<td>1,2,3,4,5,6,7,8,10,11,12,13,14,15,17,18,20,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,43,44,45</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>45</td>
</tr>
</tbody>
</table>
Table 3.4 shows the total number of positive and negative items with serial numbers of Environmental Ethics Scale. The Environmental Ethics scale has been appended in Appendix- VIII.

**Reliability of the Scale**

Reliability was computed by split-half method and found to be 0.63 and 0.60 respectively, for the half test and rise to 0.71 and 0.75 after applying Spearman Brown Prophecy formula for correlation for a sample of 200 individuals. The test-retest co-efficient after an interval of 1 month was found to be 0.48 (N=115). So, the index of reliability is 0.69.

**Validity of the Scale**

The Environmental Ethics Scale possesses content validity. The Scale appears to possess internal consistency, the high discriminatory power of the items and split-half reliability are testimony of its internal consistency.

**3.5.3.3 Environment Awareness Ability Measure**

In the present study, the investigator administered Environment Awareness Ability Measure to measure level of Environmental Awareness of Secondary School Students. Environment Awareness Ability Measure (1998) was developed and standardized by Dr. Praveen Kumar Jha. The Environmental Awareness Ability Measure is based on five dimensions of environment and these are:

i. Causes of Pollution

ii. Conservation of Soil, Forests, Air etc.

iii. Energy Conservation

iv. Conservation of Human Health


The scale consists of 51 items, in these 43 are positively worded and 8 are negatively worded and their responses are scored by using agree/disagree categories.
**Scoring of the Scale**

A numerical weightage of 1 (one) is assigned to the response category of ‘agree’ in case of positive items & 0 (zero) for ‘disagree’ and in case of negative items weightage of 1 (one) is assigned for ‘disagree’ & 0 (zero) for ‘agree’. The scores range between 0-51.

**Reliability of the Scale**

By split-half method the reliability of this scale is 0.61. Reliability by K-R method is 0.84 and by test-retest method reliability is 0.74 and 0.71 respectively.

**Validity of the Scale**

As each item was judged by subject experts, so the scale possesses content and face validity. The coefficient of correlation was also found to be 0.83.

**Norms of the Scale**

The norms for Environment Awareness Ability measure are shown in table 3.5

<table>
<thead>
<tr>
<th>Awareness level</th>
<th>Range of scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>37-51</td>
</tr>
<tr>
<td>Average</td>
<td>16-36</td>
</tr>
<tr>
<td>Low</td>
<td>0-15</td>
</tr>
</tbody>
</table>

The Environment Awareness Ability measure has been appended in Appendix- IX.

**3.5.3.4 Environmental Attitude Scale**

Environmental Attitude Scale (2001) developed and standardized by Dr. (Mrs.) Haseen Taj, measures Environmental Attitude of Secondary
School Students. Six areas are dealt within the scale. These are attitudes towards:

1. Population Explosion
2. Health and Hygiene
3. Polluters
4. Wild life
5. Forests

The scale consisted of 61 items. In this scale, 31 items are favourable and 30 items are unfavourable.

**Scoring of the Scale**

Each item alternative is assigned a weightage ranging from 4 (strongly agree) to 1 (strongly disagree) for favorable items. In case of unfavorable items scoring is reversed i.e. from 1 (strongly agree) to 4(strongly disagree). The attitude score of the individual is the sum total of item scores on all the six areas. The range of scores is from 61 to 244 with the higher score indicating the more favorable attitude towards environment and vice versa.

**Reliability of the Scale**

Reliability coefficient of the scale by split half method is 0.82 and reliability coefficient by test- retest method is 0.77.

**Validity of the Scale**

Taj Environmental Attitude Scale possesses high content validity because the items at the first stage for tryout of the scale were selected on the unanimous agreements of experts in the field regarding its content adequacy. The Environmental Attitude Scale has been appended in Appendix- X.
3.6. **PROCEDURE ADOPTED FOR THE STUDY**

Selection of students for treatment groups and experimentation are considered as two important steps of the procedure of the present study.

3.6.1 **Selection of Students for Experimental and Control Groups**

Hundred students of class IX were randomly assigned to two groups of fifty students in each group. To make two parallel groups, class VIII annual academic achievement scores of the students of class IX were taken. The scores of the students lying between 51 to 90 percent were arranged in ascending order. Fifty students with score lying in range 51 to 70 percent were randomly selected and 50 students with score lying in range 71 to 90 percent were selected. 50 duplets of each group students were arranged in ascending order of their annual achievement scores. One student from each duple was randomly assigned to control group and other to experimental group. In this way, two parallel groups i.e. control group and experimental group of 50 students each were formed by random assignment of subjects.

3.6.2 **Experimentation**

Before giving the actual treatment, both the groups were made well oriented with what they were going to do. An interaction was preceded with all to build a rapport with the students which helped to motivate and encourage the students about the treatments. Further, the experiment was conducted in three different stages.

**Stage-I**

After the formation of two parallel groups i.e. control group and experimental group, the investigator administered the Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Attitude Scale and Environmental Ethics scale as pre-test on all the students in both the groups. This was conducted so as to know the prior knowledge of students about the variables before the execution of the experiment. The investigator evaluated the scale items and scoring was done with the help of scoring key.
Stage-II

The second stage was the actual conduct of the experiment. The control group was taught environment concepts through traditional method i.e. Lecture method for a period of 50 days, one period of 40 minutes daily and the experimental group was taught through an Environmental Education Programme Utilizing ICT with LCD projector for the same period of time. The two groups were given equal attention during the course of the experiment.

Implementation of Intervention Programme

For the present study, the investigator prepared an Environmental Education Programme Utilizing ICT as an Intervention programme. After administration of the pre-test, the experimental group was subjected to an intervention programme. Execution of Intervention programme was spread over 50 days. In Intervention programme, videos and slides based on concepts of Environmental Education were incorporated. The schedule of the Intervention programme has been given in the following section:

Day-1: A Video clip (2.41 mins) showing components of earth was shown to the students. They were asked to note down the components of earth in their notebooks which were shown in the video.

Image-1: Video clip showing components of Earth
**Day-2:** Slides of constituents of earth, living and non-living things on earth were shown.

**Day-3:** Relationship between biotic and abiotic components of earth was explained by displaying the slides.

**Day-4:** Relationship of biotic and abiotic components of earth was shown through video clip (3.06 mins).

**Day-5:** Video clip and slides displaying components of environment were shown.
**Day-6:** Meaning and concept of environment was explained with the help of slides and video clip (8.00 mins).

**Day-7:** Methods of preservation and conservation of environment were discussed with the help of slides.

**Day-8:** Slides presenting meaning and examples of natural resources were displayed and explained.
**Day-9:** Methods for conservation of natural resources were discussed with help of slides.

**Day-10:** Meaning and types of environmental pollution were explained with help of video clips (12.42 mins) and slides.
**Day-11:** Students were made aware of air pollution and its causes by showing a video (3.40 mins) and slides.

![Image-16: Video clip of meaning of air pollution](image16)

![Image-17: Slide showing causes of air pollution](image17)

**Day-12:** A video (4.14 mins) of effects and prevention of air pollution was shown to the students.

![Image-18: Video clip of effects of pollution](image18)

![Image-19: Video clip showing effects of air pollution](image19)
Day-13: Slides of effects and prevention of air pollution were shown to the students.

Image-20: Slide of causes and effects of prevention of air pollution
Image-21: Slide of methods of prevention of air pollution

Day-14: Video (4.06 mins) related to water pollution was shown and meaning and sources of water pollution were discussed.

Image-22: Video clip of meaning of water pollution
Image-23: Video clip of sources of water pollution.
Day-15: Effects of water pollution were explained with the help of slides.

Image-24: Slide showing effects of water pollution

Image-25: Slide of effects of water pollution

Day-16: Video clip (3.02 mins) and slides demonstrating control of water pollution were shown.

Image-26: Video clip of methods to prevent water pollution

Image-27: Slide of methods to prevent water pollution

Day-17: Meaning of land pollution was explained with help of slides and video clip (9.19 mins) based on land pollution.

Image-28: Slide of meaning of land pollution

Image-29: Video clip showing land pollution
Day-18: Slides highlighting causes of land pollution were explained.

Day-19: Effects and control of land pollution were discussed by showing slides on land pollution.

Day-20: Noise pollution was explained with the help of video (10.56 mins) based on noise pollution.
Day-21: Causes of Noise Pollution were explained with the help of slides.

Image-36: Slide of causes of noise pollution  Image-37: Slide of causes noise pollution

Day-22: Slides were shown to explain effects and prevention of noise pollution.

Image-38: Slide of effects of noise pollution  Image-39: Slide of measures to control pollution

Day-23: Concept of food chain and types of food chain were shown with the help of video (3.02 mins) and slides.

Image-40: Video Clip showing concept food chain  Image-41: Slide of example of food chain
Day-24: Slides were shown to explain food web.

Image-42: Slide showing meaning of food web
Image-43: Slide showing example of food web

Day-25: Concept of ecological balance was discussed with the help of video (15.12 mins) and slides.

Image-44: Slide showing concept of ecological balance
Image-45: Slide showing need for balance

Day-26: Video (8.07 mins) on global warming was shown.

Image-46: Video clip of global warming
Image-47: Video clip of green house effect
Day-27: Causes and effects of global warming were discussed with the help of slides.

Image-48: Slide of causes of global warming

Image-49: Slide of effects of global warming

Day-28: Measures to reduce global warming were explained with the help of slides.

Image-50: Slide of measures to control global warming

Image-51: Slide of measures to control global warming
Day-29: Video clip (6.53 mins) and slides were shown to explain the concept of ozone layer depletion.

![Image-52: Video clip of ozone layer depletion](image)

![Image-53: Slide of consequences of ozone layer depletion](image)

Day-30: Measures to reduce ozone layer depletion were explained with the help of slides based on the topic.

![Image-54: Slide of measures to reduce ozone layer depletion](image)

![Image-55: Slide of measures to reduce ozone layer depletion](image)
Day-31: Slides were shown to explain meaning and causes of acid rain.

![Slide of definition of acid rain](Image-56)
![Slide of causes of acid rain](Image-57)

Day-32: Effects of acid rain were explained with the help of video (4.01 mins) and slides.

![Slide of effects of acid rain](Image-58)
![Video clip of effect of acid rain](Image-59)

Day-33: Measures to reduce the causes of acid rain were explained by showing video (2.28 mins) and slides based on acid rain.

![Slide of measures to reduce acid rain](Image-60)
![Video clip of measures to reduce acid rain](Image-61)
Day-34: Video (1.57 mins) based on population explosion was shown.

Image-62: Video clip of population explosion

Image-63: Video clip of population explosion

Day-35: Meaning, causes and effects of population explosion were explained by showing slides.

Image-64: Slide of causes of over population

Image-65: Slide of effects of over population

Day-36: Slides and video (5.08 mins) were shown to explain the concept of energy.

Image-66: Slide of meaning of energy

Image-67: Video clip of sources of energy
Day-37: Concept of energy conservation was explained with the help of slides.

Image-68: Slide of conservation of energy

Image-69: Slide of conservation of energy

Day-38: Video (8.03) was shown to explain the importance of use of alternate sources of energy.

Image-70: Video clip of alternate sources of energy

Image-71: Video clip of alternate sources of energy

Day-39: Examples and uses of alternate sources of energy were explained with help of slides.

Image-72: Slide of alternate sources of energy

Image-73: Slide of need of alternate sources of energy
Day-40: Concept of wild life was explained with the help of slides.

Image-74: Slide of wildlife  Image-75: Slide of meaning of wildlife

Day-41: Importance of wild life was shown with help of slides.

Image-76: Slide of importance of wildlife  Image-77: Slide of wildlife in India

Day-42: Video and slides were shown to explain conservation of wild life.

Image-78: Slide of conservation of wildlife  Image-79: Video of conservation of wildlife
**Day-43:** Forests and its types were discussed with the help of video (5.33 mins) and slides.

**Day-44:** Strategies used for conservation of forests were explained with the help of slides.

**Day-45:** Video clip (1.35 mins) and slides were shown to explain different types of wastes.
**Day-46:** Waste management techniques were explained with the help of slides.

**Image-86:** Slide of waste management technique

**Image-87:** Slide of waste management techniques

**Day-47:** Slides and video were shown to explain the concept of health.

**Image-88:** Video clip of concept of health

**Image-89:** Slide of concept of physical health

**Day-48:** Concept of disease was discussed with the help of slides.

**Image-90:** Slide of concept of disease

**Image-91:** Slide of causes of disease
Day-49: Relationship between disease and health was explained with help of a video clip (11.34 mins) and slides based on health.

![Slide of concept of good health](Image-92)

![Video clip of dimensions of health](Image-93)

Day-50: A video (2.41 mins) demonstrating good practices to maintain hygiene was shown and the same concept was explained with help of slides.

![Slide of concept of hygiene](Image-94)

![Video clip of hygiene practices](Image-95)

Stage –III

After the completion of the experiment, Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Attitude Scale and Environmental Ethics Scale as Post-test were administered on both the groups.

3.6.3 Data Collection

One of the most important requisite in any research is data, without which no study can be conducted. The collection of data is of paramount importance in the conduct of research, since, no solution can be more
adequate than data on which it is based. The data was collected keeping in view the objectives of the study. Firstly, the pre-test scores of both the groups were obtained before exposing the group to the treatment. This was done by administering the Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Attitude Scale and Environmental Ethics Scale as pre-test.

Secondly, the post-test scores of both the groups were obtained after exposing the groups to appropriate treatment. This was done by administering the Environmental Sensitivity Scale, Environment Awareness Ability Measure, Environmental Attitude Scale and Environmental Ethics Scale as a post-test. The difference between the pre-test and post-test scores was the gain score of the students.

3.7 STATISTICAL TECHNIQUES USED

Statistics is a mathematical technique or process of gathering, describing, organizing, analyzing and interpreting numerical data.

Depending upon the design and objectives of the study, different statistical techniques were used for the analysis of the data. These statistical techniques used are mentioned as follows:

1. The measure of central tendency such as Mean was worked out to know the nature of the data.

2. Standard Deviation.

3. Gain scores were worked out by finding out difference between post-test and pre-test scores.

4. The effectiveness of an Environmental Education Programme Utilizing ICT and Traditional Method of Teaching in influencing the Environmental Sensitivity, Environmental Awareness, Environmental Ethics and Environmental Attitudes among Secondary School Students was compared using ‘t-test’.
However valid, reliable and adequate the data may be, it does not serve any purpose unless carefully edited, systematically tabulated, analyzed, interpreted and concluded. It is difficult to conclude without properly analyzing and interpreting the scattered data. Keeping this in mind, analysis and interpretation of the data with respect to objectives and hypothesis was done in chapter IV to get statistically valid results.