7.1 INTRODUCTION

To achieve the aims of education in modern world, it makes sense to take an innovative approach to teaching that can prove better in the long run than letting it just filter in for the highly-motivated teachers. Multimedia has become, within a very short time, one of the basic building blocks of modern society. The incorporation of Information and Communication Technologies in education has profound influence in teaching. The student accesses knowledge and information through Internet, TV, satellite and cable network and digital media to synchronies learning mediated through these multiple delivery mechanisms. The multimedia programme allows students to work at their own pace and supports connections and comparisons that a traditional text does not. MMP is an instructional technique designed to promote the academic development of elementary students. It is the one of the most innovative technique used by the teachers throughout the world.

The present study is attempt to study the effect of Multimedia Package on Cognitive and Affective domains of elementary students in Environmental Science. The study establishes the effectiveness of the Multimedia Package in Cognitive domain by comparing the achievement score of elementary students (Sixth grade) of two groups (Experimental and Control group) by teaching five selected topics in Environmental Science. In the same manner this study establishes the effectiveness of the Multimedia Package in Affective domain by comparing the scores on attitude scale of elementary students (Sixth grade) of two groups (Experimental and Control group) by teaching five selected topics in Environmental Science. The result of present study exerted to the benefit the elementary students in their Cognitive and Affective domains. Keeping in view the importance of Environmental Science, the present study was planned.

7.2 NEED FOR THE STUDY

We are facing many environmental problems such as air pollution, water pollution, noise pollution, soil pollution and global warming
but learning about them is not sufficient to overcome these problems. By using classroom activities we can develop a positive approach and focus on what individuals can do to help in saving the earth. Teachers can provide Computer assisted Instructional material to the students on environment to make them aware about the environmental pollution and how to control it. All teachers have personal responsibility to contribute to the students’ awareness on environmental issues and to foster in their students the development of skills that promote sustainable development.

Education on environment helps the students of elementary classes to understand the physical and cultural characteristics of the world. Multimedia Package on environment provides the values, knowledge, concepts and skills to better understand ourselves, our relationship to the earth and our interdependence with other people of the world. Teachers can promote the study of environmental issues through one or more teaching strategies, personal experiences, textbooks and printed media but Multimedia Instructional material if used for the purpose is likely to be more interesting and effective as compared to the others.

Environmentalism is very important political and social movement with goal to protect environment by emphasizing importance of nature’s role in protection of the environment in combination with various actions and policies oriented to nature preservation. Environmentalism is movement connected with environmental scientists and many of their goals. Some of these goals include:

- To reduce world consumption of fossil fuels.
- To reduce and clean up all sorts of pollution (air, sea, river...) with future goal of zero pollution.
- Emphasis on clean, alternative energy sources that have low carbon emissions.
- Sustainable use of water, land and other scarce resources
- Preservation of existing endangered species
- Protection of biodiversity

177
Keeping in view the utility of Multimedia Package as instructional mode and the increasing necessity for such material in schools, the investigator decided to develop Multimedia Package on Environmental Science for Elementary school students. Multimedia Package on environmental science will certainly motivate the students to attain cent percent mastery of content and further enable them to apply this knowledge in real life situations. In addition to it, the developed Instructional Material on environment helps the students of Elementary class to understand the physical and cultural characteristics of the world. Multimedia Package on environmental science provides the values, knowledge, concepts and skills to better understand ourselves. It concentrates on giving information, developing the understanding and application of the concepts, reasoning and thinking power of the students and also enhances the creativity in developing better understanding about the environmental science. Multimedia brings a new dimension to reading and writing and need for the students to develop basic skills in information. Employing multimedia tools into the learning environment is rewarding, but complex and challenging task. All of the multimedia formats available: text, sound, video, animation and graphics, already exist in one form or another in most libraries. Students can explore an almost infinite variety of information.

7.3 STATEMENT OF THE PROBLEM

DEVELOPMENT AND VALIDATION OF MULTIMEDIA PACKAGE IN ENVIRONMENTAL SCIENCE AND ITS EFFECT ON COGNITIVE AND AFFECTIVE OUTCOMES OF ELEMENTARY STUDENTS

7.3.1 Operational Definition of the Key Terms

The terms used in the statement of the study are defined as under:

1. Multimedia Package:

Multimedia combines five basic types of media into learning environment: text, video, sound, graphics and animation, thus providing powerful new tools for education. Multimedia package by definition has the capacity to deliver large amounts of materials in multiple forms meant for teaching and to deliver them in an integrated environment that gives students
the reading, listening and viewing experience through amalgamation of text, audio, video, graphics and animation.

2. **Environmental Science:**
   The branch of Science that deals with all elements, factors and conditions that have impact on growth and development of an organism.

3. **Validation:**
   It refers to check the quality of instructional material. The programmer for improving the quality of instructional material should do empirical validation of the instructional material.

4. **Elementary Students:**
   In India elementary schools provide education from Class 01 to Class 07. The children in these classes are generally aged between 5 to 12 years. It is the next stage after kindergarten (Pre-Nursery, Nursery, Prep or Lower Kindergarten and Upper Kindergarten). Students studying in class VI between the age group of 10-11 years are taken for study in this research.

5. **Cognitive Domain:**
   Relating to knowing understanding and reasoning; logical thought processes. It is also relating to the process of acquiring knowledge by the use of reasoning, intuition or perception.

6. **Affective Domain:**
   It describes the way people react emotionally and their ability to feel another living things pain or joy. Affective objectives typically target the awareness and growth in attitudes, emotion and feelings.

7. **Achievement:**
   Achievement is a measure of knowledge gained by plan programme as indicated in the test score.

8. **Development:**
   Development means to construct.
7.4 OBJECTIVES OF THE STUDY

1. To develop the Multimedia package in Environmental science for elementary students.
2. To validate the Multimedia package in Environmental science for elementary students.
3. To develop Achievement Test on Environmental science for the elementary students.
4. To develop opinionnaire to seek the opinion of teachers about the effectiveness of multimedia package as a teaching-learning strategy for elementary students.
5. To develop Attitude Scale on Environmental science for elementary students.
6. To compare the mean achievement scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package before the experimental treatment.
7. To compare the mean achievement scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package after the experimental treatment.
8. To compare the mean gain achievement scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package after the experimental treatment.
9. To compare the mean attitude scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package before the experimental treatment.
10. To compare the mean attitude scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package after the experimental treatment.
11. To compare the mean gain attitude scores of two groups of elementary students taught Environmental Science with and without the use of Multimedia Package after the experimental treatment.
7.5 HYPOTHESES
The following corresponding hypotheses have been framed:

- **H_1** At the end of experimental treatment, the group of elementary students taught Environmental science through multimedia package scored significantly higher on the achievement test than the group of elementary students taught through the traditional method.

- **H_2** At the end of experimental treatment, the group of elementary students taught Environmental science through multimedia package showed significantly higher mean gain score on the achievement test than the group of elementary students taught through the traditional method.

- **H_3** At the end of experimental treatment, the group of elementary students taught Environmental science through multimedia package scored significantly higher on the attitude scale than the group of elementary students taught through the traditional method.

- **H_4** At the end of experimental treatment, the group of elementary students taught Environmental science through multimedia package showed significantly higher mean gain score on the attitude scale than the group of elementary students taught through the traditional method.

7.6 DELIMITATIONS OF THE STUDY
The present study was delimitated to:

- Students of Gurukul Senior Sec. School, Matindu, Distt. Sonepat only.
- Multimedia Package was tried out on one hundred students of Elementary class (Sixth grade).
- Multimedia Package was based on five topics of environmental science mentioned below:
  1. Understanding Our Environment
  2. Living and Non-living things
  3. Natural Resources
  4. Water
  5. Pollution

* 30 days of the academic session.
7.7 DESIGN OF THE STUDY

Research design is an overall plan for organizing a scientific investigation. An educational research is described as experimental when the research first, specifies a set of researchable hypotheses and then, establishes a systematic programme of data gathering under precisely defined conditions in an effort to test the hypothesis. The hypothesis provides a network of statements relating the impact of independent variables on some outcome variables or dependent variables.

According to Weiner (1977), the experimental method, which is suitable for testing hypothesis, is the strongest method for developing and understanding psychological concepts. Any experimental problem has two interrelated aspects, the design of the experiment and statistical analysis of the data. The later aspect is directly dependent upon the former. Statistical methods can greatly increase the efficiency of an experiment and also strengthen the conclusions so obtained. A good experimental design should provide some explanation with respect to all the objectives of the experiment and be kept as possible.

In the present study, Quasi experimental design was employed with a purposive sample in the form of two intact sections of elementary class students of the same school. It involved two groups of sixth grade elementary students (experimental group and control group); the experimental group was taught through Multimedia package and control group taught through traditional method.

The design comprised three stages. The first stage involved pre-testing of all the elementary class (sixth grade) students of two groups on Socio-Economic Status, Intelligence, Achievement in Environmental Science and Attitude towards Environmental Science. The second stage, involved the experimental treatment, which consisted of teaching five chapters of Environmental science through Multimedia Package to experimental group and through traditional method to control group. In the third stage, the elementary class students were post-tested on Achievement in Environmental Science and Attitude towards Environmental Science. A schematic view of the phases of experiment is presented in Table 7.1.
Table 7.1
Phases of the Study

<table>
<thead>
<tr>
<th>Stage</th>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Treatment</td>
<td>Teaching Environmental Science through Traditional method</td>
<td>Teaching Environmental Science through Multimedia Package.</td>
</tr>
</tbody>
</table>

STUDY VARIABLES

In an experimental research, the relationship between two types of variables namely independent and dependent variables is studied, Independent variable are the causes, while dependent ones are effects. Another category of variables, which is equally important, is of the intervening variables. All these three kinds of variables, identified for the study are as discussed below.

Independent Variables

1. Multimedia Package
2. Multimedia Method
3. Traditional Method

As the impact of Multimedia Learning strategy was to be studied, the method of instruction or teaching in Multimedia Package was used as an independent variable. Multimedia package was used to see its effect on the
achievement of sixth grade students in Environmental Science. The experimental group was taught through Multimedia package method of learning and the control group was taught through traditional method. Thus, multimedia method and the traditional method were the two independent variables for the study.

Dependent Variables
Achievements in Environmental Science and Attitude towards environmental science were taken as dependent variable. These variable were measured twice during the course of the study-first before beginning the experimental treatment, i.e., at the pre-test stage and then after completing the experimental treatment, i.e., at the post-test stage.

Intervening Variables
There are certain variables known as Intervening variables which have their effect on the learning outcomes and influence both independent and dependent variables. Intervening variables such as type of school, grade level, subject to be taught, socio-economic status of students, intelligence of students, previous knowledge of students etc. were successfully controlled experimentally.

Control Employed
It is necessary to control all those variables that may significantly affect the dependent variables. Hence such intervening variables were controlled by employing suitable controls.

1) Type of School
The sample was selected from a single school (Gurukul Sr. Sec. School, Matindu), situated in Matindu, Distt. Sonepat.

2) Grade Level
Elementary Class students of Sixth grade were selected for the study and grade level was thus kept constant during the study.

3) Teacher
Both the experimental group and the control group were taught by the researcher herself to avoid any variation.
4) **Subject**

The two groups were taught same five topics of Environmental Science.

7.8 **SAMPLE**

The primary purpose of research is to discover principles that have universal application, but to study the whole population in order to arrive at generalizations would be impractical, if not possible. Sampling is a technique by which a relatively small number of individuals or measures of individuals, objects or events is selected and analysed in order to find out something about the entire population from which it is selected. Sampling technique reduces the expenditure, saves time and energy permits measurement of greater scope or produces greater precision and accuracy. In all types of researches, there are some inferences regarding a well specified and identifiable group known as population and the selected number of persons known as sample. Sample is the representative proportion of the population. Educational Researchers, because of administrative limitations in randomly selecting and assigning individuals to experimental and control groups, often use available classes as samples (Best & Kahn 1995).

In the present study purposive sampling technique was followed for the selection of the school, only one school i.e. Gurukul Sr. Sec. School, Matindu was chosen for the study. The sample of the study comprised of 100 students of sixth grade studying in three sections of Gurukul Sr. Sec. School, Matindu. A figurative representation of the sample is given in Table 7.2

**Table 7.2**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the School</th>
<th>Groups</th>
<th>Total No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gurukul Sr. Sec. School, Matindu</td>
<td>Experimental</td>
<td>50</td>
</tr>
<tr>
<td>2.</td>
<td>Gurukul Sr. Sec. School, Matindu</td>
<td>Control Group</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

7.9 **CONDUCTING THE EXPERIMENT**

The experiment was conducted in three phases as given below:
Phase-1  Administration of Pre-test

Before the start of the experiment, the sample subjects were contacted and rapport was established with them. They are oriented to the tests to be used with them and also with the methodology of the treatment to be followed e.g. Multimedia Package method and Traditional method. Pre-test, i.e., Achievement Test and Attitude scale were administered to the Sixth grade students of two groups by the researcher herself. The instructions pertaining to the tests were explained verbally in clear terms to the elementary students administering test. The administration of these test was carried out as per norms and instructions contained in their manuals.

Phase-2  Conducting the Instructional Programme

The instructional treatment was given for about 30 days which included 5 Multimedia package lessons to the experimental group, whereas the control group was taught by the traditional method. Same content was taught to both the groups. Elementary class students were motivated to learn through the novel method of instruction.

Phase-3  Administration of Post-Test

Immediately after the instructional treatment was over, the subjects were assessed on criterion measures to know the effect of the treatment. The Achievement and Attitude Scale on Environmental Science were administered to both the experimental and control groups.

7.10  TOOLS USED

For the present investigation the following tools were used:-

Standardized Tests

- Socio Economic Status Scale (A.K. Kalia and Sudhir Sahu)
- Cattell’s Culture Fair Intelligence test (R.B. Cattell and A.K.S Cattell)

Self Developed Tools

- Achievement Test (Developed by the investigator)
7.11 STATISTICAL ANALYSIS

To achieve objectives of the study, the data collected was statically analyzed using the following techniques:

1. Descriptive statistics such as means and S.Ds were worked out on the score of achievement in Environmental science and Attitude towards Environmental science.
2. Analysis of variance (ANOVA) was used in order to find out the significance of difference between means of SES and intelligence among control and experimental group.
3. 't' test was employed for testing the significance of difference between the means of students Achievement in environmental science and their Attitude towards environmental science on pre test, post test and gain scores.

7.12 FINDINGS

Based on the analysis of data and interpretation of results, a set of findings and conclusions can be drawn and on the basis of their discussion, a wide range of implications and suggestions also need to be focused on for further research in the field related to this study. Some of the significant possibilities and provisions in terms of findings of this piece of research may be as follows:

1. No significant difference was found in achievement scores of experimental group and control group at pre-test score that is, both the groups were found to be similar in respect to their achievement scores.

2. It was found that the subjects exposed to Multimedia Learning Method achieved higher on achievement test in comparison to those exposed to traditional method of teaching.
3. It was found that the subjects exposed to Multimedia Learning Method achieved significantly higher mean gain score of achievement test in comparison to those exposed to traditional method of teaching.

4. No significant difference was found in the attitude scores of experimental group and control group at pre-test score that is, both the groups were found to be similar in respect to their attitude scores.

5. It was found that the subjects exposed to Multimedia Learning Method achieved higher on attitude scale in comparison to those exposed to traditional method of teaching.

6. It was found that the subjects exposed to Multimedia Learning Method achieved significantly higher mean gain score of attitude test in comparison to those exposed to traditional method of teaching.

It can be concluded from the above findings that MMP learning significantly improved the score of Sixth grade students of the experimental group in their achievement also in their attitude towards Environmental science.

7.13 CONCLUSION

It may be safely concluded from the above findings that MMP learning significantly improves the scores of the sixth grade students of the experimental group in their achievement and also in their attitude towards Environmental Science. The method of Multimedia learning proves more meaningful and effective than the traditional classroom learning strategy. The conclusion of the study needs also to be expressed in terms of their global importance for educational purposed vis-a-vis the tested hypotheses of the study.

Prima- facie, the main focus of the study addresses the multi-sensorial approach of the innovative learning process (Multimedia Learning Package) and its impact on education for sustainable development of each and every individual learner in a school situation which is deemed to be a miniature technology based society in itself. The two fold fundamental variables of the study obviously include:
(a) The learning strategy, especially the Multimedia Package.

(b) The learning outcomes, in terms of Cognitive and Affective domain.

These findings certainly have a number of important implications for teachers, teacher educators, curriculum makers and planners and for the society at large.

7.14 EDUCATIONAL IMPLICATIONS

The present research clearly shows that in changing from a traditional "chalk and talk" method to a Multimedia Package enriched class, elementary class students' achievement does not diminish; rather it significantly improves. It implies that MMP proves to be more tangible in its effectiveness on achievement than the traditional classroom approach. Multimedia Package proves to be more practical and widely acceptable to teacher.

- Multimedia package helps the teachers to make his/her learning process totally interactive.
- MMP suggests a new role for the teacher—the role of a Facilitator. A teacher accustomed to being the sole source of information for teaching the passive learners in the classroom, has to change to be a facilitator in the learning process to actively encourage the student to learn in a more effective manner, participate in discussion, participate in making of MMP and give textual, audio, video, graphical and animation input for Multimedia Package. So students feel are being a part of the entire teaching learning process.
- The study has important implications for teacher education. Given the current widespread use of Multimedia Learning globally at all levels and for all the subjects, it is imperative that teachers should learn this new technology. The teachers should understand how to develop and run MMPS. The pre-service training may be given to teachers in the making and in-service training to the existing teachers.
- MMP learning sessions in class may act as a source of edutainment (education plus entertainment) as well. The sessions may include games, recreational activities like solving puzzles and riddles, holding group discussions on some general topics related to current affairs to create
more interest among elementary class students. So teacher becomes more resourceful and classes get livelier.

• Important skills such as creative thinking, critical analysts and the synthesis of knowledge can easily be accomplished through MMP based learning in the classroom.

7.15 OVERVIEW

Keeping in view the usefulness of Multimedia Package as instructional mode and the increasing necessity for such material in school subject, the investigator decided to develop Multimedia Package on Environmental Science for Elementary school students. Multimedia Package on environmental science will certainly motivate the students to attain cent percent mastery of content and further enable them to apply this knowledge in real life situations. In addition to it, the developed Instructional Material on environment helps the students of Elementary class to understand the physical and cultural characteristics of the world. Multimedia Package on environmental science provides the values, knowledge, concepts and skills to better understand ourselves. It concentrates on giving information, developing the understanding and application of the concepts, reasoning and thinking power of the students and also enhances the creativity in developing better understanding about the environmental science. Multimedia brings a new dimension to reading and writing and need for the students to develop basic skills in information. Employing multimedia tools into the learning environmental is a rewarding, but complex and challenging task. All of the multimedia formats available: text, sound, video, animation and graphics, already exist in one form or another in most libraries. Students can explore an almost infinite variety of information.