

**Development of Self Learning Material on Education
for Sustainable Development for Teachers and
Study of Effectiveness**

**Executive Summary of a Minor Research Project Report Submitted
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Researcher

Dr. Vijay Fakira Dhamane

Place

**Tilak College of Education,
Pune- 411030**

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SUMMARY OF THE RESEARCH REPORT

1. INTRODUCTION:

In the age of modernization and globalization, the world has been replaced by technology & modern lifestyle. Though we are living in modernized world, we meet the needs from a good friend 'Environment'! We get all the basic resources required for living from the environment. It provides the things to survive and absorbs the waste that developmental activity creates.

Due to misuse of our good friend Environment, we are facing the problems like pollution, deforestation, loss of biodiversity, the ozone hole, global warming & social problems. All these problems affect human well-being. This may have short term and long term impact. To solve existing environmental problems and preventing new once, we require understanding and appreciation of the linkages between environmental well-being and human well-being. That will sustain the environment and the human life.

For well-being, we need to understand how to interact with the environment. To meet this need, education should play vital role. A teacher should be a facilitator of all this process. Education for sustainable development aims to help people to develop the attitude towards environment, knowledge & skills to make informed decisions for the benefits of themselves & others.

To develop these skills, attitude & knowledge a Teacher should be a competent. So the present study focuses on the attitude of the Pre service teachers.

The researcher is working as a Teacher educator since last 18 years, also worked at secondary school level. Year by year due to some uncertainty, we are facing so many problems regarding environment, natural calamities etc. Researchers studied these issues through national and international conferences. In our surrounding we have the problems regarding air, water, plants, wastages, transportation, health and cultural problems also. To solve all these problems education should play vital role. Being a Teacher educator to give some contributory efforts, researcher has been selected this research area.

1.2. SUSTAINABLE DEVELOPMENT:

Sustainable development is seeking to meet the needs of the present without compromising those of future generations. We have to learn our way out of current, social and environmental problems and learn to live sustainably.

Sustainable development is a vision of development that encompasses population's animal and plant species, ecosystems, natural resources and that integrates concerns such as the fight against poverty, gender equality, human rights, education for all, health, human security etc.

1.2.1 EDUCATION FOR SUSTAINABLE DEVELOPMENT :

Education for sustainable development is just another buzzword forgotten in a few years. From a global perspective as well as a local perspective we have to direct education toward what will be truly useful for each child and for each community in the future.

To have a fulfilling, life should be within reach for all children wherever they are born. In too many parts of society and of the world children grow up in hazardous environments with very poor conditions for basic requirements and bleak prospects for their future.

'Education for Sustainable Development' is derived from the Brundtland report's focus on Sustainable Development (SD). The Brundtland report requires fundamental changes in the society and its institutions, in politics and in our individual family life styles. Economic development cannot be separated from social development and a concern for the environment.

Sustainability education (ES), Education for sustainability (EFS) and Education for sustainable Development (ESD) are interchangeable terms describing the practice of teaching for sustainability, ESD is the term most used internationally level and by the United Nations.

Education for sustainable development aims to help people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon these decisions.

1.3. INTERDISCIPLINARY RELEVANCE

In emerging issues, Sustainable Development is being studied through various subjects. It is related with Environmental Sciences, Geography, Biological Sciences and Human sciences also. Through these subjects we are trying to sensitize the people to sustain the Environment ,to sustain the human life. So it shows interdisciplinary study.

1.4. THEORETICAL BACKGROUND

- **Knowledge building**

Knowledge building is considered from a constructivist perspective. This means that aspects of information processing are combined with motivational issues such as volition and self-directed learning (Phye, 1997).

- **Knowledge dimensions**

If the main goal of ESD is the development of teachers' students' and their pupils' competences which enable them to find possible pathways for solutions for SD challenges, then it follows automatically that the knowledge they need is action-oriented and that it will involve an interdisciplinary connection between environment, people, culture and society (Jensen & Schnack, 1997; Jensen, 2002). Jensen & Schnack (1997) distinguish 4 dimensions of knowledge people need when they are motivated to find solutions for environmental problems; we translate them here for SD problems:

- Knowledge about the existence and spread of sustainability issues, such as the relation between CO₂ and global warming, the occurrence of poverty and its causes etc. This knowledge is essential in order to stimulate interest and to rouse concern, creating the starting point for a willingness to act. But the same authors warn, that this knowledge may have an adverse effect if it is learned in isolation, as it may create a growing concern amongst students that the issues are too complex and too large and this will lead to 'action paralysis'.
- The second aspect deals with knowledge about the causal dimension of SD problems, knowledge which mainly belongs in the sociological, cultural and economic spheres. This includes knowledge of social organization, of economic organizations such as IMF, Worldbank, ... and the role they play in SD issues.

- The third dimension deals with knowledge about indirect and direct possibilities for action; according to Jensen and Schnack, this knowledge dimension is central to an action-oriented form of ESD and usually belongs in psychological, political and sociological spheres.
- The fourth dimension deals with the necessity of developing one's own vision on SD and ESD.

1.5. NEED OF THE STUDY:

1. Now a days due to dense population a lot of social problems, environment problems are created which affects the environment balance, creates environmental issues. Teacher will play a vital role in this. So researcher studied this problem at Teacher Education level.
2. There is a provision regarding the Education for sustainable development in the present curriculum of the teacher training. As the researcher is a Teacher-Educator, decided to provide the opportunity for novice teacher to test the attitude towards the Sustainable Development. It is necessary to test the same.
3. Teacher is the key person to solve the environmental issues and can help to sustain the environment, to do so it was necessary to test an attitude towards Education for sustainable development.

1.6. IMPORTANCE OF THE STUDY

1. Present study will develop knowledge of teacher community about Education for sustainable development which will be helpful for future generation.
2. It will also change the attitude pre-service secondary school teachers towards the environmental issues & Education for Sustainable Development.
3. This study will give the proper way to think & act about the environmental issues to the teacher community, which is the mediator of the society.
4. Environmental Education and Education for Sustainable Development is a powerful instrument in understanding, developing awareness, preventing and solving environmental problems. As the students are the citizens of tomorrow, they must have environmental knowledge, they must be environmentally aware with favorable attitude towards the environment, therefore developing the environmental knowledge and attitude towards the environment among these students is of prime importance.

5. It is the responsibility of the teacher to impart the knowledge and develop the favorable attitude of the students towards the environment.
6. Present study will develop attitude of teacher community about Education for sustainable development which will be helpful for future generation.
7. It will also change the attitude of novice teachers towards the environmental issues & Education for Sustainable Development.
8. This study will give the proper way to think & act about the environmental issues to the teacher community, which is the mediator of the society.

1.7. STATEMENT OF THE PROBLEM

To develop self learning material on Education for Sustainable Development for teachers and study its effectiveness.

- **Explanation of the problem:**

In the present study, Firstly investigator conducted survey under Pune district and assessed an attitude and knowledge of pre-service teachers towards Education for Sustainable Development. On the basis of findings from survey, Multimedia Program based on Education for Sustainable Development was developed to enhance the knowledge and attitude of pre-service teachers. It was tested on experimental group and effectiveness was found.

1.8 OPERATIONAL DEFINITION

- **Self Learning Material:**

Self Learning Material is the Computer Multimedia Program which is included PPTs, Videos, Pictures and Lectures and has been helped to develop the Teachers knowledge and attitude towards Education for Sustainable Development.

- **Education for Sustainable Development**

Education for sustainable development is the education which will help the pre service teachers to develop environmental attitudes, skills and knowledge to make decisions for the benefit of themselves.

- **Attitude :**

Responses or reactions of pre-service teachers about Education for Sustainable Development.

- **Teachers:**

Teachers are the pre- service teachers , who are completing their teacher training program under Savitribai Phule Pune University, Pune.

1.9. OBJECTIVES

- 1) To assess the knowledge of pre-service teachers about Education for Sustainable Development.
- 2) To check an attitude of pre-service teachers towards Education for Sustainable Development.
- 3) To develop the Multimedia Program for Education for Sustainable Development.
- 4) To test an effectiveness of Computer Multimedia Program

1.10. ASSUMPTION

- 1) Sustainable Development is today's need in all sectors.
- 2) Education for Sustainable Development is the need of future Education and also future generation.
- 3) Teacher is a mediator for the society to bring out the awareness and the develop the attitude towards the Sustainable Development.
- 4) The awareness about Education for Sustainable Development among the teacher community is not at satisfactory level.
- 5) Self learning material i.e. booklet and computer multimedia program will develop the teachers attitude towards Education for Sustainable Development.

1.11. HYPOTHESIS

- **Research Hypothesis**

1. There is significant difference between the mean scores of knowledge of male and female pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
2. There is significant difference between mean scores of knowledge of Science and non Science pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.

3. There is significant difference between the mean scores of knowledge of rural and urban pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
4. There is significant difference between the mean scores of attitude of male and female pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
5. There is significant difference between mean scores of attitude of Science and non Science pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
6. There is significant difference between the mean scores of attitude of rural and urban pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.

• **Null Hypothesis:**

- 1 There is no significant difference between the mean scores of knowledge of male and female pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
- 2 There is no significant difference between mean scores of knowledge of Science and non Science pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
- 3 There is no significant difference between the mean scores of knowledge of rural and urban pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
- 4 There is no significant difference between the mean scores of attitude of male and female pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
- 5 There is no significant difference between mean scores of attitude of Science and non Science pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.
- 6 There is no significant difference between the mean scores of attitude of rural and urban pre-service teachers towards Education for Sustainable Development after implementation of Multimedia Program.

1.12 SCOPE OF THE RESEARCH STUDY

The conclusions of this research study will be applicable to all secondary pre-service teachers of Pune District.

1.13 LIMITATION

- 1) The data collection tools are developed by the researcher.
- 2) The conclusions of the research study are based on the responses of the sample.

1.14 DELIMITATION

- 1) The research study is related to the knowledge and attitude regarding education for the sustainable development of pre-service secondary teachers.
- 2) This research study is related to pre-service secondary teachers affiliated to Savitribai Phule Pune University, Pune under Pune District.
- 3) It is also delimited to effectiveness of computer multimedia program on Teachers' knowledge and attitude regarding Education for Sustainable Development.

1.15 REVIEW OF RELATED LITERATURE :

Review of related literature means the survey of books, articles and other sources which are related to the present study. Through the review of related literature, the researcher has come across a number of studies which has provided a platform to the researcher to develop the conceptual framework, new ideas, research design, methodology, theoretical background , self learning program and activities for the present study.

- **Environmental Education, Dr Joseph Catherine:**

In this book objectives, scope and nature of Environmental Education is given ways of environmental management and protection, also given Environmental education in the school curriculum is focused the information regarding the attitude. The information regarding the scale is very useful for preparing the attitude scale for the present research work.

- **Environmental Education, Prof. K. Purushotam Reddy and Narsimha Reddy:**

This book focuses on environmental problems in India. From this book, it is found that sustainable development and education for sustainable development are totally based on the Environmental Education. In this book, The framework for action is given. The different aspect of Sustainable development and education for sustainable development are given in this book. For a present study, these are very valuable inputs for the development of the Multimedia program which is based on the education for sustainable development.

As the present research study focuses on the pre-service teachers' and knowledge and attitude towards Education for Sustainable Development, to develop the tools for data collection, this theoretical background was very useful. Existing essential tool for formal and non formal environmental and sustainable development education should be enhanced including multimedia computer and telecommunications technology. Society is being transformed by Information and Communication Technology. In the classroom it is lagging. So the computer multimedia program should be promoted for the students teachers.

Investigator reviewed 27 researches related to the present study. The review was very useful and guideline for designing the study.

1.16 RESEARCH METHODOLOGY

For present research the multi-method research was used by the researcher. Analysis of the chosen problem with several different methods of analysis of the same generic type that is quantitative or qualitative is called as multi-method research.

Table No.1.1: Objective wise Research Methodology

Sr. No.	Objectives	Research Method	Tools	Sample/ Experpt	Sampling Method	Statistical Technique
1.	To assess the knowledge of pre-service teachers about Education for Sustainable Development	Survey	Knowledge Test	500 pre service teachers	Probability sampling: Simple Random Sampling	Mean
2.	To check an attitude of pre-service teachers towards Education for Sustainable Development.	Survey	Attitude Scale	500 pre service teachers	Probability sampling: Simple Random Sampling	Mean
3.	To develop the multimedia program based on Education for Sustainable Development.	Product Development Method	Intervention Programme	10 - Expert	Purposive Sampling	-
4.	To test an effectiveness of Computer Multimedia Program	Experimental	Knowledge Test, Attitude Scale	40 pre service teachers	Purposive Sampling	Mean , S.D, 't' test

According to the nature and scope of the study the researcher followed a **Multi Method.Objectives 1 and 2 were studied by Descriptive method.** Among the various sub types of descriptive method **Survey Method** was adopted. Knowledge Test and Attitude Scale were administered to 500 pre service teachers of under Savitribai Phule Pune University, Pune. . **Objective 3** was completed with the help of Product Development method. An Intervention Programme was developed to enhance knowledge and attitude of pre service -teachers towards Education for Sustainable Development. **Objective 4** was studied through the Experimental Method to check the

effectiveness of the Multi Media Program regarding Sustainable Development for Pre Service-teachers.

- **Tools for Data collection:**

- Knowledge Test to find out the existing status of student-teachers about knowledge towards Education for Sustainable Development.
- Attitude Scale to check the attitude of student-teachers on Education for Sustainable Development
- Multimedia Program to enhance Knowledge and Attitude of Pre Service Teachers towards Education for Sustainable Development

- **Data Analysis & Statistical Techniques**

The following statistical techniques were used to analyze the received data:

- Mean and S.D ‘t’ test to analyze and interpret the scores

Procedure of the Study:

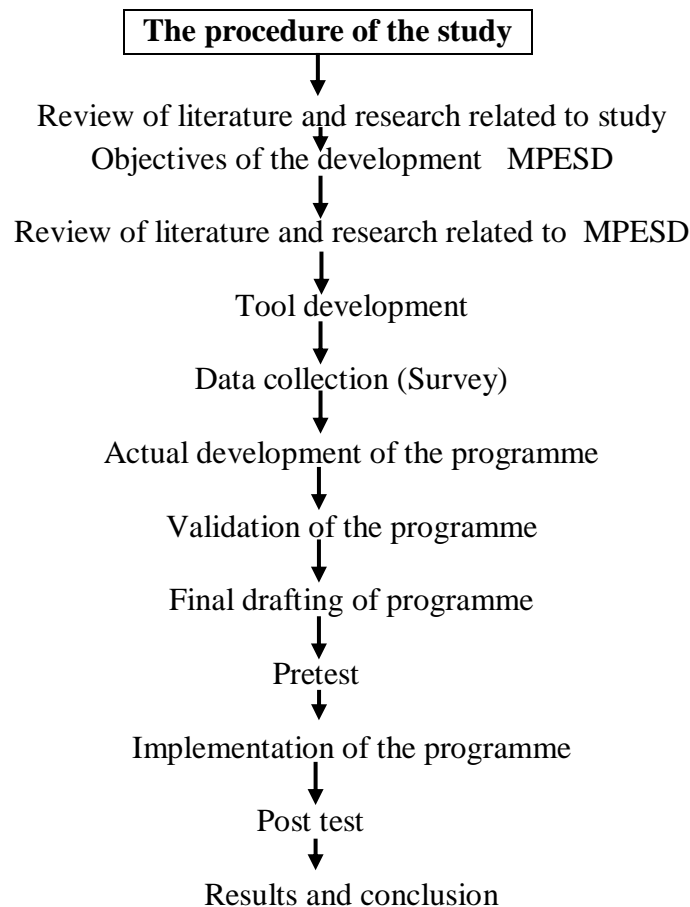


Figure No. 1.1 Procedure of the Study

a. Steps for the Programme Development:

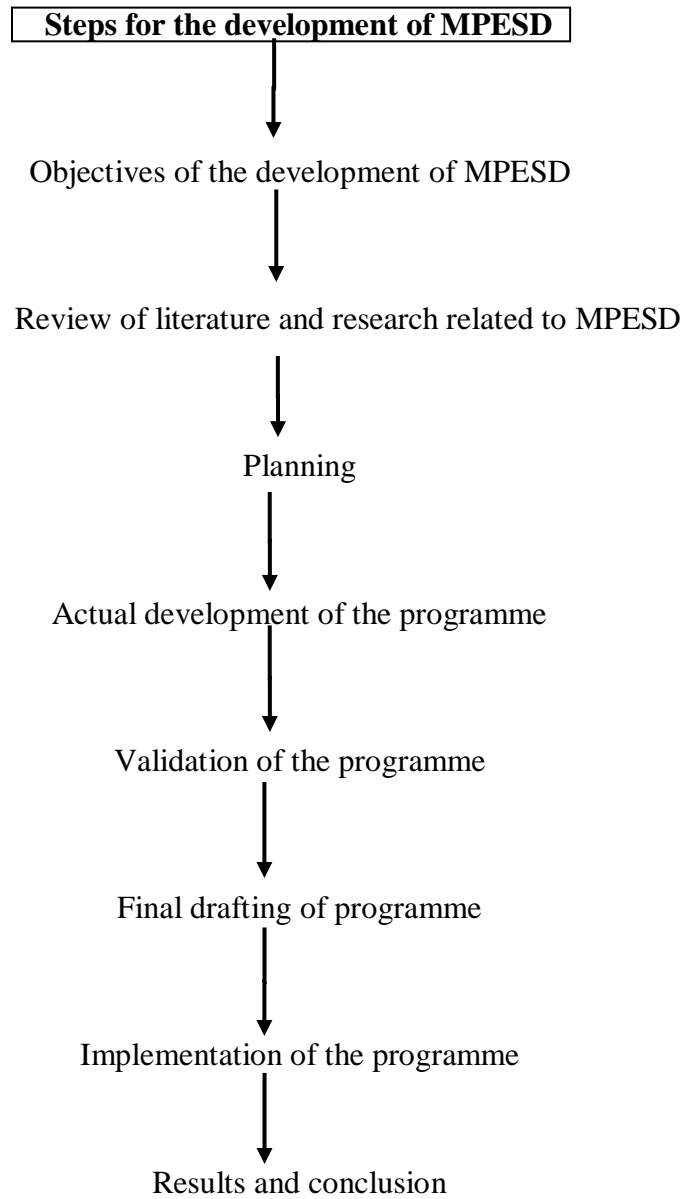


Figure No.1.2 Steps for the Programme Development

Reviews from domain experts helped the final draft of the intervention programme. Following is the consolidated table of all activities:

Table No. 1.2 Final Draft of MPESD

Area	Sub-Area	Activities	Theoretical Base	Duration
Programme orientation	Concept Of SD and ESD	Meaning, definition, Aims, objectives and importance of Sustainable Development.	Cognitive Developmental Theory Schema Theory Mental Model Theory Proposition Theory	2 hours
Knowledge about Environment Education	Components of Knowledge towards EE	PPT, audio, Video images and photos about Environment Education	Constructivism	2 hrs
Knowledge about Sustainable Development	Aspects of Sustainable Development	PPT, audio, Video images and photos about Sustainable Development	The Traditional Bottom-up view, Cognitive or Top-down Processing and Schema theory	2 hrs
Sensitization about Sustainable Development	Sensitization	Video, Case Study, Actual site photo, Discussions etc...	Schema Theory	2 hrs
Sensitization about Education for Sustainable Development	Building attitude towards Education for Sustainable Development	Video, Case Study, Actual site photo, Discussions etc...	Schema Theory	2 hrs

Features of the Multimedia Program:

- i. The Multimedia Program was made for self learning
- ii. It includes textural and pictorial information about ESD
- iii. The flasher is used to create interest to learn.
- iv. Pre-service teacher can learn at his/her own level and speed.
- v. Main points are highlighted.
- vi. Appropriate links are given to the text.
- vii. It is inclusive in textural aspect.
- viii. It is easy to operate.

- **Experimental Research Design:**

The Single-Group, Pretest-Posttest Design

$O_1 \quad XO_2$

$O_1 = \text{pretest} \quad O_2 = \text{posttest}$

- **Variables**

- **Independent variable**– Multimedia Program based on Education for Sustainable Development
- **Dependent Variable**– knowledge and attitude of pre-service teachers towards Education for Sustainable

It can thus be concluded that the methodology of research gives a vivid description about the identification of the problem, pinning down the objectives, finalizing the need of tools, design of tools, number of tools for the study and the intervention programme. All research processes and procedures have been explained in detail. The final Multimedia programme has been explicitly explained.

1.17 ANALYSIS OF DATA:

Analysis of data means studying the organized material in order to discover inherent facts. The data collected by using data collection tools have a little meaning to a researcher until it has been arranged or classified in a systematic way in order to discover inherent facts. Analysis is an important phase of classification and summarization of data.

Objective-1: To assess the existing status of the knowledge regarding ESD of pre-service teachers.

For investigation of this objective researcher has been used survey method. The tool for the survey was knowledge test for ESD of pre-service teachers. The data collection tool was having 40 multiple choice questions for 40 marks. As each correct answer have 1 mark and false have 0 marks. The data collected from 500 pre-service teachers . This analysis and interpretation tried to find out the answers of research questions.

Interpretation of Scale :

For interpretation of knowledge regarding overall knowledge test for ESD of pre-service teachers, knowledge test in to five grades. The minimum score is 0 and maximum score is 40.

Table No.1.3

Reference scale for Interpretation of knowledge regarding ESD:

Mean Scores for overall managerial skill	Levels
31 to 40	High
21 to 30	Average
11 to 20	Below Average
1 to 10	Very Low

These levels were used for the interpretation of the knowledge regarding knowledge of pre-service teachers regarding ESD.

Analysis for objective no.1:

The results obtained statistically analysed with mean. The detailed analysis and interpretation given in table form:

Table No. 1.4

Analysis for Objective-1

Knowledge regarding ESD	N	Mean	Remark
	500	26.16	Average level

Observation: Table no 5.4 clearly shows that the mean score of the knowledge regarding ESD of 500 pre-service teachers is 26.16.

Interpretation: Above analysis interprets that knowledge regarding ESD of pre-service teachers is at average level and needs training to improve it.

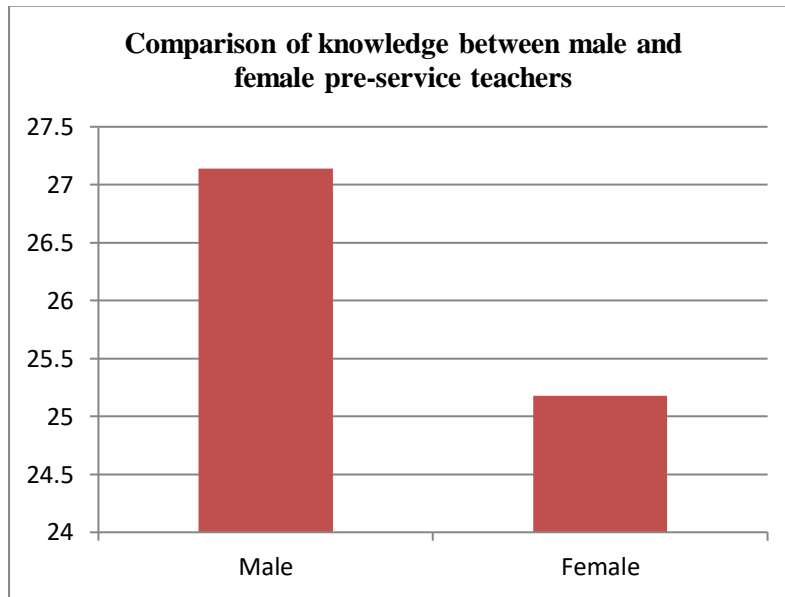
Comparison of knowledge regarding ESD on the basis of gender, area, stream

I) Comparison of knowledge between male and female pre-service teachers:

For comparison of knowledge between male and female, knowledge test for pre-service teachers was conducted. The data were collected from 183 male headmasters and 317 female pre-service teachers and analysed statistically with the functions mean value. The analysis is given below in the form of table.

Table 1.5 :Comparison of knowledge between male and female pre-service teachers:

Knowledge regarding ESD	Gender	N	Mean	Level
knowledge regarding ESD	Male	183	27.14	Average
	Female	317	25.18	Average



Graph No. 1.1

Observation:

Table No 1.5, shows that mean scores of the knowledge regarding ESD of the male pre-service teachers is 27.14, while mean of female pre-service teachers is 25.18. The mean score of both male and female pre-service teachers is on average level.

Interpretation:

It is interpreted that the knowledge regarding ESD of both male and female pre-service teachers are on average level and needs training to improve it.

In this manner the remaining comparison of knowledge regarding to ESD was done .

Quantitative analysis and interpretation of Objective no. 2:

To check an attitude of pre-service teachers towards Education for Sustainable Development.

From the Table No 1.6 it is clear that, minimum score for attitude level is 35 (thirty five) and maximum is 175 (35 statements X 5). Attitude levels are decided as per the scores.

Table No 1.6 Scores and Attitude Level

Sr. No.	Scores Obtained	Attitude Level
1	1-35	Highly Negative
2	36-70	Negative
3	71-105	Moderate
4	106-140	Positive
5	141-175	Highly Positive

Table no. 1.7 Statistical Analysis of attitude total scale score

	N	Mean	SD	SE
Attitude Score	500	116.03	29.15	1.28

Observation :

The above table no1.7, is the Summary Statistics for Attitude score. N= 500, Mean =116.03, SD= 29.15 and SE= 1.28.

Interpretation:

The above table no. 1.7, an attitude of pre-service teachers related to ESD clearly indicates that, the mean score is 116.03, which means that, it is slightly above average. As per the scores and level, an attitude of pre-service teachers towards ESD is positive.

- **Comparison of an attitude scores of science and non-science** pre-service teachers related to ESD

For a deeper understanding of attitude variations among all pre-service teachers related to ESD, they were further divided into two groups, namely – Science and Non-Science pre-service teachers. There were a total of 316 science pre-service teachers and 184 non-science pre-service teachers. The following are their scores and its interpretation:

Table no1.8

Comparison of Attitude scores of science and non-science student-teachers

Pre-service teachers	N	Mean
Science	316	118.39
Non Science	184	112.34

Observation:

The table no. 1.8, on comparison of scores between science and non-science pre-service teachers shows that the mean score of science students is 118.39, and mean score of non-science pre-service teachers is 112.34.

Interpretation:

For comparison of mean attitude score of science and non-science students, from above table we can observe that, there is slightly difference observed in mean attitude score of science and non-science pre-service teachers. Attitude of science and non-science pre-service teachers is positive and attitude of science pre-service teachers is found slightly at high level.

Similarly the comparison of attitude of male and female teachers, rural and urban teachers were done.

1.18 HYPOTHESIS TESTING

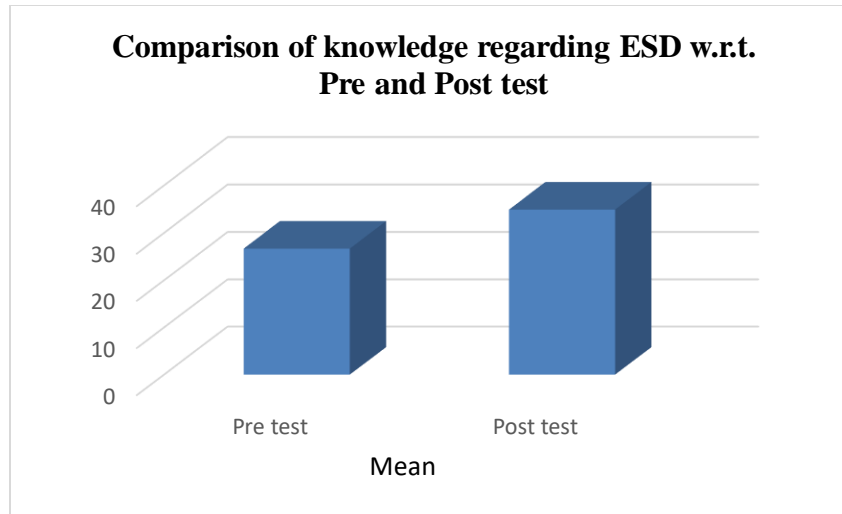
For the present study, total eight hypotheses were established to test an effectiveness of the ‘Multimedia Program based on Education for Sustainable Development’. These were tested with ‘t’ test. Following are the detail analysis of the data.

Hypothesis No 1:

There is no significant difference between the mean scores of pre and post test of knowledge towards Education for Sustainable Development of pre-service teachers after implementation of Multimedia Program.

Table no 1.9
Comparison of knowledge regarding ESD w.r.t. Pre and Post test

Sr. No.	Knowledge Test	Numbers (N)	Knowledge towards ESD		Hypothesis Rejected/Accepted
			Mean (M)	S.D.	
1	Pre test	50	26.68	2.21	Ho Rejected
2	Post test	50	34.9	3.41	
3	t value		7.45		



Graph No. 1.2

Observation :

From table 1.9 the mean of pre test regarding knowledge of pre-service teachers towards ESD is 26.68 and S.D is 2.21 and of post test mean is 34.9 and S.D. is 3.41 . The 't' value shows 7.45.

Interpretation:

According to mean value of knowledge of pre test and post test of pre-service teachers regarding ESD, and 't' value, it is interpreted that difference between the knowledge is significant. As $t_{cal} > t_{table}$, the null hypothesis is rejected .

All the remaining seven hypotheses were tested and interpreted accordingly.

1.19. FINDINGS :

1. The knowledge regarding ESD of pre-service teachers is 26.16 and it is at average level and needs training to improve it.
2. The knowledge regarding ESD of the male pre-service teachers is 27.14, while mean of female pre-service teachers is 25.18. The mean score of both male and female pre-service teachers is at average level.
3. It is found that, mean scores of the knowledge regarding ESD of rural pre-service teachers is 26.46 while mean of urban pre-service teachers is 25.15. It is at average level.

4. It has been clearly found that, the knowledge level of ESD of non-science and science pre-service teachers is average.
5. An attitude of pre-service teachers towards ESD clearly indicates that, the mean score is 116.03, which means that an attitude of pre-service teachers towards ESD is positive.
6. Attitude of science and non-science pre-service teachers towards ESD is positive (118.39,112.34 resp.) and attitude of science pre-service teachers is found slightly at high level.
7. Attitude of male and female pre-service teachers towards ESD is positive (121.12, 114.75 resp.) and as compared to the female pre-service teachers, attitude of male pre-service teachers is found slightly at high level.
8. According to mean value of knowledge of pre test and post test of pre-service teachers regarding ESD, and 't' value, it is found that difference between the knowledge is significant. As $t_{cal} > t_{table}$, the null hypothesis is rejected .
9. According to mean value of knowledge of male & female pre-service teachers regarding ESD, and 't' value it is found that difference between the knowledge is not significant. As $t_{cal} < t_{table}$, the null hypothesis is accepted.
10. It is found that there is a difference between the mean value of Science & Non-Science pre service -teacher. It also found that, the 't' value is 7.95. Since $t_{cal} > t_{table}$, it shows that the difference between these two means is significant and the hypothesis regarding Science & Non-science students knowledge towards ESD is rejected.
11. The deviation from the mean value is greater in rural students scores, The 't' value is 0.68. Hence $t_{cal} < t_{table}$, It is found that , the difference between the means scores of rural and urban pre-service teachers towards ESD is not significant so the null hypothesis is accepted.
12. It is found that, the scores from pre test of an attitude scale of pre-service teacher towards Education for Sustainable Development shows positive attitude and from scores of post test, it shows very positive attitude . The 't' value shows that the difference between two means is significant. Therefore, null hypothesis is rejected.

13. From the above data it is clear that, the attitude of Male & Female pre-service teacher towards Education for Sustainable Development is positive and 't' value shows that the difference between two means is not significant. Therefore, null hypothesis is accepted.
14. It is found that, an attitude of Science pre-service teachers is highly positive and Non Science pre-service teachers is positive. Since, 't' value shows that the difference between two means is significant, the null hypothesis is rejected.
15. An attitude of Rural & Urban pre-service teaches towards Education for Sustainable Development is found positive and 't' value shows that the difference between two means is not significant. Therefore, null hypothesis is accepted.

1.20 CONCLUSIONS:

1. The knowledge of pre-service teachers regarding Education for Sustainable Development is at average level.
2. The knowledge regarding Education for Sustainable Development of pre-service teachers w.r.t. their gender, stream(Science and Non Science) and locale is at average level.
3. An attitude of pre-service teachers towards Education for Sustainable Development is positive.
4. An attitude towards Education for Sustainable Development of pre-service teachers w.r.t. their gender, stream (Science and Non Science) and locale is positive.
5. The Self Learning Multimedia Program based on Education for Sustainable Development is effective to enhance the knowledge of pre-service teachers towards ESD.
6. The Self Learning Multimedia Program based on Education for Sustainable Development is effective to enhance an attitude of pre-service teachers towards ESD.

1.21 DISCUSSION:

In the present study the main focus was enhancement of knowledge and attitude of the pre service teachers towards education for sustainable development and it was found that the knowledge and attitude of the teachers are at average level. similarly

Maurice I. Wee, Fatin Nabilla Ariffin, Theam Foo Ng & Ahmad Firdaus Ahmad Shabudin had conducted study in which the aim of this study is to determine the level of awareness and attitudes towards sustainable development amongst Malaysian youth and it was found that the awareness of respondents about the concept and issues of sustainable development were well developed however, differed over semantics and what sustainable development encompasses The same study was conducted in 2010 by **Alex C. Michalos, Heather Creech, Christina McDonald & P. Maurine Hatch Kahlke**, in which they found that for students and adults, having attitudes favorable to ESD/SD is relatively more influential than age, levels of education and knowledge for behaviors favourable to ESD/SD. They also found that gender was most influential for the student samples, while favourable attitudes were most influential for the adult samples; and while attitudes were practically equally influential to knowledge (though numerically more influential) for the student sample, attitudes were vastly more influential than education for the adult samples. **Maidou, Anthoula; Plakitsi, Katerina; Polatoglou, Hariton** conducted research and findings showed that most pre-service teachers had knowledge on environmental aspects but did not consider societal and financial matters to be aspects of ESD.

1.22 EDUCATIONAL CONTRIBUTION:

- It will play the contributory role for testing the knowledge and attitude towards Education for Sustainable Development.
- Present study will be helpful to know the present status about knowledge and attitude of novice teacher towards Education for Sustainable Development.
- It has given a deep insight about the fact that novice teachers' have positive attitude towards Education for Sustainable Development.
- It will helpful to know the areas where the novice teachers have moderate or low attitude level.
- It will guide to decide the teaching strategies for novice teachers to develop the attitude towards Education for Sustainable Development.

1.23 RECOMMENDATIONS:

- The knowledge of Pre service teachers towards Education for Sustainable Development should be enhanced.
- An attitude of Pre service teachers towards Education for Sustainable Development should be enhanced.
- For enhancing the knowledge and attitude of pre service teachers towards Education for Sustainable Development, the special focus should be given on rural and non science pre service teachers.
- Self Learning Multimedia Program based on Education for Sustainable Development should be used for the enhancement of knowledge and attitude.

1.24 SUGGESTIONS FOR FURTHER RESEARCH STUDY:

On the basis of present study, investigator suggested following topic for research.

1. The study can be carried out for enhancement of the skills towards sustainable development.
2. The study can be conducted for the in service teachers.
3. The behavioral study with special reference to education for sustainable development can be conducted for pre service teachers.
4. Development of the digital program for enhancement of skills required for sustainable development.
5. comparative study of in service and pre service teachers with respect to education for sustainable development.

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