# EFFECTIVENESS OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN DEVELOPING THE ENVIRONMENTAL ETHICS AMONG SECONDARY SCHOOL STUDENTS

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*Abstract*

*Aim: The present study investigated the effectiveness of Information and Communication Technologies in developing the environmental ethics among secondary school students. Methodology: Keeping in view the main purpose of the study experimental method was used by the investigator. The study was conducted on a sample of 80 students studying in class IX of MDAV Senior Secondary School, Ambala. For the study, pre-test post-test control group design was used. For the purpose of the study an intervention programme based on environmental education developed by the investigators and scale measuring environmental ethics developed and standardized by Haseen Taj were used. t-test was used to compare pre-tests and post-tests of control and experimental groups. Findings: The results of the study revealed that before giving intervention programme both the groups were equivalent. There was a significant difference between environmental ethics of students of experimental and control group after intervention programme and significant difference was also found between the experimental group before and after intervention programme. Relevance: For formal education to contribute to sustainability, traditional systems and methodologies need to be re-oriented. Research shows the traditional education system has not succeeded in influencing choices and behaviours that would support sustainable development. ICTs, at their most basic level, enable the presentation of course content using multimedia (images, text and sound) and facilitate interactivity and simulation, thereby offering opportunities to improve learning and making new ways of understanding possible. Thus, the use of new technologies can offer exciting new possibilities to promote the changes in education methodologies called for in ESD.*

## INTRODUCTION

In recent history, human involvement with the earth has a significant impact on the earth's resources in a manner that has impacted the sustainability of the planet. Today we are facing a wide range of environmental problems such as global warming, ozone layer depletion, deforestation and reduction in biodiversity etc. The continuing depletion of natural resources, deforestation and extinction of many plants and animal species, rise in global temperature and environmental pollution are few examples of environmental degradation. Human is exploiting species and the nature to the extent that nobody will escape from the

harm caused out of the greedy grabbling. Everyone is looking to fulfil his or her needs at the cost of degradation of our nature. We are fulfilling our endless needs meanwhile we are ignoring the right and wrong, good and bad about environment. The today's good for us may convert the whole environment into bad in the future.

But, in the last four decades there is a growing awareness and activism relating to worsening environmental situation at the local, national and global levels. The emerging environmental concerns have led to the reconsideration of our conception, goals and strategies of development. As a result of this, our conception of development has experienced a paradigm shift and has its expression in the concept of sustainable development, which emerged in 1980s. According to **Bruntland Commission's Report**, **Our Common Future (1987),** "Sustainable development is the development which meets the needs of the present without compromising the ability of future generations to meet their own needs." Due to the international attention which sustainable development has been receiving in the recent years, the United Nations General assembly declared the period from 2005 to 20014 as the United Nations Decade of Education for Sustainable Development (UNDESD). Education for sustainable development refers to all aspects of public awareness, education and training provided to create or enhance the understanding of the linkages among the issues for sustainable development and to develop the knowledge, skills, perspectives and values that will empower people of all ages to assume responsibility for creating sustainable future. For creating sustainable future, every individual must be able to distinguish between the good and bad, right and wrong. The good and bad, right and wrong come under ethics and when it is related with environment, it is termed as environment ethics.

Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on large range of disciplines including environmental law, environmental sociology, ecology and environmental geography. It is the philosophical discipline that considers the moral and ethical relationship between humans and the natural environment. It believes that as humans are a part of society so the other living creatures, which includes plants and animals. It refers to the responsibility to understand the environmental consequences of our consumption, and need to recover our individual and social responsibility to conserve natural resources and protect the earth for future generations.

It is a force within a man which controls human behaviour and actions. It sensitizes a human being for various environmental issues and the man is controlled here by an internal force and not by the fear of punishment. **Bunnin and James (2003)** defined it as a theory and practice about appropriate concern for, values in, and duties regarding the natural world.

ICT i.e Information and Communication technology has become within a very short time one of the building blocks of modern society. Basically, ICTs are information-handling tools- a varied set of applications and services that are used to produce, store, process, distribute, manage and exchange information. These include the 'old' ICTs such as radio, television and telephone, and the 'new' ICTs including computers, satellite and wireless technology and the Internet. These different tools are able to work together and combine to form 'networked world'. In the field of formal education, ICTs are increasingly deployed as tools to extend the learner's capacity to perceive, understand and communicate, effectively as seen in the use of the computer as a learning support tool in the classroom and the online learning resources. Educators are continuing to develop new applications and online resources to support learning objectives in all disciplines. The field of environment and sustainable development education is no exception. ICTs play an important role in advancing ESD by increasing access to educational materials about sustainability; and by helping to promote new ways of interacting in order to facilitate the learning called for in ESD.

## JUSTIFICATION OF THE STUDY

The world scenario has undergone great upheaval during the last century. Technological advancement, ever increasing industrialization and the tendency of masses to settle down in urban area has resulted in environmental degradation. The deteriorating environmental conditions have been casting negative impact on the ecological conditions on the globe. There is a great need that the society should not only be aware of the present deteriorating environmental conditions but it should also feel the responsibility to save the environment. Thus, this is a crucial time to realize that environmental sensitivity and environmental ethics should be cultivated among masses particularly among youth through education. For the awareness of the society about the environment, it is essential to work at grass root level therefore, it becomes essential to educate and train children regarding the significance of healthy environment which in turn will contribute to the sustainable development.

Research shows the traditional education system has not succeeded in influencing choices and behaviours that would support sustainable development. For formal education to contribute to sustainability, traditional systems and methodologies need to be re-oriented. One of the new methodologies that are being used in the schools to promote learning is the use of ICTs. ICTs, at their most basic level, enable the presentation of course content using multimedia (images, text and sound) and facilitate interactivity and simulation, thereby offering opportunities to improve learning and making new ways of understanding possible. ICT provides variety in the presentation of content which help learners in concentration, better understanding, and long retention of information which is not possible otherwise. Many studies have found positive effects associated with technology aided instruction. **Ziden et al. (2011)** identified the relationship between the Information and Communication Technology (ICT) use in teaching and learning towards the achievement of primary school students in Science subject and found that ICT use in teaching and learning increased the students' achievement in Science subject in the primary school. Similarly, **Adeyemo (2010)** investigated the impact of information and communication technology on teaching and learning of physics and found that ICT have great impact on teaching and learning of physics. Also the introduction of ICT makes learning of physics so interesting for the students. But, a very less number of studies have been conducted on the role of ICTs in developing the environmental awareness and ethics among students. Therefore, the investigators have studied the effect of ICTs in developing environmental ethics among secondary school students.

**OBJECTIVES OF THE STUDY**

1. To study the environmental ethics of Secondary School Students.
2. To develop instructional programme for developing environmental ethics among Secondary School Students.
3. To study the effectiveness of instructional programme used for developing environmental ethics among Secondary School Students.
4. To find the difference in the environmental ethics of experimental group and control group before intervention programme.
5. To find the difference in the environmental ethics of experimental group and control group after intervention programme.

**6.** To find the difference in the environmental ethics of experimental group before and after intervention programme.

**HYPOTHESES**

1. There exists no significant difference between environmental ethics of experimental group and control group before intervention programme.

2. There exists no significant difference between environmental ethics of experimental group and control group after intervention programme.

3. There exists no significant difference between environmental ethics of experimental group before and after intervention programme.

**METHOD OF RESEARCH**

The investigators aimed to study the effect of the ICTs in developing the environmental ethics among secondary school students. Keeping in view the main purpose of the study experimental method was used by the investigator

**DESIGN OF THE STUDY**

For the present study, pre-test post-test control group design was used.  It involved two groups of students, experimental and control group. Intervention programme was given to experimental group, whereas no treatment was given to control group.

**Table-1**

| Groups | Pre-test | Independent Variables | Post-test |
|---|---|---|---|
| Experimental Group (G1) | $T_1 G_1$ | Intervention programme | $T_2 G_1$ |
| Controlled Group (G2) | $T_1 G_2$ | No treatment | $T_2 G_2$ |

The figurative representation of the design of the study is shown in figure 1.
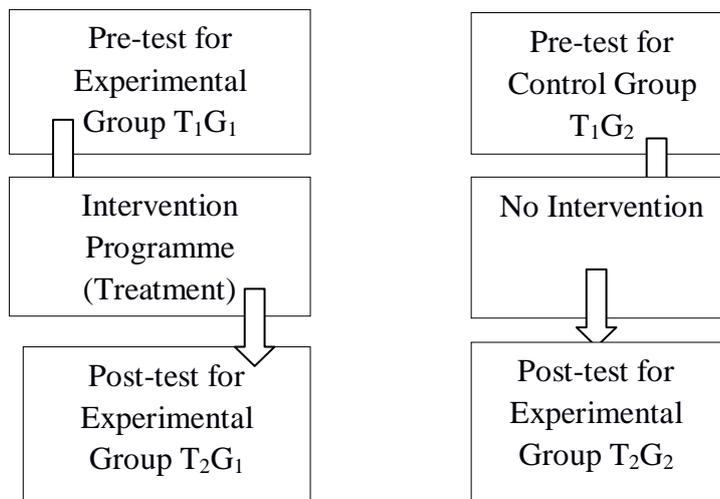


**Figure 1: Design of the Study**

## VARIABLES

Variables used by the investigator for the study were:

**Independent Variable:** Teaching through Instructional programme on environmental education was an independent variable.

**Dependent Variable:** In this study, Environmental ethics was taken as the dependent variable. This variable was 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:** In the study, there are many intervening variables that have been controlled by the investigator, e.g., age, class, teacher, intelligence and background of the students.

## SAMPLE

In the study, a sample of 80 students studying in class IX in MDAV Senior Secondary School of Ambala was drawn randomly. Intelligence Test was administered on all 80 students and the students having comparable intelligence (60 students) were selected for experiment. A pre-achievement test on environmental ethics was administered on all 60 students. On the basis of the scores of pre achievement test, the students were divided into two groups i.e., experimental and control group consisting of 30 students in each group.

## TOOLS USED

In the present study the following tools were used

1.  Tandon's group test of Intelligence for Children developed by Dr. R.K Tandon.
2.  Intervention programme on environmental education
3.  Environmental ethics Scale developed and standardized by Haseen Taj (2000).

## STATISTICAL TECHNIQUES USED

The following statistical techniques were employed to analyze the data obtained from the experimental and control groups to test the hypotheses:

1.  Descriptive statistics : Mean and Standard Deviation
2.  Inferential Statistics: "t-test" for measuring the significance of difference between the performance of experimental and control groups.

**DELIMITATIONS OF THE STUDY**

1.      The study was limited to only one School of Ambala District.

2.      Only few topics related to Environmental education were taken.

3.      The study was confined to Secondary School Students.

**RESULTS AND INTERPRETATION**

**Hypothesis-1:** There exists no significant difference between environmental ethics of experimental group and control group before intervention programme.

**Table -2 Table showing difference of means in the pre-test scores of experimental and control group students on environmental ethics**

| Method | N | Mean | S.D. | $S.E_D$ | t-Ratio | Significant Level |
|---|---|---|---|---|---|---|
| Experimental Group (Pre-Test) | 30 | 94.53 | 7.86 | 2.13 | 0.39 | NS |
| Control Group (Pre-Test) | 30 | 93.7 | 8.66 | | | |

Df: $N_1 + N_2 - 2 = 60 - 1 = 58$

Tabular t value = (2.58 at 0.01 level of significance)

(1.98 at 0.05 level of significance)

**Interpretation**

As the calculated value of `t' i.e. 0.39 is less than the tabular value of `t' at 0.05 level of significance. So the calculated value of `t' is not significant. Hence the hypotheses-1 framed earlier was accepted. It means there is no significant difference between environmental ethics of experimental group and control group before intervention programme.

**Hypothesis-2** There exists no significant difference between environmental ethics of experimental group and control group after intervention programme.

**Table -3 Table showing difference of means in the post-test scores of experimental and control group students on environmental ethics**

| Method | N | Mean | S.D. | $S.E_D$ | t-Ratio | Significant Level |
|---|---|---|---|---|---|---|
| Experimental Group (Post-Test) | 30 | 114.43 | 6.15 | 1.59 | 7.18 | Sig. at 0.01 level |
| Control Group (Post-Test) | 30 | 102.53 | 6.19 | | | |

Df: $N_1 + N_2 - 2 = 60 - 1 = 58$

Tabular t value = (2.58 at 0.01 level of significance)

(1.98 at 0.05 level of significance)

**Interpretation**

As the calculated value of `t' i.e. 7.18 is greater than the tabular value of `t' at 0.01 level of significance. So the calculated value of `t' is significant. Hence the hypotheses-2 framed earlier was rejected. It means there exist a significant difference between environmental ethics of experimental group and control group after intervention programme. The mean of experimental group is (114.43) which is far more than the control group (102.53), this show that experimental group have better environmental ethics than control group after the intervention programme.

**Hypotheses-3** There exists no significant difference between environmental ethics of experimental group before and after intervention programme.

**Table- 4 Table showing difference of means in the pre-test and post-test scores of experimental group on environmental ethics.**

| Method | N | Mean | S.D. | $S.E_D$ | t-Ratio | Significant Level |
|---|---|---|---|---|---|---|
| Experimental Group (Pre-Test) | 30 | 94.53 | 7.86 | 1.82 | 10.9 | Sig. at 0.01 level |
| Experimental Group (Post-Test) | 30 | 114.43 | 6.15 | | | |

Df: $N_1 + N_2 - 2 = 60 - 1 = 58$

Tabular t value = (2.58 at 0.01 level of significance)

(1.98 at 0.05 level of significance)

**Interpretation**

As the calculated value of `t' i.e. 10.9 is greater than the tabular value of `t' at 0.01 level of significance.so the calculated value of `t' is significant. Hence the hypotheses-3 framed earlier was rejected. It means there exist a significant difference between environmental ethics of experimental group before and after intervention programme. This shows the instructional material developed (Intervention programme) was effective in developing environmental ethics among the students.

**MAJOR FINDINGS**

1. From the analysis of results it is clear that before giving intervention programme to one of the group both the groups were equivalent. So the effectiveness of the intervention programme can be easily predicted.

2. There exists a significant difference between environmental ethics of experimental group and control group after intervention programme. It reflects that the intervention programme was effective.

3. There exists a significant difference between environmental ethics of experimental group before and after intervention programme. It shows that the intervention programme was effective.

## EDUCATIONAL IMPLICATIONS

Environmental awareness is the need of the hour. Inculcating sensitivity, ethics and positive attitudes about the environment among students is the responsibility of the teachers and to carry out this noble task, education is the perfect instrument. If positive attitudes related to environment are induced in children, these attitudes will be transmitted to later generations also by them.

The findings of the study revealed that environmental education programme utilizing *ICT is* effective in enhancing environmental ethics among secondary school students. It has provided opportunity for the learners to use maximum senses to acquire and understand the new information. It helped in the dissemination of knowledge, skills and values regarding environment among students. Therefore, it is recommended that there should be the maximum use of technology by the teachers in the classroom to create awareness among students regarding good and bad of the environmental use. For the maximum utilization of ICT, the teachers should be provided opportunities to attend workshops and refresher courses to equip them to prepare environmental education programme utilizing ICT. The principals should arrange seminars, discussions etc. in the school for the teachers and the students. More books, journals etc. Related to environmental education should be made available in the school library. Sufficient financial aid should be allotted to organize nature club in the schools and sufficient audio visual aids, internet facility should be made available. Necessary changes should also be made in the curriculum on all the levels of education, so that environmental awareness and ethics can be enhanced among the students. Training should also be given to pre-service and in-service teachers to learn, to select and blend the different strategies used for preparing ICT based programmes for transaction of the content of environmental education. In short, to realize the need for maximizing the environmental ethics among the students ICT can play a major role.

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