LEARNING OF ENVIRONMENTAL EDUCATION CONCEPTS BY SECONDARY SCHOOL STUDENTS THROUGH SPECIFIC INSTRUCTIONAL STRATEGIES

1. INTRODUCTION

The challenge we face in this century is that of reorienting the development of human society along a path that does not threaten the ecological health of the planet. Finding a new balance between the welfare of our species and health of the planet will require a high degree of environmental understanding and commitment on the part of all members of the society. In short, it will require environmental citizenship.

2. NEED FOR THE STUDY

The basic qualities, including knowledge, skills, and values that an environmental citizenship might need, can be acquired only through environmental education. This is also reflected in the National Policy on Education (1986) and the Honourable Supreme Court of India in its order issued on 22 November, 1991. Hence environmental education has been made a compulsory subject for classes I to XII.

The objectives of environmental education demand challenging learning outcomes and the existing classroom practices had to be supplemented with more innovative techniques. Hence the researcher chose to develop three different instructional strategies and use them in actual classrooms to verify their comparative efficacy against conventional strategy.

3. OBJECTIVES OF THE STUDY

i. To develop three different instructional materials for environmental education strategies namely activity-based, multimedia-based and visual aids based as per the state board eighth standard syllabus.

ii. To develop tools to measure achievement and attitude with regard to environmental education.
iii. To make a comparative analysis of the efficacy of different instructional materials among themselves and also with the conventional method.

4. HYPOTHESES OF THE STUDY

Hypothesis – 1

There is no significant difference between the initial and final achievement scores with reference to independent variables (treatment and attribute variables)

Hypothesis – 2

There is no significant difference in the adjusted means of achievement scores with reference to independent variables.

Hypothesis – 3

There is no significant difference between the initial and final attitude scores with reference to independent variables.

Hypothesis – 4

There is no significant difference in adjusted means of attitude scores with reference to independent variables.

5. CONCEPTS OF ENVIRONMENTAL EDUCATION CONSIDERED FOR THE STUDY

Concepts drawn from the science textbook and environmental education book of eighth standard of the state board syllabus of Tamil Nadu were taken up for the study. The broad areas of content in environmental education are:

a) Noosphere – population explosion, urbanisation and waste management,

b) Biosphere – vegetation types and ecosystems, c) Pollution – air, water, and soil pollution and d) Natural Resources – water and energy. Based on the above mentioned content areas, instructional materials for different strategies and measurement tools were prepared.
6. BASIS FOR THE SELECTION OF THE STRATEGIES

Each one of these strategies must be suitable to all practising teachers, enable pupils to learn all the concepts relating to environmental education syllabus prescribed for standard eight, adoptable for the age group and the existing facilities available in the schools.

7. THEORETICAL FRAMEWORK AND DISTINCT FEATURES OF THE STRATEGIES

Conventional strategy is the most common method used by the teachers. In this strategy, lecture method was employed and black board was the only aid and hence active participation of students was not ensured.

Mahatma Gandhi wanted to keep students engaged in many activities, throwing them from one excitement to another, which will provide to each pupil hectic activity and scope for showing creative genius and organising capacity. Activity strategy employed in the present study had all the features of participatory learning, and the process of learning happens both physically and mentally. A series of exciting activities were employed wherever possible.

There is rich evidence to support a positive impact of multimedia packages on learners. Course-relevant multimedia packages must be available to the teachers to organise easier, better and quicker learning. This strategy employed power point along with audio tag recorded by the researcher. Relevant pictures and video clippings were added wherever necessary and hence capable of bringing the scenario of damage caused to the earth, into the classroom.

There is a simple, yet meaningful saying: “I hear and I forget, I see and I remember”. One picture is equal to hundreds of words. Visual medium is mostly traditional but is regarded as the most powerful of all the senses through which we see, perceive and visualise everything. Visual package included charts, maps, graphs, diagrams, posters, pictures and models. It was cost effective and easy to use in the classrooms as it did not require any additional teaching facility.
8. DEVELOPMENT OF THE TOOLS

Learning outcomes expected in environmental education were under two domains namely cognitive and affective. Hence the investigator designed an achievement test to measure cognitive domain and an attitude scale meant to measure affective domain.

Achievement test containing hundred items with a variety of test items namely, multiple choice (55), fill in the blanks (10), match the following (10), and true or false (25) and attitude scale containing forty statements were first prepared. Likert - type attitude scale had three alternative responses namely, strongly agree, agree and disagree.

The total of one hundred and forty items prepared in both Tamil and English were scrutinized by a panel of experts in education, namely two senior school teachers, two Head Masters, and three Professors in the Colleges of Education in terms of appropriateness, concepts, teaching learning outcomes, clarity, specificity, brevity, objectivity and refinement of the items. The items on which queries were raised, clarifications were sought and modifications suggested by the experts were executed.

Pilot study one was used for ascertaining validity and reliability of the two tools. Pre – test was administered at the beginning of the pilot study and scores obtained in achievement test were subjected to item analysis.

In the achievement test, 50 questions having difficulty index between 25 and 75 were chosen with due consideration for validity. Care was taken to choose an equal number of questions from four major areas of environmental education syllabus. (Noosphere – 12, Biosphere – 13, Pollution – 13, Natural resources – 12) This ensured content validity.

In the attitude scale, 20 statements with reliability score above 0.75 were selected to constitute the final attitude scale.

Changes were effected in a few items of the tools based on the reactions of the students. Face validity and content validity of the present tool was established by the fact that the tests were constructed by the methods suggested and practised by the experts, that is, jury opinion. Items of the tools were shuffled. Thus the tools can be claimed to be a valid one.
9. FEASIBILITY STUDY OF THE PACKAGES

Pilot study I was conducted by the researcher herself for the English version of all the three packages. Additions, deletions and modifications were done where necessary and then Tamil versions of the packages were prepared.

Pilot study II was carried out for Tamil version by the practising teachers. At both the stages suggestions of the teachers were sought and relevant changes were made in the packages making them fit for classroom usage.

10. SAMPLE SELECTION

The independent variables considered for this study were of two types namely attribute and treatment variables. The attribute variables chosen were: Type of school (Government and Private), Locality (Urban and Rural), Gender (Boys and Girls) and Medium of instruction (Tamil and English).

The treatment variables chosen for the present study were: conventional strategy, activity strategy, instructor controlled multimedia strategy and visual aids strategy.

Six hundred and twenty seven pupils were selected with due consideration to the above mentioned variables. Simple random sampling technique was followed in selecting the sample.

11. TREATMENT

The investigator allotted instructional materials to the teachers and gave required training to them on how to use these instructional materials in the classroom. Teachers handling particular strategy were assembled in one school and model classes were taken and clarifications were given where necessary. One week time was given to them to go through the entire material and prepare themselves. Then classroom trials were experimented to ensure that the teachers had a thorough understanding of the usage of the
materials supplied to them. The investigator made frequent visits to the schools and ensured that the instructional materials were used appropriately.

12. DATA COLLECTION

Using the achievement test and attitude scale pre – test was conducted before the commencement of the treatments and scores obtained were initial scores. After the treatments the very same tools were administered for the post – test and the scores were final scores. Both the tests were administered by the investigator herself.

13. METHOD OF ANALYSIS

i. Paired t- test was considered appropriate for this before – and – after – treatment study (Kothari, 1990). Hence this test was employed to find out if there was significant difference between the initial and final scores of the pupils based on all the independent variables.
ii. This was a quasi experimental study where selection of groups of pupils was done at random and they were not matched before treatment on the basis of any of the independent variables. Hence to find out whether there was significant difference in the initial scores between / among groups, t – test was applied for pairs of groups which vary based on attribute variables and ANOVA was applied for the four types of treatment groups.

![Diagram of statistical analysis]

iii. Since significant differences were found in the initial scores of most of the categories of samples, the covariate (initial) effect had to be removed in order to ascertain that the significant difference between the initial and final score was due to a particular treatment. It necessitated the statistical analysis of final score employing ANOCOVA. The aims of applying ANOCOVA on the final score were:

i) To find if the covariate (initial score) had significant effect on the final scores.

ii) To remove the covariate effect.

iii) To find out whether significant differences existed on the final scores among the various levels of attribute variables

iii) To find out whether significant differences existed on the final scores among various levels of treatment variables.
iv) To find out if the interaction between the treatment and attribute variables was significant.

iv. After removing the effect of the initial score (covariate) on the final scores, adjusted means (residuals) of scores were obtained. The analysis of adjusted means of final scores revealed that the final scores differ significantly, based on treatment in all the groups. Hence the post-hoc test (Scheffe’s – F test) was applied, to find out the values of adjusted means of final scores of pairs of (treatment and attribute) groups and also their significance.

14. MAIN FINDINGS

A. Analysis of achievement scores

The results indicate that in all four types of treatments employing conventional, activity, multimedia and visual aids strategies, the differences between initial and final scores are significantly high and hence the hypothesis that there is no significant difference between the initial and final total achievement scores with reference to independent variables (treatment and attribute variables) is rejected.

The analysis of adjusted mean achievement scores final shows that pupils from government schools, rural schools, boys and those with Tamil as medium of instruction are greatly influenced by activity strategy followed by the sequence of multimedia, visual aids and conventional strategy while their counter parts namely private schools, urban schools, girls and those with English as medium of instruction are also greatly influenced by activity strategy but followed by visual aids, multimedia and conventional strategy sequence. Hence the hypothesis that there is no significant difference in the adjusted means of achievement scores with reference to independent variables is partially rejected.

B. Analysis of attitude scores
The results of ‘t’ test indicate that in all four types of treatments namely conventional, activity, multimedia and visual aids strategy the differences between initial and final attitude scores are significantly high and hence the hypothesis that there is no significant difference between the initial and final attitude scores with reference to independent variables (treatment and attribute variables) is rejected.

The analysis of adjusted mean attitude scores final show that activity strategy the most effective one as seen from the adjusted means of attitude scores and hence the hypothesis that there is no significant difference in adjusted means of attitude scores by type of school, locality, gender and medium of instruction versus type of methodology is rejected.

15. CONCLUSION:

Overwhelmingly, the students engaged in activities were highly motivated and co – operated with the teacher in completing all activities. The success of this may be attributed to participatory learning opportunities provided in this method. With the evidence of the results obtained from the investigation, the researcher suggests that activity strategy was a successful method that could be adopted in schools for teaching – learning of environmental education. The study could be extended to other classes and also for other areas of environmental education. This approach could be applied not only to environmental education but also to other school subjects.

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