CHAPTER – III
METHOD AND PROCEDURE

The present research was designed to study the effectiveness of self learning modules in EE on Academic achievement and attitudinal change. The nature of the study led the investigator to design experiment so the present study is experimental in nature.

3.1 SAMPLE

Since the population under study is large it is not possible for the investigator to collect data from the whole population. There are several methods of sampling, but in the present study stratified random cluster sampling technique was used. Stratification introduces a secondary element of control as means of increasing precision and representativeness. Stratification was done at residence level and at educational level. All the degree colleges under Panjab University were listed. Six colleges 3 urban and 3 rural were selected. Similar unit of 50-60 first year students of these cluster of units were randomly selected. Initially the total sample from all the six colleges consisted of 350 students, which was gradually reduced to 300 students because rest of the students did not take part in the complete experiment. Among the sample of 300 students group I control comprised of 150 and group II experimental also comprised of 150 students.

All these students were pursuing same course of environmental education under Panjab University Chandigarh. They also belonged to nearly similar socio-economic status and came from middle income group families. The college environment and college resources were also same for both the groups as all were selected from region under Panjab University Chandigarh.

Randomization in selection of the sample, condition of a true experimental design, could not be met, as is there in educational researches involving so many human beings. It is not desirable to disturb the classes because changing the placement in different sections would create other difficulties. Besides this, during the experiment students should not be subjected to a new or changed condition(s), as that may in any way effect them psychologically. Making the children conscious too can affect environmental conditions. Thus the placement of students is rather kept intact. Keeping in view the availability, feasibility and objectives of the experiment intact grouping of first year students were selected for the study in natural settings.
3.2 **OBJECTIVES OF THE STUDY**

1. To develop self learning modules on some selected topics in the subject of environmental education.

2. To find out the environmental achievement of students taught with traditional method verses self learning modules.

3. To find out whether intelligence has any effect on environmental achievement irrespective of teaching.

4. To compare the environmental achievement of rural and urban students.

5. To find out the environmental attitude of students taught with traditional method verses self learning modules.

6. To find out whether intelligence has any effect on environmental attitude irrespective of teaching.

7. To compare the environmental attitude of rural and urban students.

8. To study the influence of interaction between treatment and intelligence on academic achievement of students in the subject of environmental education.

9. To study the influence of interaction between treatment and residence on academic achievement of students in the subject of environmental education.

10. To study the influence of interaction between residence and intelligence on academic achievement of students in the subject of environmental education.

11. To study the influence of interaction between treatment and intelligence on environmental attitude of students.

12. To study the influence of interaction between treatment and residence on environmental attitude of students.

13. To study the influence of interaction between residence and intelligence on environmental attitude of students.

14. To study the influence of interaction between treatment, intelligence and residence on academic achievement of students in the subject of environmental education.

15. To study the influence of interaction between treatment, intelligence and residence on environmental attitude of students.
3.3 DELIMITATIONS OF THE STUDY
1. Self learning modules were limited to five topics only.
2. The study was limited to undergraduate students only.
3. Out of three universities of Punjab only Panjab University Students were selected for the study.

3.4 HYPOTHESES
1. There is no significant difference in the academic achievement of students in the subject of environmental education between experimental and control group.
2. There is no significant difference in the academic achievement of students in the subject of environmental education at various levels of intelligence.
3. There is no significant impact of residence on academic achievement of students in the subject of environmental education.
4. There is no significant difference in the environmental attitude of students between experimental and control group.
5. There is no significant difference in the environmental attitude of students at various levels of intelligence.
6. There is no significant impact of residence on environmental attitude of students.
7. There is no significant effect of interaction between treatment and intelligence on academic achievement of students in the subject of environmental education.
8. There is no significant effect of interaction between treatment and residence on academic achievement of students in the subject of environmental education.
9. There is no significant effect of interaction between residence and intelligence on academic achievement of students in the subject of environmental education.
10. There is no significant effect of interaction between treatment and intelligence on environmental attitude of students.
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13. There is no significant effect of interaction between treatment, intelligence and residence on academic achievement of students in the subject of environmental education.
14. There is no significant effect of interaction between treatment, intelligence and residence on environmental attitude of students.

3.5 DESIGN OF THE STUDY

In every scientific investigation, there is a systematic procedure that is followed. The present investigation is experimental in nature following quasi experimental method with pre test and post-test non equivalent group design. This design is often used in classroom when experimental and control groups are such naturally assembled groups as intact classes which may be similar. Often in educational research, the researcher is not in a position to assign subjects randomly to treatment, while college authorities may be willing to make two classes available for testing, they are not likely to permit researchers to break the classes up and reconstitute them; rather they intend them to be kept as intact groups. However this design mandates the use of a pre-test to demonstrate initial equivalence of the intact groups are not equivalent, the experimenter may proceed with the conduct of experiment by using the technique of analysis of co-variance to compensate for this lack of equivalency between the groups.

The study involved two independent variables namely intelligence and location, two dependent variables i.e. academic achievement in the subject of environmental education and environmental attitude and one intervening variable i.e. teaching strategy. The efforts here were directed to find out the answer of the question, “In what way and to what extent the teaching strategy interact with location at various levels of intelligence to affect academic achievement in environmental education and attitude towards environment. The answer to this question had been sought through the factorial design of 2 x 2 x 3 analysis of variance.

As a requisite of factorial design 2 x 2 x 3 analysis of variance the whole data was collected from two groups rural and urban, incorporating variable of teaching strategy, these groups were varied at two levels i.e. traditional method of teaching (lecture method) and teaching with the help of self learning modules. Furthermore, from each of these two groups the groups having high, average and low intelligence were identified on the basis of median scores. The layout of the factorial design and no. of combinations is given in figure.
FIGURE – 2: 2x2x3 Analysis of Variance
It is clear from the above figure that treatment variable of teaching strategies has been designated as A and its two strategies teaching with self learning module and traditional teaching as A₁ and A₂ respectively. As far as location is concerned rural population is designated by R and R₁ for experimental group and R₂ for control. Similarly urban population is designated by U and U₁ for experimental and U₂ for control group. The factor of intelligence is designated as C and its three levels C₁, C₂ and C₃ correspond to High average and low intelligence respectively.

The total number of combinations came out to be \(2 \times 2 \times 3 = 12\) as shows in figure.

3.6 PROCEDURE

The following procedure was adopted to conduct the experiment.

Phase-I (Pre test phase)

In this phase Taj Haseens Environmental Attitude Scale (TEAS), Dr. S.S. Jalota’s Group Test for General Mental Ability (1967) and self prepared achievement test was administered to the whole sample. Both the groups experimental A₁ and control A₂ were administered these tests one by one. While administering those tests the norms and instructions contained in their manuals were followed.

Phase-II (Experimental Phase)

In this phase assignment of teaching strategy was done randomly. The investigator personally met the teachers who were teaching environmental education and general orientation to the practicing teachers was given. Group I was taught through traditional teaching i.e. lecture method, and Group II was taught through self learning modules. Often the importance of content matter or the subject is underplayed in research, yet it is not to be lost sight of. The content dealt with during teaching learning process is of central importance. Hence care was taken of this fact also. Same topics were taught to both the groups. Experiment continued for 6 months. The investigator frequently visited all the colleges during this period to ensure that experiment is conducted properly. The investigator was continually in touch with concerned teachers.
Phase-III (Post Test Phase)

Immediately after the treatment, same tests, i.e. achievement test and TEAS test were administered which were previously used in pretest phase.

Phase – I (pre test phase)

Jalotas Intelligence Test TEAS, Attitude Scale, Achievement test (self prepared)

Phase II

Experimental phase

GI – Control

GII - Experimental

Phase III

Post test phase

TEAS, Attitude scale, Achievement test

FIGURE - 3 : Procedure
3.7 DATA COLLECTION

The tools mentioned under chapter III were employed for data collection.

First of all achievement test, was administered. Since it contained 25 multiple choice test items so accordingly half an hour was given for this test. It was followed by the administration of Taj Environment attitude scale. However before the actual administration of the test, instructions were read out to students as given in the manual since there is no time limit for this test, students were allowed to complete it according to their own speed.

To test the general mental ability of students Jalota’s GMAT was administered. Directions were explained to them. They were asked to go through the examples given for practice. Their doubts were removed by the investigator, before they started the test. Since time limit of 25 minutes is given to complete the test it was taken care of that students given the answers to maximum questions with in the stipulated time.

3.8 DESCRIPTION OF TOOLS

Taj Environment Attitude Scale

To measure the attitude of students towards various aspects of environment Taj Environment Attitude Scale developed by Dr. (Mrs.) Haseen Taj was used. It contains 61 statements or items consisting of six areas.

The six areas along with the no. of items in each area dealt with in the scale are Health and Hygiene (5), Wild Life (6) Forests (5), Polluters (26), Population explosion (5) and environmental concerns. Out of 61 statements 31 are favourable and 30 unfavourable. There are no right or wrong answers to these statements. Four alternatives are given for each statement in the form of strongly agree, agree disagree and strongly disagree. The students are required to give their opinion about these statements and tick mark (✓) on the cell below in any of the four alternatives preferred by them. Each item alternative is assigned a weightage ranging from 4 (Strongly agree) to 1 (Strongly disagree) for favourable items. In case of unfavourable items the scoring is reversed i.e. from 1 (Strongly agree) to 4 (Strongly disagree). The attitude score of an individual is the sum total of item scores on all the six areas. The range of scores is from 61-244 with the higher score indicating the more favourable attitude towards environment and vice versa.
The final sample of try-out comprised of 600 persons 250 females and 350 males belonging to three age groups adolescents, youth and adults. Various demographic variables of the final sample include sex, locality, SES, religion, age, education and occupation of adults.

Taj Environment Attitude Scale (TEAS) possesses high content validity since the items at the first stage of try-out of the scale were selected on the unanimous agreement (80-100%) of experts in the field. It also has item validity as the method of item selection after computing ‘the t’ value for each item were based on 27% upper and 27% lower scores. The concurrent validity was determined by administering a parallel scale with the same number of items worded differently retaining the theme.

The index of reliability computed for the scale also reflect the intrinsic validity. Reliability of the scale was estimated by two methods (a) split half (odd-even 1st Half – 2nd half) and test retest reliability co-efficient with a time gap of and month on a sample of 150.

Table 3.1: Methods, Reliability Co-efficient and Index of Reliability of TEAS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Method</th>
<th>Reliability</th>
<th>Corrected co-efficient</th>
<th>Index of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test-retest (1 month)</td>
<td>0.60</td>
<td></td>
<td>0.77</td>
</tr>
<tr>
<td>2.</td>
<td>Split half</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) odd-even</td>
<td>0.51</td>
<td>0.67</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>(b) 1st – 2nd half</td>
<td>0.49</td>
<td>0.66</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Dr. S.S. Jalota’s Test for General Mental Ability. (GMAT)

To assess the intelligence level of students Dr. S.S. Jalotas Group General Mental Ability Test was employed. It contains 100 questions on 5 pages, 20 on each page. The elements of (1) vocabulary similars (10 questions) (2) vocabulary opposites (10 questions) (3) Number series (20 questions) (4) classification (20 questions), (5) Best answers (10 questions) (6) inferences (10 questions) and Analogies (20 questions) are included in the test. All the items are assigned positions according to their objectively determined order of difficulty. All questions are in simple language 10 examples of various types of questions set in the test are given and there are to be explained to the students before they start the test. Time given to complete the test is 25 minutes. In each
case alternative answers are given, and the students have to simply choose the right answer and write its number on the answer sheet. Thus the answer to each question is always a number. The answer sheet is provided with 5 columns and 10 rows. The five columns correspond to 5 pages of the test booklet and 20 rows correspond to 20 questions on each page. There is only one correct answer to each question and each correct question carries one mark. Time given is very short it is very rare a person to complete all the test. The reliability of the test was found to be +.938 and the validity of the test ranged from +.50 to +.78.

Achievement Test in Environmental Education

Environmental achievement test developed by the investigator was used to measure the achievement of students in environmental education. The test consists of 25 items related to the topics taught. The test has test-retest reliability of .81 and it has content validity. A handmade scoring key was prepared for scoring the responses. The total number of rights responses were taken as the total score of the students.