Effectiveness of Concept Attainment Model and Gaming Strategy in Environmental Awareness among Elementary School Learners

Dr. Suman

Lecturer, Govt. DIET-NW, SCERT, Delhi

ABSTRACT

In this paper, the author has discussed about the effectiveness of concept attainment model and gaming strategy in environmental awareness among elementary school learners. The unprecedented increase in population and intensity of human activities, which have occurred largely in this century, has been brought about by the growing mastery of science and its application. In this experimental study pre test, post test, control group design was employed on a sample of 120 class VIII students. Environmental Attitude Scale (TEAS) by Haseen Taj, Jalota’s verbal group test of general mental ability and ‘socio-economic status scale’ by Rajiv Lochan and Chauhan and self developed achievement test in environmental awareness was used to collect data. Data was analysed using t-test and ‘ANCOVA’. Concept Attainment Model (CAM) was found better than gaming strategy and traditional method of teaching as far as achievement in environmental awareness attitude towards environment is concerned.

Keywords: Concept Attainment Model (CAM), Gaming Strategy (GS), Environmental Awareness.

INTRODUCTION

“Environmental awareness is that which provides power and understanding to take decisions individually and collectively and initiate actions for social, cultural and economic survival, growth and development and for conservation of nature and natural resources.”

Now environment has become the burning issue for all the academicians intellectuals, scientists, policymakers and governments of all over the world. Widespread and systematic concern for the environmental issues has been growing the world over particularly after 1960s [1].

The UN World Conference on the Environment in Stockholm in 1972, the Global Forum 1992, the Earth Summit held in Rio de Janeiro 1992 and in Johannesburg 2002, and activities organized by the government and non-government organizations of different countries generated awareness among masses towards environment; consequently efforts are being made to resist environmental degradation.

The awareness towards environment should be aroused from childhood, as children are the future decision makers. They should be aware of their responsibilities and duties towards the social and ecological environment [2].

In 1972 at Stockholm an international workshop was held on Environmental Education to discuss various aspects of environmental problems.

UNESCO in cooperation with the UNEP launched the ‘International Environmental Education Programme (IEEP) in 1972. IEEP aimed at assisting governments, national, international and regional institutionas to incorporate Environmental Education. In 1975, IEEP organised the Belgrade workshop concerned with Environmental Education. In 1977 the inter-governmental conference on Environmental Education was organised at Tbilisi, Georgia: in Rio-de-Janeiro (Brazil) in 1992, the United Nations conference in Environment and Development (NCED) organised a meeting of 160 countries for global awareness towards environment. In India the National Policy on Education 1986/1992 and 9th Five year (1997-2002) plan have given a great impetus to the government to promote environmental concerns [3].
DESIGN AND PROCEDURE OF THE STUDY

Major responsibility of researcher is to set up a research design capable of providing the solution of his problem, while unity of research makes it possible to say that one aspect is more crucial than another. Design is overall scheme of research and research design is the strategy of investigation so as to obtain answers to research questions. It is the blueprint of procedures that help to test hypotheses.

METHOD

The purpose of the present study was to compare the effectiveness of Gaming Strategy and concept attainment model on achievement in environmental awareness and attitude of elementary school learners. As it was an experimental study, the students were divided into three groups and those three groups were matched on the basis of age, mark secured in VIIth class, intelligence and socio-economic status. To match the groups on the basis of intelligence, Jalota’s Verbal Group Test of General Mental Ability was used and to match the groups on the basis of socio-economic status, socio-economic status scale by Rajeev Lochan and Chuahan was used.

In the present study, pre-test, post-test controlled group design was employed. It involved three groups of students, two experimental groups and one control group. The Experimental Group I (E₁) was taught Environmental science through Gaming strategy. Experimental Group II (E₂) was taught Environment science through concept Attainment model and the control group was taught through conventional method of teaching [4].

DESIGN OF THE STUDY

The design comprised of three stages. The first stage involved pre-testing of all the students of three groups on achievement in environmental awareness, attitude towards environment, intelligence and socio-economic status. The second stage involved treatment for 16 weeks. The experimental treatment consisted of teaching four units of Environmental science through Gaming strategy to experimental group I, through concept attainment model to experimental group II and through conventional method of teaching to control group. In the third stage, the students were post-testing on achievement in environmental awareness and attitude towards environment. The design of study is presented below in Table 1

Table 1: Design of the Study

<table>
<thead>
<tr>
<th>Stage</th>
<th>Duration</th>
<th>Control Group</th>
<th>Experimental Group I</th>
<th>Experimental Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>II Treatment Administration</td>
<td>16 weeks in between pre-testing and post-testing</td>
<td>Teaching environmental Sc. Through conventional method</td>
<td>Teaching Environmental sc. Concepts through Gaming strategy.</td>
<td>Teaching Environmental science concepts through CAM</td>
</tr>
</tbody>
</table>
EFFECT OF CONCEPT ATTAINMENT MODEL IN TERMS OF INTELLIGENCE

Kanta (1989) studied the effectiveness of concept Attainment Model in teaching concepts of chemistry in relation to intelligence and cognitive styles. In her study, a sample of one hundred twenty students of IX class was drawn. She found that teaching strategies helped the students in attaining and learning the concepts and intelligence also played a significant role in acquisition of concepts. The cognitive style did not show different effect with respect to teaching strategies.

Jalivant (1999) conducted a study to find the effectiveness of Bruner’s Model of Teaching of concept learning in relation to the cognitive style and intelligence at secondary school stage and found that concept attainment model was superior to lecture method. Intelligence played no role for concept learning, cognitive styles also did not play any role in achievement in concept learning. He also found that girls had better performance than boys when taught by lecture method. Interaction between cognitive styles, intelligence level and gender was found to be non-significant. Interaction among cognitive styles, gender and teaching models was found to be significant.

Most of the studies conducted on CAM indicated that CAM is more effective the Traditional Teaching Method and Manocha, 1991 and Bromen 1999 showed that CAM is not more effective [5].

Some More Research Studies on Cam in India

Pandey (1981) evolved teaching styles on the basis of verbal interaction taking place in the classroom, determined the effect of teaching style on science concept attainment at various levels to identify the teaching behaviour commonly exhibited by science teachers and determined the effect of individual teaching behaviour were not frequently observed in the science teachers. Extended lecturing was negatively related with different levels of concept attainment and the segment of formal level, excepting for segment of problems and definitions with which it was positively correlated. The teacher’s questioning had significant positive effect on both the levels, classificatory and formal of concept attainment. Teaching styles had varying affects on both the levels of concept attainment as well as total concept attainment [6].

Antimadas (1986) developed the model competency of pre-service teacher trainees by adopting CAM with three different training strategies and found it very effective in comparison to conventional method of teaching [7].

Sushma (1987) studied the effect of CAM based teaching pupil achievement, the effect of Biological science inquiry model based teaching on pupil achievement and the effectiveness of traditional method. CAM was found to be more effective than biological science inquiry model and traditional method [8].

Mahendran (1988) checked the effectiveness of information Processing approach on minimizing errors in translation among high school students and found it very effective [9]. Chanderlekha (1996) studied the effectiveness of learning of educational concepts through strategies and found this strategy effective than traditional teaching method [10].

Rajmamal and Balasubramaniam (1996) studied the effectiveness of concept mapping strategy for teaching to B.Ed trainees and found it very effective [11]. Saminathan (1997) studied the effects of information processing Approach on developing problem solving ability in Physics and found it very effective [12].


Singh. R and Abbas. Y.M. (2012) concluded from their research work that students had high level of environmental knowledge and positive attitudes towards the environment, but low level participation in environmental protection activities [16]. Das and Banerjee (2014) conducted a study to determine the environmental awareness among secondary school students in West Bengal and concluded that there was no significant difference in environmental awareness among higher secondary school students in respect of their gender, locality and academic stream [17].

Pasha. J (2015) studied the environmental awareness among secondary school students in relation to caste, father occupation and class of study in Warangal District and revealed that there is a significant impact of caste, father occupation and class on environmental awareness among students [18]. Usha.et. al. (2016) formulated a research work in which they
studied the attitude and awareness of college going undergraduate students towards environment. Overall level of awareness was found to be average. Number of students with high level of awareness is found to be extremely low whereas number of students with low level of awareness is found to be fairly high. The process by which students integrate into the host country during study abroad is not a smooth one and its pace may differ for each student [19].

Deaf and hard of hearing students could access detailed notes, captioned video clips, and the same features that supported weak readers. Individuals with a loss of vision had access to digital versions of the content, the PowerPoint™ had high contrast colours and font sizes that met the “Web Content Accessibility Guidelines” of the World Wide Web Consortium and described video and photographs (Henry, 2017) [20].

**EXPERIMENTAL ANALYSIS**

After pre-testing, the experimental treatment of teaching Environmental science to class VIII students was started. All the three groups (control group, experimental group-I and experimental group II) were taught by the investigator herself. The control group was taught through conventional method of teaching, the experimental group I was taught through gaming strategy and the experimental group II was taught through concept attainment model. This treatment was maintained for 16 weeks for one period of thirty five minutes for each working day.

**Teaching through Gaming of Experimental Group-I**

One cycle for the game was stipulated for 10 minutes. Thus both the groups completed question response sequence in 10 minutes. In 20 minutes both the groups have their turns to put questions and to respond to these. This entire process is tape-recorded. After one such unit of the same, the tape was replayed and the irrelevant questions and incorrect responses were pointed out. In the next unit students attempted questioning and responding in a better way. To get bonus marks, each group wanted its members to participate. Hence, there was an increase in the incidence of questioning also [15].

**Teaching through Concept Attainment Model to Experimental Group-II**

Concept attainment model was used to teach the experimental group II. Concepts were selected from the same content taught to control group and experimental group I. Reception model of concept attainment was used to teach the concepts. For teaching the experimental group II through reception concept attainment model, a lesson plan for each concept was prepared according to the guidelines of Planning Guide provided by Weil Marsha and Bruce Joyce. The syntax of the Reception Concept attainment model consists of three places which were followed in the class while teaching different concepts.

**Phase One-Presentation of Data and Identification of the Concept**

The teacher introduced this phase in the following manner.

“Students, today we are going to play a game, the procedure of which is like this. I have a concept in my mind which you will tell me. For teaching to the concept, I shall give you some examples labeled `yes` and some other labeled `No`. The examples labeled `yes` are positive examples related to the concept while the examples labeled `No` are negative examples. First, you compare positive examples with positive examples and find out the similarities on the basis of their attributes. Then you compare the positive examples with negative examples and find out the dissimilarities on the basis of their attributes. Similarities in the positive examples will help you in framing the concept. You have to tell my concept through the process of generating the testing of your hypothesis.”

Thus the activities of this phase were carried out in the class when the teacher presented labeled examples, students compared the attributes in positive and negative examples and generated and tested the hypotheses. Finally, they name the concept and stated a definition of the concept according to the essential attributes [18].

**Phase Two-Testing Attainment of the Concept**

The teacher said, “Dear students, I will give you some more examples but this time they will not have the label `yes` or `No`. You will label them as `yes` or `no`. Then teacher gave same unlabelled examples and the students labeled them as
'yes' or 'No'. The teacher confirmed the hypothesis, named the concept and gave the definition of the concept according to the essential attributes. Finally, the students were asked to give some more examples.

Phase Three - Analysis of the Teaching Strategies

The teacher asked the students to reflect on the roles of attributes and concepts in their strategies. Different questions were asked. How did you guess my concept? Did you frame any rule to the concept? Do you concentrate or rule or essential attributes?

The students described their thoughts. They discussed the role of hypotheses and attributes along with the type and number of hypotheses.

All the concepts selected were taught using the above procedure. The experiment took sixteen week time. Special care was taken to control time period for teaching all three groups. Courses in all the three groups were completed in time.

ACHIEVEMENT IN ENVIRONMENTAL ATTITUDE

After studying the terminal behaviour of all the three groups of students with reference to achievement in environmental awareness then terminal behaviour of all these three groups of students with reference to their achievement in environmental attitude was studied as follows:

Comparison of mean environmental attitude scores of the experimental group I, experimental group II and the control groups, after the experimental treatment.

ANCOVA results of student’s post-test environmental attitude scores after experimental treatment adjusted on their intelligence and socio-economic status scores are provided in tables 1 and 2.

Table 1: Ancova for Post-Test Environmental Attitude Scores Sums and Means of Experimental Group I, Experimental Group II and Control Group

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post-Test Environmental Attitude Scores</th>
<th>Intelligence Test Scores</th>
<th>Socio-Economic Status Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ΣY</td>
<td>Y</td>
<td>ΣX₁</td>
</tr>
<tr>
<td>Experimental Group I</td>
<td>40</td>
<td>8498</td>
<td>212.45</td>
<td>4710.8</td>
</tr>
<tr>
<td>Experimental Group II</td>
<td>40</td>
<td>8861.2</td>
<td>221.53</td>
<td>4531.2</td>
</tr>
<tr>
<td>Control Group III</td>
<td>40</td>
<td>7804</td>
<td>195.10</td>
<td>4729.2</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>25162.8</td>
<td>209.69</td>
<td>13971.2</td>
</tr>
</tbody>
</table>

Table 2: Ancova For The Post-Test Environmental Attitude Scores Between Experimental Group I, Experimental Group II And Control Group

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degree of Freedom (df)</th>
<th>Residuals</th>
<th>F Value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sum of Square (Ss)</td>
<td>Mean Squares (Ms)</td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>2</td>
<td>14422.12</td>
<td>7211.06</td>
<td>88.15</td>
</tr>
<tr>
<td>Within</td>
<td>117</td>
<td>9571.48</td>
<td>81.81</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>23993.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 indicates that the ‘F’ value of 88.15 for df 2/117 for the experimental group I, experimental group II and control group is significant at 0.01 level. It shows that there is a significant difference between the post-test mean environmental attitude scores of the experimental group I, II and control group. Since ‘F’ value is significant at 0.01 level in case of post-test mean environmental attitude scores, there arises a need for further testing. The ‘t’ test, therefore, has been applied for testing the significance of the differences. The ‘t’ test results are provided in table 3 to 5.

**Table 3: Difference In The Post-Test Mean Scores Of The Students Of Experimental Group I And Control Group On Attitude Towards Environment**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>S.D.</th>
<th>‘t’ Value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group I</td>
<td>40</td>
<td>212.45</td>
<td>9.57</td>
<td>8.91</td>
<td>Significant at 0.01 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>40</td>
<td>195.10</td>
<td>7.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 3, it may be observed that the ‘t’ value of 8.91 for the difference in the mean scores at the post-test stage, of the students of experimental group I and control group on environmental attitude is significant at 0.01 level. It shows that the mean attitude score of 212.45 for the experimental group I is significantly higher than control group mean which is 195.10 at the post-test stage. This indicates that environmental attitude of the students of experimental group I is higher than that of the control group after the experimental treatment.

**Table 4: Difference In The Post-Test Mean Scores Of The Students Of Experimental Group II And Control Group On Attitude Towards Environment**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>S.D.</th>
<th>‘t’ Value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group II</td>
<td>40</td>
<td>221.53</td>
<td>9.69</td>
<td>13.48</td>
<td>Significant at 0.01 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>40</td>
<td>195.10</td>
<td>7.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 4, it is clear that at post-test stage, the ‘t’ value of 13.48 for the difference in mean scores of the students of experimental group II and control group, on environmental attitude is significant at 0.01 level of significance. It may also be observed from the table that the mean scores of 221.53 of the students of experimental group II is higher than the mean score of 195.10 of the students of control group. This indicates that environmental attitude of the students of experimental group II is higher than that of the control group after the experimental treatment.
Table 5: Difference in The Post-Test Mean Scores Of The Students Of Experimental Group I And Experimental Group II On Environmental Attitude

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>S.D.</th>
<th>‘t’ Value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group I</td>
<td>40</td>
<td>212.45</td>
<td>9.57</td>
<td>4.21</td>
<td>Significant at 0.01 level of significance</td>
</tr>
<tr>
<td>Experimental Group II</td>
<td>40</td>
<td>221.53</td>
<td>9.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5 indicates that at the post-test stage, the ‘t’ value of 5 for the difference in mean scores of the students of experimental group I and experimental group II on environmental attitude is significant at 0.01 level of significance. The mean score of 221.53 of the students of experimental group II is higher than the mean score of the students of experimental group I which is 212.45. This indicates that the environmental attitude of the students of experimental group II is higher than that of the experimental group I.

Analysis Related with Terminal Behaviour Status of the Students

In the second part, the terminal behaviour of the experimental group I, experimental group II and control group was determined on the completion of the treatment. The terminal behaviour of both variables i.e. environmental awareness and environmental attitude was analysed one by one as follows.

Achievement in Environmental Awareness

Comparison of mean achievement scores of experimental group I, experimental group II and control group, after the environmental treatment.

ANCOVA results of student’s achievement in environmental awareness adjusted on their intelligence and socio-economic status scores after the experimental treatment i.e. at post-test stage are provided in Table 6.

Table 6: Ancova for Post-Test Environmental Awareness Achievement Scores Sums and Means of Experimental Group I, Experimental Group II and Control Group

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post-Test Achievement Scores</th>
<th>Intelligence Test Scores</th>
<th>Socio-Economic Status Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ΣY</td>
<td>Y</td>
<td>ΣX₁</td>
</tr>
<tr>
<td>Experimental Group I</td>
<td>40</td>
<td>1881.2</td>
<td>47.03</td>
<td>4710.8</td>
</tr>
<tr>
<td>Experimental Group II</td>
<td>40</td>
<td>1981.2</td>
<td>49.53</td>
<td>4531.2</td>
</tr>
<tr>
<td>Control Group III</td>
<td>40</td>
<td>1659.2</td>
<td>41.48</td>
<td>4729.2</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>5521.6</td>
<td>46.01</td>
<td>13971.2</td>
</tr>
</tbody>
</table>
CONCLUSIONS

This study shows that the post-test achievement mean score of the experimental and control groups, controlling for intelligence and socio-economic status, differ significantly in favour of experimental groups. This implies that the learners who were taught through Gaming Strategy (GS) and Concept Attainment Model (CAM) have shown significant improvement in their achievement in environmental awareness than the learners who were taught through conventional method. This suggests that the gaming strategy and concept attainment model contribute in raising the achievement of elementary school learners.

In case of learners attitude towards environment this, study revealed that the post test environmental attitude mean scores of the experimental and control groups, controlling for intelligence and socio-economic status, differ significantly in favour of the experimental groups. This implies that the learners who were taught through gaming strategy and concept attainment model have shown significant improvement in their achievement in attitude towards environment than the learners who were taught through conventional method. This suggests that gaming strategy and concept attainment model contributes in raising the attitude of learners towards environment also. The elementary school learners who were taught through concept attainment model have shown significantly higher attitude towards environment than the group of learners taught through gaming strategy. Learners taught through concept attainment model have shown significantly higher gain on environmental attitude scale than the learners taught through gaming strategy as well as with conventional method of teaching.

So, it can be said that the CAM is better than gaming strategy and conventional method of teaching as far as achievement in environmental awareness and attitude towards environment is concerned.

REFERENCES