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Effectiveness of Scientific Environmental Awareness Program on Higher Secondary School Students in Relation to Gender and Parent's Education

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Abstract

Over recent decades, worldwide problems relating to deprivation of natural resources and pollution have amplified intensely. Natural resources are depleted by excessive use. Fresh water scarcity on a global scale, deforestation, degradation of coastal and marine areas, soil depletion and loss of biodiversity are some of the problems that have become a cause for concern. Air and water pollution has reached levels that are already resulting in serious health problems, as well as a negative impact on the environment, and inevitably influencing prospects for economic growth. In such a scenario, the importance and need for environment awareness can hardly be stressed. Environmental awareness is to know the delicateness of our environment and position of its protection. Promoting environment awareness is an easy way to become an environment fighter and contribute in generating a brighter future for our children. The necessity to spread environment awareness is huge in the context of successfully addressing environmental problems. It is linked to environment education. Schools and universities play an enormously significant role in generating environment awareness among children and the youth. The present research problem taken in hand by the researcher aims at investigation following research work to develop a program for environment awareness through scientific approach then try it out on the students of higher secondary level and finally find out how much effective it has been to enhance the existing level of awareness. Such a program which would lead the students to not only be aware about the major global environmental issues but also enable them to tackle real world environmental problems using skills, concepts and values. The major objectives of the study being to study the effectiveness of the Scientific Environmental Awareness Program in relation to gender and level of parent's education . The present study is delimited to the XI standard students of CBSE English medium Schools of Ahmadabad city. In the present study the researcher has developed a 'Scientific Environment Awareness Program' which has to be given in as a treatment by creating special environment and by controlling the situation. This is why experimental research method has been used by the researcher. Post-test only control group design has been used for the investigation. The researcher in the present study has found it appropriate to select the schools through purposive sampling method. The researcher selected samples from both the schools using cluster sampling method. An achievement test, Scientific Environmental Awareness Test (SEAT) has been constructed by the researcher and finalised after taking expert's opinion. The t-test was performed for the post test scores obtained on SEAT and the scores were compared between the experimental group and controlled group at 0.05 and 0.01 level of significance. The statistical techniques directed towards the rejection or non-rejection of the null hypotheses.

1. Introduction

Mankind's encounter with the environment is as old as the man himself. Since the evolution of man on the earth he has been reliant on the environment. Initially need of man was limited and small; therefore the activities of man did not affect the environment. But gradually human being established and civilized himself and learnt to cultivate. Over recent periods global issues relating to dilapidation of natural resources and pollution have amplified dramatically,

One of the most widely accepted definitions of EE was given in the Tbilisi Declaration which was developed at the international conference of environment education, sponsored by UNESCO in 1971. Environment education was defined there as "Learning process that increase people's knowledge and awareness about the environment and associated challenge, develops the necessary skills and expertise to address the challenges and forms attitude, motivation and commitments to make informed decision and take responsible action." (UNESCO 1978)

Environmental awareness should be the integral part of any environment curriculum encouraging children to take an active role in the protection of their environment.

Thus, in the present research problem taken in hand by the researcher aims at developing a holistic scientific program, which would be based on active learning strategy (participatory), action-oriented strategy, using issue-based approach, value clarification approach to enhance environmental awareness of students. Developing such a program for environmental awareness could redesign the environmental setting to foster teaching learning environment both in science courses and in other courses as well.

2. Objectives of the Study

To carry out a scientific inquiry in a definite direction, it is imperative for an investigator to formulate precise objectives. This study is carried out with the following objects in view.

2.1 Research objectives

1. To develop a Scientific Environmental Awareness Program (SEAP) for the higher secondary school students.

2. To try out the Scientific Environmental Awareness Program (SEAP) on the higher secondary school students.

3. To study the effectiveness of the Scientific Environmental Awareness Program in relation to gender.

4. To study the effectiveness of the Scientific Environmental Awareness Program in relation to level of parental education of students.

2.2 Task Objectives:

1. To construct Scientific Environmental Awareness Test (SEAT) to assess the effectiveness of the program.

3. Statement of the Problem

Effectiveness of Scientific Environmental Awareness Program for Higher Secondary School Students in Relation to Gender and Parents Education

4. Hypotheses of the Study

. In the present study the researcher has tried to study the effectiveness of Scientific Environmental Awareness Program (SEAP) on environmental awareness of higher secondary students in relation to gender and parental education.

These hypotheses formed for the study were as follows:

Null Hypothesis-

Ho1 There is no significant difference in between the mean scores of CBSE 10th board exams marks obtained by the students of experimental and controlled groups

Ho2 There is no significant difference between the mean scores on SEAT of the girl students in the experimental and in the controlled group.

Ho3 There is no significant difference between the mean scores on SEAT of the boy students in the experimental and in the controlled group.

Ho4 There is no significant difference between the mean scores on SEAT of the boy and girl students in the experimental group.

Ho5 There is no significant difference between the scores on SEAT of students with highly educated parents of experimental group and controlled group.

Ho6 There is no significant difference between the mean scores on SEAT of students with Average / medium educated parents of experimental and control group.

Ho7 There is no significant difference between mean scores on SEAT of students with highly educated parents and average educated parents of experimental group.

5. Type of Research

This research is an attempt to put some theoretical foundations of Environmental Studies into practice so it becomes applied research. The present research was an attempt to develop an interactive, methodical, fun activity based, multimedia based scientific program for environment awareness, so it was an **applied** kind of research.

6. Research Method

If research is to be done by putting the subjects in a specific environment or by creating special environment or by controlling the situation in a particular way, then **experimental method** of research is used. In the present study the researcher has developed a 'Scientific Environment Awareness Program (SEAP)' which has to be given in as a treatment by creating special environment and by controlling the situation. This is why experimental research method has been used by the researcher.

7. Data Gathering Tools

To carry out the research investigation the researchers must collect data with which to test the hypothesis or response the questions. Many different means and measures have been developed to support in the acquisition of data.

- To have numerical information (quantitative data) -

1. An achievement test, Scientific Environmental Awareness Test (SEAT)

8. Variables of the Study

- **Independent** –

Scientific Environmental Awareness Program (SEAP)

- **Dependent** –

Scientific Environmental Awareness Test (SEAT) scores

9. Sampling Method and Sample of the Study

The present study is an experimental study wherein the students of higher secondary level are to be taught for a specific period of time in the actual classroom situation. The researcher in the present study has found it appropriate to select the sample of study through **purposive sampling method**.

The researcher selected samples from both the schools using cluster sampling method. In this method units of population are divided in different groups on basis of some natural criteria and some groups are selected randomly for sample according to the need of researcher. Such selected group is known as cluster of subjects.

Table 1

Sample of Study

	Name of School	Boys	Girls	Total students
Experimental Group	St. Kabir H.S. School	39	35	74
Controlled Group	ASIA English School	34	29	63

St. Kabir H.S. School, Ahmadabad was considered as experimental group and the other group from ASIA English School, Ahmadabad was considered as controlled group.

10. Analysis and Interpretation of Data

10.1 Equalization of the Experimental and Controlled Groups

Prior to the treatment phase, two groups namely experimental and control group were formed on the basis of the marks they obtained in the CBSE class 10th board exams. Statistical t-test was performed to check whether the formed groups were equal or not. Mean achievement scores, standard deviation and t- values are presented in table 2.

Table 2

Comparison of the Experimental and the Controlled Groups in relation to 10th board marks.

Group	N	Mean	SD	SE_D	t-value	Significance	Remarks
Experimental	**74**	79.87	8.58	1.53	1.85	Not Significant	Ho1 Not Rejected
Controlled	**63**	77.05	9.18				

***Significant at 0.05 level**

**** Significant at 0.01 level**

df **135**

Table 2 shows that the mean scores of the experimental group is 79.87 whereas the mean of the controlled group is 77.05. The S.D. of the experimental group is 8.58 and that of controlled group is 9.18. The calculated t-value is 1.85 which is less than the table value at 0.05 levels i.e., 1.97 and at 0.01 levels

i.e., 2.6. Therefore, it is not significant at both 0.05 and 0.01 levels of significance.

Hence the hypothesis Ho1: "There is no significant difference in between the mean scores of CBSE 10th board exams marks obtained by the students of experimental and controlled groups" is not rejected.

Therefore, it is evident that the experimental and controlled groups are equal on the basis of their obtained total scores in 10th board exams.

10.2 Analysis and Interpretation of the Quantitative Data on SEAT

An elaborate Scientific Environmental awareness program SEAP was prepared by the researcher. The experimental group was exposed to this program. To find out the effectiveness of this program a test to measure Scientific Environmental Awareness Test, henceforth called as SEAT, was administered on the experimental as well as on the controlled group. The responses were scored and the comparisons of these scores were worked out in relation to selected variables. The analysis was done using t-test of significance and the hypotheses were tested on the acquired t values. The interpretations are done based on the rejection or non-rejection of the hypotheses.

Gender wise effectiveness of SEAP on SEAT

Table 3.1

Comparison of the Girl students in the experimental and controlled groups in relation to mean scores on SEAT

Group/gender	N	Mean	SD	SED	t-value	Significance	Remarks
Controlled	**29**	19.34	4.39	1.78	9.26	*	Ho2

Girls						**	Rejected
Experimental Girls	**35**	35.83	9.37				

***Significant at 0.05 level**
**** Significant at 0.01 level**

df **62**

From the table 3.1 it is evident that for the 29 girl students of controlled group and 35 girl students of experimental group, the mean scores obtained is 19.34 and 35.83 respectively. The value of standard deviation is 4.39 and 9.37 respectively. The df is 62 and the t-ratio for the girl students in the experimental and controlled group in relation to the scores on SEAT is 9.26 which is greater than the table value at 0.05 level i.e., 2.00 and also at 0.01 level i.e., 2.66. So, the difference between them is significant.

Hence, the null hypothesis Ho2: There is no significant difference between the mean scores on SEAT of the girl students in the experimental and in the controlled group is rejected.

Therefore, it can be interpreted that there is difference in effect of SEAP in between the girls of both the groups. From the average scores it can be said that the girls of experimental group have been significantly benefitted by the programme.

Table 3.2

Comparison of the Boys students in the experimental and controlled groups in relation to mean scores with respect to SEAT

Group/gender	N	Mean	SD	SED	t-value	Significance	Remarks
Controlled Boys	34	15.53	5.53	1.88	9.03	* **	Ho3 Rejected
Experimental Boys	39	32.49	10.12				

***Significant at 0.05 level**
**** Significant at 0.01 level**

df **71**

The table 3.2 shows that for the number of boys 'N' in controlled group 34 and 39 in experimental group, the mean scores obtained is 15.53 and 32.49 respectively. The SD values are 5.53 and 10.12 respectively. For df 71, the t calculated is 9.03 which is more than t tabulated at 0.05 level i.e., 2.00 and at 0.01 level i.e., 2.65. So, the difference between them is significant.

Hence, the null hypothesis Ho3: There is no significant difference between the mean scores on SEAT of the boy students in the experimental and in the controlled group, is rejected.

It is evident from the mean scores that the programme has exerted a significantly high effect on the boys of experimental group as compared to their counterparts in the controlled group.

Table 3.3

Comparison of the Boy and Girl Students in the Experimental Groups in Relation to Mean Scores on SEAT

Gender	N	Mean	SD	SED	t-value	Significance	Remarks
Girls	35	35.83	9.37	2.27	1.47	Not significant	$H_0$4 not rejected
Boys	39	32.49	10.12				

***Significant at 0.05 level**
**** Significant at 0.01 level**

df **72**

The table 3.3 shows that for the number of boys 'N' in for girls in experimental group is 35 and 39 for boys in experimental group, the mean scores obtained is 35.83 and 32.49 respectively. The SD values are 9.37 and

10.12 respectively. For df 72, the t calculated is 1.47 which is less than t tabulated at 0.05 level i.e., 1.99 and at 0.01 level i.e., 2.65. So, the difference between them is not significant.

Hence, the null hypothesis Ho4: There is no significant difference between the mean scores on SEAT of the boy and girl students in the experimental group, is not rejected.

It is evident from the mean scores that the programme has exerted almost equal effect for the boy and girl students of experimental group.

Parental Education wise effectiveness of SEAP with respect to SEAT

Table 4.1

Comparison of the students with highly educated parents of the experimental and controlled groups in relation to mean scores obtained on SEAT

Group/Parents Education	N	Mean	SD	SED	t-value	Significance	Remarks
Controlled /Highly Educated	47	17.96	5.58	1.56	11.05	* **	Ho5 Rejected
Experimental /Highly Educated	54	35.15	9.74				

***Significant at 0.05 level**

**** Significant at 0.01 level**

***df* 99**

The table 4.1 shows, at df 99 the calculated t value is 11.05, is greater than the reference table value (1.98) at 0.05 level and also greater than reference table value (2.63) at 0.01 level.

Therefore, the null hypothesis Ho5: There is no significant difference between the scores on SEAT of students with highly educated parents of experimental group and controlled group, is rejected. This means that there is significant difference between both the groups.

The mean of the Scores for the experimental group students with highly educated parents is higher, which suggests that the program positively affected those students to whom the program was given as a treatment.

Table 4.2

Comparison of the students with Average educated parents of the experimental and controlled groups in relation to mean scores obtained on SEAT

Group	Parents Education	N	Mean	SD	SED	t-value	Significance	Remarks
Controlled	Medium Educated	16	15.31	4.14	2.42	6.54	* **	Ho6 Rejected
Experimental	Medium Educated	20	31.15	9.78				

***Significant at 0.05 level**

**** Significant at 0.01 level**

df 34

According to the table 4.2, the t calculated at df 34 is 6.54 which is more than the table value at 0.05 level (2.03) and at 0.01 level (2.72). Therefore, the difference between the groups is significant at both levels of significance.

Hence the Ho6 There is no significant difference between the mean scores on SEAT of students with Average / medium educated parents of experimental and control group is rejected.

The mean scores indicate that the students of experimental group having medium educated parents were more benefitted by the Scientific Environmental awareness programme.

Table 4.3

Comparison of the students with High and Medium Educated parents of the experimental group in relation to mean scores obtained on SEAT

Group	Parents Education	N	Mean	SD	SED	t-value	Significance	Remarks
Experimental	Highly Educated	54	35.15	9.74	2.56	1.56	Not significant	Ho7 Not Rejected
Experimental	Medium Educated	20	31.15	9.78				

***Significant at 0.05 level**

df 72

**** Significant at 0.01 level**

The table number 4.3 describes the statistics that the df =72 and the t ratio of the students in experimental group with Highly educated parents and those with medium educated parents in relation to SEAT is 1.56 which is very less than the reference table value (1.99) at 0.05 level and (2.64) at 0.01 level of significance. So, the difference is not significant.

Hence the null hypothesis Ho7: There is no significant difference between mean scores on SEAT of students with highly educated parents and average educated parents of experimental group is not rejected.

It is hence interpreted that the program has not generated any bias on the basis of education of parents.

It is evident from the mean scores that the programme has exerted a significantly high effect on the students of experimental group as compared to their counterparts in the controlled group indicating that the program was highly beneficial for the Experimental group students.

11. Findings

1. The effect of SEA Program on girl and boy students of the experimental group has almost been equal. The percentage of mean scores of boys' students is 54.15 and the percentage of the mean score of girl students is 59.71. Hence there is a difference of 5% only which is almost negligible. Also, there is no significant difference between the two at 0.01and 0.05 level.
2. The students with highly educated parents and medium educated in the experimental group have scored comparatively higher in SEAT than the controlled group. The average difference in percentage is 28.65 for students with highly educated parents and 26.4% for students with medium educated parents and the t-values were significant at 0.05 and 0.01 levels.

12. Conclusion

i. The SEAP has proved to be gender free. The program was equally effective for the boy and girl students.

To highlight over here it can be said that the performance of girls was slightly better than the boys, which gives us a hope that in future we will have more female environmental saviours.

ii. The program for development of Scientific Environmental Awareness has generated almost equal positive effect on the student with parents from different educational backgrounds.

The students with average or highly educated parents have not affected the impact of the programme. Therefore, we can say that the scientific awareness about the environment was equally taken by the students irrespective of their parents having a master's degree or bachelor's degree or lesser than that.

13. Recommendations

1. Educators are one of the key people of an educational system. Educators should be a role model. Environment education shall begin from 'self'. So, it should start with the teacher in all his/her walks of life.

2. Teacher should give utmost concern to environment education by instead of just treating it as a subject for syllabus coverage.
3. Students should be motivated to participate in different social public drive such as Beach Cleaning, Railway Station Cleaning, and Wall Painting etc.
4. Every educational institution should have an Environmental Club where information regarding Environment / Nature should be made available to all students. Educational institutions should take environmental awareness and environment conversation as one.
5. Students can perform various activities related to the environment under the direct guidance and supervision of the teachers. The activities to be performed by the students under such programme may be listed as below:
   a. Solving Word Search/Crossword puzzles related to environment concepts.
   b. Identifying hazardous things at home and looking for their constituent chemicals.
   c. Making models for food web, ecological pyramids etc.
   d. Preparing alternate plans for traffic control.
   e. Taking steps for waste management at school and home.

References:

- Agarwal, K.M., Sikdar, P.K., Deb, S.C. (2002). A Textbook of Environment. Macmillan India Ltd. Kolkata, India.
- Amy Burge (2020). How To Design Effective Teaching Modules? University Association for contemporary European Studies. uaces.org
- Amitav Ghosh. (2017). The Great Derangement: Climate Change and Unthinkable. Penguin Random House India
- Bharucha, Neepa (2011). An Investigation into the Effectiveness of Orientation to Philosophy of Science in Relation to Student-Teacher's Perception of Teaching of Science. Sardar Patel University, Vallabh Vidyanagar.ISBN:978-93-81386-01-9
- CEE (1999). Towards a Green Future- A Trainers' Manual on Education for Sustainable Development. Ahmedabad: Centre for Environmental Education.
- J. Arun Kumar, August (2012). A Study on Assessment of Environmental Awareness Among Teacher Trainees in Teacher Training Institutes.IJRSS, Volume2, Issue 3
- Koul Lokesh (2009). Methodology of Educational Research, Fourth Revised and Enlarged Edition. Vikas Publishing House Pvt.Ltd. Noida.
- Shukla, Satish Prakash (2018). Research Methodology and Statistics. Rishit Publications, Ahmedabad.
- V.Sarabhai, Kartikeya. Raghunathan Meena. Jain, Shivani (2002). Environment Education, Some Experiences from India. Research Paper Series: Submitted in the path to Success: Some Pioneering Examples of Environment Education. Institute for Global Environmental Strategies, Japan. Published by Centre for Environment Education (CEE)