

EFFECT OF COMPUTER ASSISTED INSTRUCTIONS ON ATTITUDE TOWARDS ENVIRONMENTAL POLLUTION OF SECONDARY SCHOOL STUDENTS

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The study was conducted to explore the effect of computer-assisted instructions developed by the researchers on environmental education of secondary school students. The study was conducted on the sample of 640 secondary school students studying in class IX of Amritsar district. The study employed a pre-test/post-test equivalent group experimental design. Results revealed that Computer Assisted Instruction as a technique was more effective in creating a positive attitude towards prevention of environmental pollution among students. The CAI is effective in generating environmental awareness among secondary school students. They are also independent of the residential area of the students for generating environmental awareness among secondary school students. However, they are dependent on the type of school and gender for generating environmental awareness among secondary school students.

KEYWORDS: Computer Assisted Instructions, Environmental Attitude, Conventional Teaching

INTRODUCTION

Computer Assisted Instructions (CAI) provides direct learning experience to the user. It is a learning device, which is interactive. The learner can choose his own pace and pause for testing in a computer-assisted environment. Computer Assisted Instruction is one of the advanced programmed learning devices.

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Programmed learning is a method of individualised instruction in which the student receives information related to his own needs in progressive sequence but in small units. Learner remains active and proceeds at his own rate and knows immediately whether he is right or wrong. CAI represents a highly individualised and systematic instructional strategy for classroom instructions as well as for self-learning.

As the world forges ahead into the twenty first century, along with the developments in all spheres, it is faced with many prominent problems and issues. Dwindling of fossil fuels, forests, biodiversity and aquifers are the consequences of environmental pollution. No doubt, science has led to inventions and discoveries, which have improved the human race, but it has also led to deterioration of the environment. Environmental education seems to be the only solution to this ever-spreading problem. Environmental education is helping social groups and individuals to acquire an awareness of environment. The knowledge about the environment and awareness would be of no meaning without cultivation of right attitudes towards environment especially environmental pollution. Need of environmental education cannot be ignored, we must understand this to improve the quality of life. It is not only a question of air and water pollution but it also includes elimination of polluters, diseases, hunger, poverty, population explosion, health and hygiene, environmental concerns, destruction of forests, wildlife, erosion of soil and accumulation of waste. Hence, there is an urgent need for propagation of positive attitude towards prevention of environmental pollution. As students are the nation builders, environmental education among them plays an important role in shaping and moulding the future of the nation with a healthy and pollution free environment. Environmental education through CAI plays an important role in creating a positive attitude towards prevention of environmental pollution among the students.

REVIEW OF RELATED LITERATURE

Computer Assisted Instruction (CAI) has been proving an effective medium of education in the advanced countries for formal and non-formal education at all the levels. The use of computers in the classroom has boomed since the 1980s but studies within the past 15-20 years have focused on the relationship between CAI and academic achievement in many different subject areas. Number of studies have been carried out to find the effectiveness of CAI at different levels. Dalton and Hannafin (1986), Richardson (1986), Price (1989), Roberts and Madhere (1990), Rha and Bedell (1998), Hsiao (2001) and Raninga (2010) carried out studies to find out the effectiveness of CAI in teaching learning of Mathematics at different levels. They found a good increase in

scores of the learners by using CAI. It was found that secondary students exposed to CAI showed higher academic achievement than the students exposed to traditional instructions. In different studies carried out by Stern and Repa (2000), Drake (2001) and Hema and Vasanthi (2003), it was concluded that CAI has positive effects in learning social skills, literary activities as well as in learning chemistry in comparison to conventional method.

The effects of CAI on achievement of secondary school students in Sciences were also studied by Vessel (1988), Aggarwal (1995), Rangaraj (1997), Chang (2002), Tabassum (2004), Saini (2008) and Sheetal (2008) in different research studies. They found that students taught through CAI showed better results in sciences than those taught through traditional method. In another study conducted by Uplane, Sonawanae and Padmini (2011) on secondary school low achievers, CAI was found as an effective instructional method in teaching Physics to low achievers.

SIGNIFICANCE OF THE STUDY

No doubt, computer literacy has spread far and wide but still there is dearth of Computer-Assisted Instructions in the field of education. The corporate world has to large extent used computers for its benefits but the educational field is still lagging behind. Hence, we need to make the students of our society well aware of environmental issues. Environmental studies has become a compulsory subject in schools so it becomes necessary to find out the attitude and awareness of students about environment, who play a significant role in developing our nation. They form our future task force and the impact of the ideology of future generations can lead to a positive change. In this respect students can play a dominant role in bringing about healthy change in the society by apprising them of the importance of keeping environment free from all sorts of pollution. Being a teacher educator of science background and having a positive attitude towards healthy environment the researcher has been prompted to take up the present study to understand the effect of CAI on the attitude towards environmental pollution.

OPERATIONAL DEFINITIONS

Computer Assisted Instructions (CAI)

Computer Assisted Instruction refers to a method of instruction in which computer is used to instruct the students and where the computer contains the instruction which is designed to teach, guide and test the students until the desired level of proficiency is attained. In the present study computer assisted instructions refers to MS PowerPoint presentations on environmental

education and attitude towards environmental pollution.

Conventional Teaching (CT)

Conventional Teaching is the most common method of teaching used by the teachers for carrying out the teaching learning process in the classroom situations. In this method, the teacher talks more or less continuously to deliver the facts and ideas worth remembering but the class does not converse with the teacher. This implies that it is one of the autocratic teaching strategies. In this study, the instructional material was prepared for the conventional teaching also. It was prepared in the form of lesson plans for teaching environmental education by the researcher.

Attitude Towards Environmental Pollution

Attitude towards environmental pollution means a readiness to respond to or against various types of environmental pollution as air pollution, water pollution, soil pollution and noise pollution in particular manner as with concern or hate, fear or resentment to a particular degree of intensity.

Secondary School Students

In the present study 9th class students studying in schools affiliated to Punjab School Education Board (P.S.E.B) represent the secondary school students.

OBJECTIVES OF THE STUDY

The present study was undertaken keeping in mind the following objectives:

1. To study the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students.
2. To study the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students with respect to their residential area.
3. To study the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students with respect to their type of school.
4. To study the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students with respect to their gender.

HYPOTHESES FOR THE STUDY

The various hypotheses framed for the study are:

1. There exists a significant difference in the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students.
2. The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to their residential area.
3. The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to their type of school.
4. The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to their gender.

RESEARCH METHODOLOGY

The present study comes under the domain of experimental research. The study is based on the pre-test/ post-test equivalent group design. The experimental and controlled groups were matched on the basis of their 8th standard final results. The study was conducted to assess the effect of Computer Assisted Instructions on attitude towards environmental pollution among secondary school students.

TOOLS USED

In order to collect the required data for the study, the following tools were used:

1. CAI (Computer Assisted Instructions) on environmental awareness developed by the investigators (Instructional tool).
2. Conventional Lesson Plans on environmental awareness developed by the investigators (Instructional tool).
3. Taj Environmental Attitude Scale by Taj (2001) used as a criterion reference test.

SAMPLE

Purposive sampling technique was used for the study. Two samples were selected at two different stages of experimentation. These were a) Sample for the development of teaching learning material and b) Sample for final

experimentation. Sample for the development of teaching learning material for CAI as well as for CT was taken from Govt. Senior Secondary School, Mall Road, Amritsar. First of all, already developed instructional material for CAI as well as Conventional Teaching for each method of environmental education was given to experts and then for the individual try out to a student of class IX. After the individual try out, the developed material for each method was given to 5 to 8 students of class IX for small group try out. After the modifications suggested by them, the developed material was field tested on 100 students of class IX.

In the present investigation final sample for experimentation consisted of 640 students of class IX of rural and urban areas of different government and private secondary schools. Out of the total sample, 320 were treated as control group to be taught by conventional method and the rest 320 were treated as experimental group to be taught by Computer Assisted Instructions.

DATA COLLECTION

The data was collected from 640 students of class IX of both rural and urban, government and non-government secondary schools affiliated to P.S.E.B. of Amritsar district. The Taj Environmental Attitude Scale was administered at pre- test and post- test stage on both controlled and experimental group.

EXPERIMENTATION

After preparing and standardising the CAI, the investigator made the necessary arrangements with the principals of the schools selected for the experiment. The Taj Environmental Attitude Scale to evaluate the attitude towards environmental pollution was administered as a pre-test measure. The students were assigned to two groups -experimental and controlled group on the basis of 8th standard achievement scores to make equivalent groups. The experimental group was taught through CAI (Computer Assisted Instructions) and the controlled group was taught through Conventional Method. After the discussion and completion of content with both the groups by using both these techniques, the Taj Environmental Attitude Scale to measure attitude towards environmental pollution in secondary school students was administered as post-test measure.

The experiment was conducted in two phases. In the first phase i.e. before being exposed to the teaching material, both the groups were pre-tested with Taj Environmental Attitude Scale as a criterion referenced test on environmental education. After this, the students were provided orientation and instructions about the treatment to be allotted to them. The purpose of such an orientation was to get over the anxiety and curiosity of the students, which

could hinder the final outcome of the results. The students of the experimental group were given a trial of the CAI material so that they might be able to know what they had to do while going through the instructional material. Likewise, the students of the control group were made familiar about the objectives so that they might become familiar in the teaching setup.

The second phase of the experiment was concerned with the real execution of the experiment. During this phase, the group designated as experimental group was exposed to Computer Assisted Instructions and the group designated as control group was taught through Conventional Method. After treatment i.e. at the end of the content teaching, both the groups were tested with criterion-referenced test to measure their attitude towards environmental pollution. The scores of criterion-referenced test were compared in order to assess the effectiveness of two methods of teaching.

RESULTS AND DISCUSSIONS

To test the first hypothesis, t-test was employed. Mean gain scores on environmental attitude of experimental and controlled group were calculated by finding the difference between two groups. Mean, SD and t-ratio were calculated. The results are presented in Table 1.

Table 1
t-Ratio of Mean Gain Scores of Attitude Towards Environmental Pollution of Experimental and Control Group.

Variable	Experimental Group			Controlled Group				
Mean Gain Scores	N	Mean	SD	N	Mean	SD	SE	t
	320	28.78	9.23	320	22.97	8.62	1.06	4.80**

***Significant at 0.01 level of Significance*

From Table 1, it is clear that mean gain score of experimental group is equal to 28.78 and the mean gain score of controlled group is equal to 22.97. The t-ratio is 4.80 and is significant at .01 level of significance. This shows that there exists significant difference in attitude towards environmental pollution of students taught through Computer Assisted Instructions (CAI) and Conventional Method of teaching, which is in favour of CAI. Thus, the first hypothesis, which states “There exists a significant difference in the effect of Computer Assisted Instructions and Conventional Method of teaching on the attitude towards environmental pollution of secondary school students” is accepted. It may be concluded that Computer Assisted Instructions are an effective technique for creating positive attitude towards environmental pollution among students. The probable reason behind the results may be that

Computer Assisted Instructions provide individualised instructions as compared to Conventional Method of teaching. The results are in consonance with the findings of Tabassum (2004) who found that there exists significant difference in the achievement of students in science taught with Computer Assisted Instruction as supplementing strategy.

Table 2, Shows the results of the Analysis of Variance of the effect of Instructional Strategy (Computer Assisted Instructions and Conventional Method of Teaching) on the attitude towards environmental pollution among Secondary School Students with respect to residential area, type of school and gender.

Table 2

Analysis of Variance of the Effect of Instructional Strategy on the Attitude Towards Environmental Pollution with Respect to Residential Area, Type of School and Gender.

Variable		Sum of Squares	df	Mean Squares	F	Significance
Instructional Strategy (CAI & CM) & Residential Area (Urban & Rural)	Between Groups	547.88	1	481.18	9.87	Not Significant
	Within Groups	5631.57	318	2171.39		
	Total	6179.45	319			
Instructional Strategy (CAI & CM) & Type of School (Govt.& Non.Govt)	Between Groups	931.00	1	698.06	25.01**	Significant
	Within Groups	7674.72	318	2113.78		
	Total	8605.72	319			
Instructional Strategy (CAI & CM) & Gender (Male & Female)	Between Groups	999.87	1	495.01	24.01**	Significant
	Within Groups	7419.37	318	4117.04		
	Total	8419.24	319			

***at 0.01 Level of Significance*

Results in Table 2 reveal that the interaction of instructional techniques such as Computer Assisted Instructions (CAI) and Conventional Method (CM) of teaching with respect to residential area (Urban and Rural) is not significant as the value of the F- ratio is less than the table value at both the levels of significance.

Further, from Table 2, it is clear that in case of the interaction of Computer Assisted Instructions and Conventional Method of teaching with respect to type of school (Govt. and Non-Govt.), the F ratio is equal to 25.01 for 318 df and is significant at 0.01 level of significance.

The results also reveal that in case of the interaction of Computer Assisted

Instructions and Conventional Method of teaching with respect to gender (Male and Female), the F ratio comes out to be 24.01 for 318 df which is again significant at 0.01 level of significance.

Table 3

t-ratio of Mean Gain Scores on Attitude Towards Environmental Pollution of Experimental and Control Group with Respect to Residential Area.

Variable	Experimental Group					Controlled Group						
	N	M	SD	SED	<i>t</i>	N	M	SD	SED	<i>t</i>	SED	<i>t</i>
Mean Gain Score												
Urban	160	22.54	3.19	1.43	1.17	160	20.71	2.62	1.32	1.02	0.98	1.06
Rural	160	21.49	2.68			160	19.48	2.97			0.93	1.03

From Table 3, it is clear that mean gain score of experimental urban group is equal to 22.54 and the mean gain score of experimental rural group is equal to 21.49. The t-ratio for the experimental group comes out to be 1.17, which is not significant. Similarly, the mean gain score of the controlled urban group is equal to 20.71 and the mean gain score of controlled rural group is equal to 19.48. The t-ratio is 1.02, which is not significant. This shows that there exists no significant difference in the attitude towards environmental pollution of students taught through Computer Assisted Instructions (CAI) and Conventional Method of teaching with respect to their residential area. Thus, the second hypothesis, which states that “The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to the residential area”, is accepted. It may safely be concluded that residential area does not affect the attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching.

The above results are in consonance with the findings by Rose (1992) who studied the effectiveness of Computer Assisted Instructions with special reference to underachievers and found that there was no relationship between post treatment scores and variable locale of the experimental group.

To test the third hypothesis, t-test was employed and t-ratio of mean gain scores on environmental attitude of experimental and control group were calculated with respect to their type of school. The results are presented in Table 4.

Table 4

t-ratio of Mean Gain Scores of Attitude Towards Environmental Pollution of Experimental and Control Group with Respect to their Type of School.

Variable	Experimental Group					Controlled Group						
	N	M	SD	SED	<i>t</i>	N	M	SD	SED	<i>t</i>	SED	<i>t</i>
Mean Gain Score												
Govt.	160	21.72	2.65	0.87	4.95**	160	17.69	2.56	1.84	4.68**	1.27	4.53**
Non Govt.	160	24.91	3.12			160	19.27	2.69			1.05	4.63**

***Significant at 0.01 Level of Significance*

From Table 4, it is clear that the mean gain score of the experimental group of government school students is equal to 21.72 and the mean gain score of experimental group of non government school students is equal to 24.91. The t-ratio for the experimental group comes out to be 4.95, which is significant at 0.01 level of significance. The mean gain score of controlled group of government school students is equal to 17.69 and the mean gain score of controlled group of non-government school students is equal to 19.27. The t-ratio is 4.68, which is significant at 0.01 level of significance. This shows that there exists a significant difference in attitude towards environmental pollution of students taught through Computer Assisted Instructions (CAI) and Conventional Method of teaching with respect to their type of school. Thus, the third hypothesis, which states that “The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to their type of school”, is rejected. It may safely be concluded that type of school effects attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching. The probable reason behind the results may be that no doubt steps are being taken to uplift education in government schools but still there are lack of facilities in the government schools which results in lack of motivation towards environmental education.

The above results are in consonance with the findings of Das (2003) who found that students of non-government schools learnt better through CAI as compared to students of government schools.

To test the fourth hypothesis, t-test was employed and t-ratio of mean gain scores on environmental attitude of experimental and control group were calculated with respect to their gender. The results are presented in Table 5.

Table 5

t-ratio of Mean Gain Scores of Attitude Towards Environmental Pollution of Experimental and Control Group with Respect to their Gender.

Variable	Experimental Group					Controlled Group						
	N	M	SD	SED	<i>t</i>	N	M	SD	SED	<i>t</i>	SED	<i>t</i>
Mean Gain Score												
Male	160	22.52	2.93	1.63	4.71**	160	18.52	2.13	1.13	4.41**	1.43	4.36**
Female	160	25.61	3.42			160	21.95	3.0			1.23	4.64**

***Significant at 0.01 Level of Significance*

From Table 5, it is clear that mean gain score of experimental group of male students is 22.52 and the mean gain score of experimental group of female students is 25.61. The t-ratio for the experimental group comes out to be 4.71, which is significant at 0.01 level of significance. The mean gain score of the controlled group of male students is 18.52 and the mean gain score of controlled group of female students is equal to 21.95. The t-ratio is 4.41, which is significant at 0.01 level of significance. This shows that there exists a significant difference in attitude towards environmental pollution of students taught through Computer Assisted Instructions (CAI) and Conventional Method of teaching with respect to their gender. Thus, the fourth hypothesis, which states that "The attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching does not differ with respect to their gender", is rejected. It may safely be concluded that gender effects attitude towards environmental pollution of secondary school students taught by Computer Assisted Instructions and Conventional Method of teaching. The probable reason behind the results may be that female students have more concentration and thus retain the concepts related to environmental education.

The findings are in conformance with the findings of Das (2003) who found that girls have a high positive attitude towards CAI as compared to boys.

CONCLUSIONS

The present study adds to the exiting stock of knowledge especially with regards to the application of CAI. The study can be a boon for the students where they are generally taught through the lecture method. It can be concluded on the basis of analysis and interpretation of results of the present study that the Computer Assisted Instructions are effective in generating environmental awareness among secondary school students. Computer Assisted Instructions as a technique are independent of residential area for generating environmental awareness among secondary school students. However, they are dependent on the type of school and gender for generating environmental awareness among secondary school students. Computer Assisted Instructions should be employed to enhance the quality of education

at both school and college levels. They can be utilised to spread environmental education and develop a positive attitude to prevent environmental pollution.

Development of CAI material should be made part of teaching subjects and the student teachers should develop Computer Assisted Instructional material for at least one unit of a particular class. The teacher educators should motivate the pre-service as well as the in-service teachers to develop positive attitude towards the application of CAI in teaching learning process. Especially at pre-service level of training, the teachers should be motivated towards the use of computers in teaching learning process. The ability of development and application of CAI can improve their interest in the use of computer technology in classrooms. The curriculum planners should also include such chapters in the textbooks that can be converted into Computer Assisted Instructional Material (CAIM) easily. The teachers should be given special instructions by the administrators to teach those particular chapters through CAI and they should motivate the pre-service as well as the in-service teachers to develop positive attitude towards the application of CAI in teaching learning process. The administrators should also arrange the workshops and seminars for in-service teachers to provide them training to develop material for CAI. Teachers and parents should encourage their children to utilise educational packages available in the market. Online Computer Assisted Instructions can be used as per the level of students as well. Schools should be actively involved in the development and up gradation of different educational packages keeping in mind the interest of the students.

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