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Preparing and Evaluating Computer Assisted Instruction on Environmental Education of B.Ed. Students

Ashish Pathak
Assistant Professor,
Deptt.of Teacher Education,
SMP Govt Girls PG College,
Meerut

Abstract

The present study was conducted to assess the effectiveness of Computer Assisted Instruction Program as compared with traditional method of instruction in the subject area of environmental education for B.Ed. class. Present study was Quasi experimental in nature. Sample of the study was 300 B.Ed. students of DBRA University, Agra (150 students in control group and 150 students in experimental group). The experimental group was taught by the computer assisted instructions and the control groups comprising 150 students were taught by the conventional method of teaching. Achievement Test to be used as pre test and post test was developed and validated by the researcher. Test was comprised of 50 multiple choice items. Findings of this research indicate that CAI is a better method of instruction for environmental education of B.Ed. class as compared to the traditional method of instruction. Achievement scores of science students on Environmental Education found higher than art students whether both the groups were taught with CAI.

Keywords: Computer Assisted Instruction, Environmental Education .

Introduction

The concept of computer assisted instruction is not new. According to Wang and Sleeman (1993) the origin of computer assisted instruction can be traced back to the invention of small multiple choice items scoring machines by Sidney L. Pressey in 1926 in Ohio University (America) and B. F. Skinner's work to improve and expand the concept of programmed instruction in late 1950s and early 1960s. The use of computer for programmed instruction started in late 1960s.

Computer assisted instruction is defined as a method of instruction between a learner and computer device having useful instructional material as software for helping the individual learner to achieve the desired instructional objectives with his own pace and ability at his command. Computer assisted instruction is the process by which written and visual information is presented in a logical sequence to a learner through computer.

Therefore Computer assisted instruction is a form of independent learning where the students have the responsibility to learn. In its broadcast meanings, it is a process in which students take the initiative with or without the help of others in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes.

Now environmental education is a part of education at every level of education. B.Ed There are many teaching methods which can be used in teaching of environmental education of B.Ed. class such as lecture cum demonstration, field trip, project, activity and play way method. Students get only bookish knowledge by traditional methods and outdoor methods (field trip method, activity method, project method, play way method) need much more time but during B.Ed. program there is not so much time that student could be taught all the principles of environmental science by these outdoor methods. colleges in India have tradionally accepted deductive lectures as the primary mode of instruction but it neither can clarify perfectly the principles and facts of environmental education nor it can make interaction with student according to their needs. So students take no interest in environmental education. In such a way we can't achieve the objectives of environmental education. Educational research has proved that the students who study independently learn more effectively than

students who attend lectures. In this complicated situation we may use CAI which serves the information more effectively with graphics, sound, animated forms, 3-D pictures etc. The present traditional system of instruction is highly group oriented. Students are instructed in a group while they have different intellectual abilities, motivations, interests and emotional developments etc. There should be the need for an instructional system attuned to the background and abilities of the individual. At college level students are mature enough in terms of language, understanding and development of other mental abilities to a great extent. It indicates the capabilities of these learners to learn at their own speed if suitable environment is provided. They should try to learn at their own pace by self learning process of CAI and by doing different activities. Active involvement of the learner makes the content easy and more understandable.

Scientific attitude is positively correlated with the multimedia approach in teaching and learning. There is a positive relationship between learning achievement and scientific attitude. Therefore CAI also should affect the learning outcomes of students. But before starting any new technology it is necessary to find out its benefits and shortcomings, so it is a matter of research to prepare and evaluate Computer assisted instruction on environmental education of B.Ed. students.

Findings of the study may be a source of encouragement for the widespread use of CAI at various grade levels and in varied subject areas. This study may also be a source of inspiration for researchers to develop educational software and conduct experiments.

Objectives of the Study

1. To compare the achievement of students taught by CAI and traditional methods.
2. To compare the effect of CAI on achievement of students of science and art stream.

Research Hypothesis

1. There is a significant difference between achievement of students taught by CAI and traditional methods.
2. There is a significant difference between achievement of students of science and art stream taught by CAI.

Null Hypothesis

1. There is no difference between achievement of students taught by CAI and traditional methods.
2. There is not a significant difference between achievement of students of science and art stream taught by CAI.

Critical Review and implications from Past Researches

Related literature was reviewed by the investigator for deeper and broader knowledge of the problem. A large number of studies have been undertaken on the CAI. Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. Researchers evaluated the effectiveness of CAI in different subjects at various levels. Some studies revealed that CAI is more effective mode of instruction at secondary and higher secondary level of education in various subjects like; Biology, Science, mathematics etc (Kumar 1982; Singh et. all 1991). Litterie (2003) investigated that CAI is more effective than lecture or conventional method of teaching at higher level of education and CAI has been assumed to have an increasing role in medical education also while Jenkins (2008) evaluated the effectiveness of an online computerized dermatology module compared to traditional lecture based teaching to medical students and found that CAI was at least as effective as traditional lecture teaching of dermatology morphology to medical students.

Khan (2011) revealed that CAI method was more effective than the traditional method in teaching civics at class 9th level. The study demonstrated that CAI produced significant positive difference in the achievement on the knowledge, comprehension and application aspects. Bakac, et al. (2011)[2] observed the effect of computer assisted instruction (CAI) with simulation technique used in teaching the subject of "Electric Current" on the successes of students. At the end of the study it was detected that CAI technique increased the academic successes of students in the subject of 'Electric Current'.

The researches by Cakir and Simsek (2010) showed that there was no significant achievement difference between treatment and control groups.
They found that There was no significant difference exists between those who studied in the computer–based environment and those in the paper based environment.

Mohammad (2010) found its effectiveness in primary level also. He found that CAI was more effective on enhancing the classification skills in young children (Experimental Group).

Some researches of CAI or multimedia instruction were conducted on B.Ed. or prospective teachers also and it was found that Computer Assisted Instruction or multimedia instruction was more effective than conventional method. The major objective of Dubey and Joshi (2008) study was to study the effectiveness of self learning strategy in terms of achievement of NTT. The major finding of the study was the majority of the students performed very well through self learning strategy hence developed SLS was found to be effective.

Diversities of the results of the reviewed researches indicate a need for further investigation in the area of computer delivered instruction. This led the present researcher to undertake the study. All of these studies cover a wide variety of of variables i. e. psychological variables, biographical variables and situational variables. There were many researches of CAI with different subjects such as – Mathematics, Biology, Music, etc. But no study of CAI is conducted on Environmental education and fewer researches have been done for higher education especially for prospective teachers.

Methodology

The present study aimed at ascertaining the effectiveness of computer assisted instruction by comparing it with the traditional method of instruction

in the subject of Environmental Education for B.Ed. class. This study was conducted in two phase:

1. Development of educational software for computer assisted instruction
2. Experimentation with CAI to ascertain the effectiveness of CAI in terms of student achievement.

Development of CAI Software

As no CAI program covering the topics of B.Ed. level environmental education was available, CAI program to be used in the experiment was developed by the researcher. It was decided to develop the CAI program in Hindi. Tutorial form of presentation was adopted in CAI software.

Procedure for The Development of CAI

Researcher has developed Computer Assisted Instructional Package to teach two units of Environmental Education, utilizing computer language package 'HTML' Presentation Application tool. Detailed description and steps regarding the development of the package is as under.

Selection of the Subject and Unit

First of all selection of teaching unit should be done. For this, the unit under selection should carry higher dynamic matter was selected in the manner that animation effect could be implied on it. The content was carefully selected and arranged, according to the level and need of the B.Ed. student's syllabus. The concept of Environmental Education, its objectives and importance and the concept of pollution its different kinds, different Environmental hazards, green house effect, acid rain and ozone layer depletion, its causes and effects were the main parts. Definition, explanation as well as examples were also formed.

Determination of Instructional Objectives

The researcher determined the following instructional objectives after deciding the content and the unit.

1. To make the students aware of the concept of Environmental Education.
2. To enable the students to understand the objectives and importance of Environmental Education.
3. To enable the students to recall or recognize the concept of pollution.
4. To enable the students to identify the different kinds of pollution.
5. To clarify the ways to control different types of pollution.

Construction of the Story Board

The researcher prepared the storyboard on the basis of the instructional objectives. At the time of analyzing and planning of the content, its style of presentation should be decided. It could be in the form of pictures, graphics or a combination of both. Story board means planning and presenting the content in proper sequence of the principal points both verbal and non-verbal form.

Drafting of the Text and Development of The Graphics

On the basis of story board, the text was prepared. Computer language package HTML software was basically used to prepare the text as well as presentation. However, Microsoft Word software was extensively used for making the drawings and diagrams and then those were incorporated into the HTML presentation. To make the programme more attractive and effective for the students, graphics, photographs etc were collected from internet.

Development of the HTML Web Page

The researcher prepared the HTML web page presentation on the base of the flow chart, story board, content matter and various graphics the researcher developed the slide show.

1. A Slide with multiple choice questions was formed after every content slide. A conscious attempt was made while constructing multiple choice items to enable the students assesses their knowledge and comprehension of the text. Such items were also included which invited the students to apply their knowledge and comprehension.
2. For every wrong answer a window was also formed for remedial instruction to the learner. All Questions should be correct to get next slide.
3. After that, the presentation was edited and formatted in order to make it more effective.
4. Finally all the slides were ordered sequentially and numbered as well.

Expert Opinion and Try Out

After the package was developed, the filtration was done in two ways.

Experts' Opinions

The prepared package was shown to technical as well as subject experts. Their suggestions were sought regarding the appropriateness of the slide format, fonts, objects, colour background design, animation, slide transition and graphics

Tryout

The whole package was presented to a small group of students and their reactions and responses were noted. Thus the views of both the experts and the users were kept in mind and due weightage was given to them in finalizing the package.

The final version of CAI package has 21 Slides and 84 Multiple Choice questions. A CD of finalized CAI package is enclosed.

Experimentation with CAI

For different types of research problems different research methods are used. In fact the choice of the method depends upon the problem selected for the study. Keeping in view the nature of the problem, the appropriate method has gotten to be selected and justification needs to be given for the choice of the research method in the research design. The present study was quasi-experimental in nature. It did not stand the demands and pre requisites of a rigorously controlled strict experimental investigation.

Research Design

This study was a Quasi-Experimental type, of the pre test, post test control group design.

Population

All B.Ed. students (Prospective Teachers) of B. R. Ambedakar University, Agra, who were studying

Environmental Education as a subject paper was constituted the population of the research.

Sample

Five colleges were selected purposively. Random sampling technique was used to select B.Ed. students and they were randomly assigned into experimental group, received treatment through CAI and Control group which was a traditionally classroom taught group.

The sample for experimental group is made up of 150 students (75 males, 75 females) in which there are 75 science students and 75 art students. The sample for control group is also made up of 150 students (75 males, 75 females) in which there are 75 science students and 75 art students.

Sampling Process

Out of 100 students of B.Ed. class studying environmental education in ACME College, Sikandara, Agra 32 pairs of equal intellectual capacity were selected and assigned them randomly to the experimental and the control group. Matched pair technique was done on the basis of intellectual capacity scores. TGI of Dr. S. K. Pal and Dr. K. S. Mishra were used to measure intellectual capacity scores.

Instruments / Tools

Keeping in view the nature of the problem following tools were selected for this study;

1. Test of General Intelligence
2. Achievement Test

Test of General Intelligence

This inventory has been constructed and standardized by Dr. S. K. Pal and Dr. K. S. Mishra in 2005. There are six subtests in TGI and ten items were constructed in each subtest. Time limit for every test was 4 minutes.

Achievement Test

The achievement of the students in the area of experimentation was measured by conducting an achievement test. Achievement Test to be used as pre test and post test was developed and validated by the researcher. Test was comprised of 50 multiple choice items. This test was based on the text material included in the computer assisted instruction program.

Procedure of the Experiment

The experiment was conducted in three phases:

1. Pre-testing
2. Treatment
3. Post-testing

Pre-Testing

To compare CAI with traditional method of instruction on student's achievement in environmental education, an experiment was conducted in 5 colleges of DBRA University Agra. The investigator constructed an achievement test which would be used as pre-test and post-test. Administration of this achievement test to the experimental group and control group helped the investigator to study the initial level of achievement of the pupils in environmental education.

Experimental Treatment

The control group was taught through conventional method of teaching i.e. they were taught using conventional classroom format. The classroom contained a chalkboard and teaching aids which were used for the instruction.

Experimental group students received treatment in the form of computer assisted instruction in the computer lab of the college. Both the groups were taught by the same teacher in each college and thus the teacher factor variable was somewhat satisfactorily controlled.

There was no chance of mixing of the students of the control group with students of the experimental group. The treatment for both the group lasted for four weeks.

Post Testing

After completion of both the treatments, achievement test was administered again to find the post achievement scores of both the groups of each college. The scoring of answer sheet was done. Data was obtained on interval scale.

Analysis of Scores on Achievement Test

Research Hypothesis (H_1)

There is a significant difference between achievement of students taught by CAI and traditional methods.

Null Hypothesis (Ho_1)

There is no difference between achievement of students taught by CAI and traditional methods.

Table

Showing the Pre-test Score Analysis of Learning Achievement of Control Group And Experimental Group

S. No.	Group of students	No. of Student	Mean	S.D.	C-R Value
1.	Control Group	150	21.47	5.63	.58 [not significant]
2.	Experimental Group	150	21.13	4.47	

Table denotes the mean value of learning achievement of control group is 21.47 and that of experimental group is 21.33 and mean difference is .34 which is not significant at .01 level or .05 level.

It indicates that the performance of the pupils in the two groups during the pre test was almost the same.

Table 4.2

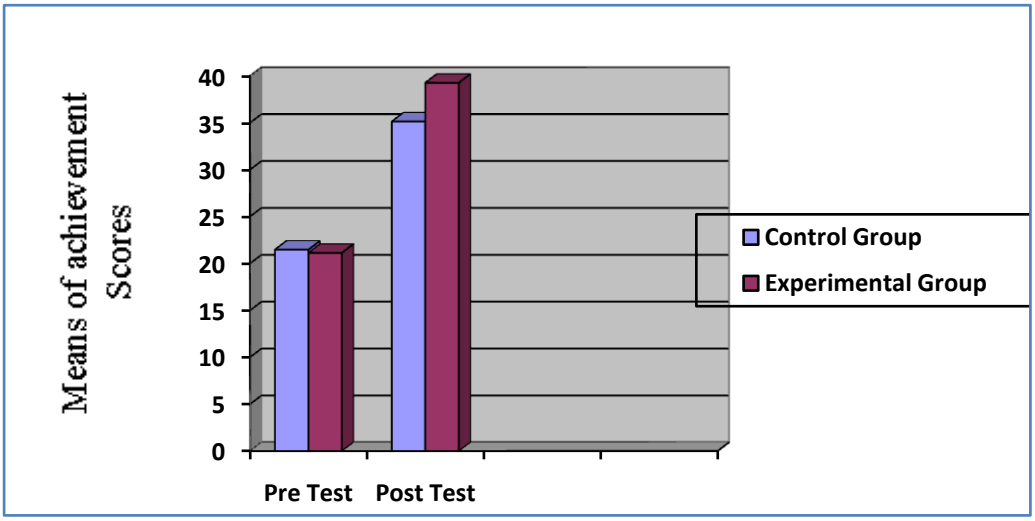
Showing the Post Test Score Analysis of Learning Achievement of Control Group And Experimental Group

S.No.	Group of students	No. of Student	Mean	S. D.	Corr. Coeff	Stand. Error	C-R Value
1.	Control group	150	35.14	4.85	.70	.33	12.8 [significant at .01 level]
2.	Experimental group	150	39.26	5.34			

Table denotes the mean value of learning achievement scores of control group on post test is 35.14 and that of experimental group is 39.26 and their mean difference is 4.12. Correlation Coefficient between the achievement scores of both the groups is .70 and Standard error of mean difference between both the equivalent groups matching by pairs is .33. Mean difference is significant at .01 level of significance as calculated t score was 12.8.

Thus the null hypothesis is rejected and research hypothesis that There is a significant difference between achievement of students taught by CAI and traditional methods, is accepted.

Diagram Showing Comparison between Mean Achievement Scores on Pre/Post Achievement Test of Control and Experimental Groups



Research Hypothesis (H_2)

There is a significant difference between achievement of students of science and art stream taught by CAI.

Null Hypothesis (H_{02})

There is not a significant difference between achievement of students of science and art stream taught by CAI.

Table

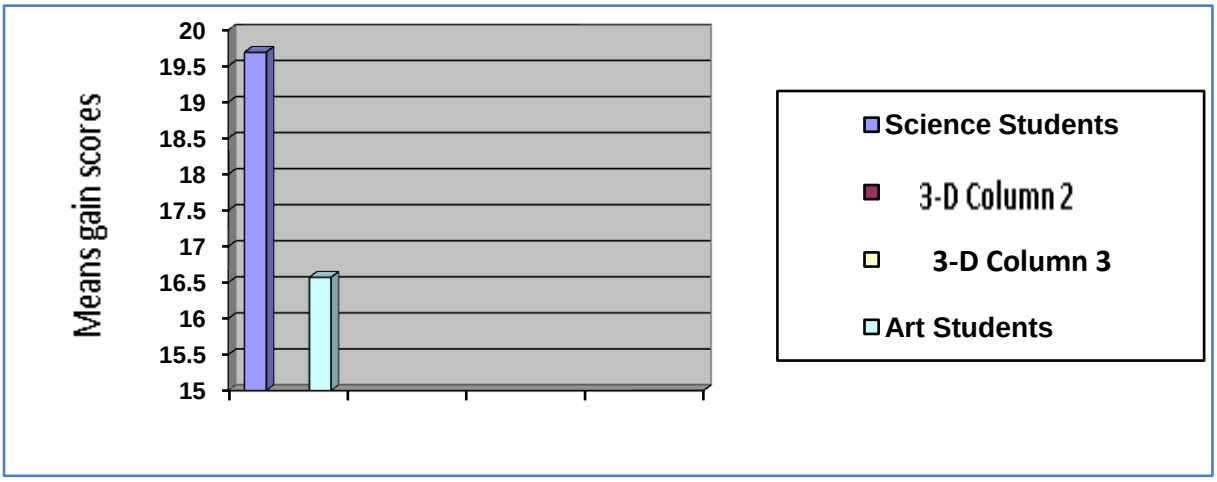
Showing the Gain Score Analysis of Learning Achievement Scores of Science Side And Art Side B.Ed. Students of Experimental Group

S. No.	Group of Students	No. of Student	Mean	S.D.	C-R Value
1.	Science students	75	19.69	1.8	9.17 [significant at .01 level]
2.	Art students	75	16.57	2.3	

Table denotes the mean value of gain scores of learning Achievement and S.D. of 75 science side B.Ed. students of experimental group is 19.69 and 1.8 and that of 75 art side B.Ed. students of experimental group is 16.57 and 2.3 respectively. Mean difference of both the groups of gain scores is 3.12 which is found significant at .01 level.

Thus Null Hypothesis (H_{02}) that there is not a significant difference between achievement of students of science and art stream taught by CAI, is rejected and research hypothesis (H_2) that there is a significant difference between achievement of students of science and art stream taught by CAI is, accepted.

Diagram showing Comparison between Mean Gain Score of Achievement Scores of Science & Art Students of Experimental Group



Findings

The conclusions are follows.

1. Results of the present study demonstrated that CAI is a better method of instruction for environmental education of B.Ed. class as compared to the traditional method of instruction.
2. It was found that the gain value of learning achievement during pre and post test of science side B.Ed. students of experimental group was higher than that of art stream B.Ed. students of experimental group and it was significant on 0.01 level of significance.

It is likely that the art side students are less exposed to computer at school/college. It implicates the need to improve the availability of the computer facilities in art stream colleges/schools also in order to achieve the objectives of the IT@ school program envisaged by the Ministry of Education, Government of India in a shorter span of time.

Conclusions

Based on the analysis and interpretation of the data and the discussion on the results, the following conclusions can be drawn:

1. CAI is a better method of instruction for Environmental Education of B.Ed. class as compared to the traditional method of instruction.
2. Achievement scores of science students on Environmental Education found higher than art students whether both the groups were taught with CAI.

Recommendations

1. Potential of computer assisted instruction should be utilized to enhance quality of education at college level.
2. Prices of hardware should be lowered.
3. Various incentives should be provided for teachers who increase their proficiency in computer studies and contribute to enhance computer assisted instruction.
4. Computer literacy training should be given to In service teachers through refresher courses. It is necessary to develop a culture for better utilization of computer in teaching learning process.

Educational Implications of the Study

Findings of the present study have a great implication for our educational system. Findings of the study point out that there is a need to expose CAI methods in classroom teaching. These types of efforts reduce the work load of teachers as well as boring task of learning on the part of students.

Thus the findings of the present investigation have implications for the students, teachers, teacher-educators, principals, policy planners, parents and well wishers of the society. Findings of the study may be a source of encouragement for the widespread use of CAI at various grade levels and in varied subject areas. This study may also be a source of inspiration for researchers to develop educational software and conduct experiments.

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Footnotes

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