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Try out of Computer Aided Instruction (CAI) programme for the unit of science and technology on secondary school students

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Abstract
This study investigated the effectiveness of a Computer Aided Instruction (CAI) programme on the academic achievement of Standard 9 students in Science and Technology. A CAI programme was developed for the unit Diversity in Organisms and compared with the conventional lecture method using an experimental research design. Sixty students from a Gujarati-medium secondary school in Anand Taluka were selected through purposive sampling and divided into an experimental group and a control group of 30 students each. A researcher-developed achievement test was administered as a post-test to assess learning outcomes. The findings revealed that students taught through the CAI programme achieved significantly higher scores than those taught through the lecture method, indicating the superior effectiveness of CAI. The study also found gender-based differences within the experimental group but no significant gender difference in the control group. The findings suggest that CAI enhances student achievement and promotes innovative, engaging, and technology-enabled science teaching.

Keywords: Academic achievement, CAI, experimental research, science

Introduction

Education is a very important aspect for human development. The aim of education is to develop the child in an all-round way. The process of education should be a bipolar process, in which both the teacher and the student remain equally active poles. That is, only if the teacher's teaching method and the student's tendency to study are actively used, all the objectives of education can be achieved and the classroom can become a temple of knowledge. Keeping in mind the changes that are coming day by day, it is very necessary to change it to eliminate the old mistakes and create an expected system and at the same time productive education according to the demands of tomorrow. New ideas and new methods are entering every field. So, education cannot remain deprived of these things. In today's modern era, the field of education includes various methods such as narration, group discussion, seminar, experiment, demonstration, field trip, project work, etc. Apart from this, computers have entered every field in today's era and have developed their power. It seems as if the whole world has been absorbed within itself. In such a situation, the teacher is still the only speaker in the classroom and teaches subjects like Maths, Gujarati, Science, English and Social Science in the same way only through the 'Chalk and Talk' method, destroying its effectiveness. When a student enters the class with new expectations, it seems that his thoughts, logic and expectations are constantly ignored. Due to this, the development of the child is stunted and this divine process of teaching and learning proves to be ineffective and one-sided. In such a time, if the process of education is to be made divine and effective, computers must be associated with education. Teaching through Computer Aided Instruction (CAI) program is a technique in which the teacher can prepare a Computer Aided Instruction (CAI) program of the content to be taught to the students through the computer and through it, the teaching work given in the class can be made more effective by teaching the students in the class. Even a teacher with general knowledge of computers can prepare a Computer Aided Instruction (CAI) program for the content issues to be taught to the students. In today's modern era where knowledge is constantly being wasted, it is imperative for a teacher to increase his professional preparedness by using such a new teaching method in the classroom. Thus, keeping the above problem in mind, the researcher has conducted a study at the secondary school level with this new teaching method with the aim of providing the teacher with an understanding of creating Computer Aided Instruction (CAI) programs and teaching the students through a new educational method.

Research Objectives

- To design a Computer Aided Instruction (CAI) program for a unit of Standard 9 Science and Technology.
- To examine the effect of Computer Aided Instruction (CAI) program and lecture method on academic achievement through post-test.
- To design an academic achievement test for a selected unit of Standard 9 Science and Technology.

Research Hypotheses

H_{o1}: There is no significant difference between the average scores obtained by the students of the experimental group and the control group in the post-test.

H_{o2}: There is no significant difference between the average scores obtained by the boys and girls of the experimental group in the post-test.

H_{o3}: There is no significant difference between the average scores obtained by the boys and girls of the control group in the post-test.

Research area

Educational Technology and Science

Variables included in the research

Table 1: Table of Variables

No	Variables	Variable Types
1	C.A.I. Method Lecture Method	Independent Variable
2	Academic Achievement Researcher-designed assessment test	Dependent Variable
3	Boys Girls	Control Variable
4	Standard, Medium, Secondary School, Subject	Control Variable

Limitations of the research

1. The present research is limited to the students studying in standard-9 of Gujarati medium school of Anand taluka during the year 2025-26.
2. The present research is limited to the CAI program created considering any one unit of science and technology subject.
3. The CAI program created for the present research study contains only descriptive and pictorial information.

Importance of the study

1. Teaching with the help of CAI program can bring innovation in the daily teaching process.
2. Teaching through CAI program can make the learning-teaching process active and lively.
3. Teachers will be able to get information about how to do teaching work through computers. And in the future, they will get a new insight into teaching students by using this type of technology in their teaching work.
4. Teachers of a wide range of subjects will be able to get information about creating CAI programs to teach difficult topics of the subject in a simple and active way on computers.

Research Population and Sample

The Population of the present research includes students studying in Standard-9 in Gujarati medium secondary schools of Anand taluka during the year 2025-26. In the present study, the unit 'Diversity in Organisms' of Science and Technology subject of Standard-9 was selected. With regard to the selected unit, Anand Secondary School was selected through purposive sampling for trial of C.A.I. program and lecture method. In which a total of 60 students were taken as a sample, 30 students in the experimental group and 30 in the control group. The equivalent group of students has been formed keeping in mind the marks of the annual examination of Standard-8.

Testing of Hypotheses

Table 2: Table of Hypothesis testing

H_0	Hypothesis	SED	t-value	df	H_0 is Rejected or Accepted
Ho_1	There is no significant difference between the average scores obtained in the post-test by the students of the experimental group and the control group.	1.18	4.72	29	Rejected
Ho_2	There will be no significant difference between the average scores obtained in the test by boys and girls in the experimental group.	1.25	2.40	29	Accepted
Ho_3	There will be no significant difference between the average scores obtained in the test by boys and girls in the control group.	1.87	0.33	29	Rejected

Ho1: There is no significant difference between the average scores obtained in the post-test by the students of the experimental group and the control group.: Here the hypothesis is rejected. Because there is a significant difference between the scores obtained by the total students of the experimental group and the control group. That is, the CAI program and its teaching have been found to be effective compared to the traditional teaching method based on the diversity unit in living organisms.

Ho2: There will be no significant difference between the average scores obtained by the boys and girls of the experimental group in the answer test: Here the hypothesis is rejected because there is a significant difference between the scores obtained by boys and girls in the experimental group. That is, there is a difference in effectiveness in the experimental group from the point of view of gender.

Ho3: There will be no significant difference between the average scores obtained in the test by boys and girls in the control group: Here the hypothesis is accepted. That is, there is no difference between the scores of boys and girls in the control group in the test.

Research findings

- In the answer test designed on the unit of diversity in living organisms in the science subject of standard 9 of secondary school, the total scores of the students of the experimental group were found to be higher than the total scores of the students of the control group. Here the CAI program was found to be effective.
- In the answer test designed on the unit of diversity in living organisms in the science subject of standard 9 of secondary school, the scores of the boys of the experimental group were found to be higher than the scores of the girls.
- In the answer test designed on the unit of diversity in living organisms in the science subject of standard 9 of secondary school, there is no difference between the scores of the boys of the control group and the scores of the girls.

Educational Achievements

- Research has shown that teaching through CAI programs is more effective than teaching through the Vyapyan method. Therefore, teaching through CAI programs can increase the academic achievement of students.
- Teaching through CAI programs can bring innovation in teaching in the classroom and content issues can be taught more effectively.
- Teaching through CAI programs saves teachers' time, energy and effort. Which the teacher can use in other matters.

- The present research inspires future researchers and teachers to design CAI programs according to their subject.
- Learning through CAI programs increases students' confidence in learning and motivates students to teach.

Suggestions for future research

- In the present research, the CAI program has been prepared in Gujarati language. In addition, such CAI programs can be prepared in Hindi and English languages and research can be beneficial.
- The present research has been prepared for the subject of Science and Technology. Such CAI programs can be prepared in other subjects such as Gujarati, Social Science, English etc. and experimental research can be beneficial.
- Research can be beneficial by including other variables such as gender, area, type of school, achievement of students etc. other than the present research.
- Research can also be conducted by comparing the CAI program with other methods such as group discussion, seminar method, extended learning etc. other than the lecture method.
- Research can be conducted on the opinions and attitudes of parents, teachers, students, principals regarding the CAI method.

Conclusion

The present research has examined the effectiveness of lecture method and CAI program on the academic achievement of students. This research concludes that the teaching work done through CAI program is more effective than the teaching work done through lecture method. Through CAI program, students can be attracted towards science and technology subjects and the present research will be useful in cultivating interest in science and technology subjects among teachers and students. The findings indicate that integrating CAI into classroom teaching creates a more interactive, engaging, and learner-centered environment, leading to improved understanding of scientific concepts. The study also demonstrates that technology-supported instruction can promote innovation in teaching practices while increasing students' motivation and participation. Therefore, the adoption of CAI programme can significantly improve the quality of science education in secondary schools. The findings encourage teachers, curriculum developers, and educational institutions to integrate digital instructional strategies into regular classroom practices. Future research may extend this work by developing CAI programme for other subjects, educational levels, and languages, and by examining additional variables such as learning styles, attitudes, and long-term academic performance.

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