

EFFECT OF COMPUTER-ASSISTED INSTRUCTION ON ACADEMIC ACHIEVEMENT OF ELEVENTH GRADE STUDENTS

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Education is considered as an effective tool that prepares us for the future by controlling access to opportunities. Advancement and progress of a nation depend upon the quality of education that will empower those who will become tomorrow's work force. Therefore, to learn to adapt to the new technologies coming to us at increasing speeds and not merely teaching the students to acquire the skills needed for today becomes one of the primary goals of education (Hurd, 1993).

The teacher's dominated teaching, rote learning by the pupils and the information based examination system continue to dominate the scene in our country despite the efforts to bring about the reforms in education by the government from time to time. Many of the ills of education are the result of this situation prevailing in our schools today. The dissatisfaction that the child experiences in school ultimately results in maladjustment, failure and a large dropout rate. It is not an exaggeration to say that 21st century is the century of computer education and technological development. Teaching-learning through computers can contribute significantly in diluting these problems by enabling students to overcome their natural limitations in areas such as memory, calculation and problem solving.

Therefore, understanding the effects of CAI on learning has become extremely important for its future implementation in schools and we need to study afresh the utility of CAI in the field of teaching-learning.

The present study is an attempt to answer the following research question:

Is there a significant difference in achievements of a group of students taught by CAI and a group of students taught by the traditional lecture-demonstration method in terms of realizing knowledge, comprehension and application levels of instructional objectives of a specified content in biology at 10+2 level?

OBJECTIVE OF THE STUDY: Keeping in view the need for the study, the following objective was framed for the study.

- To find out the effect of CAI in biology on students' achievement at 10+2 level.

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METHODOLOGY:

The main purpose of the study was to examine the effect of Computer-Assisted Instruction (CAI) on different levels of achievement. Three levels of achievement i.e. knowledge, comprehension and application were considered as an achievement level of the students. The design which was found to be most useful for the purpose of study was non-randomized two groups pretest-posttest design.

Sample: The sample of the study consisted of 74 male students studying in Central Hindu Boy's School in Varanasi City who were selected purposely to examine the effect of CAI. One of the two sections of Biology group of class XI of the same school constituted the experimental group consisting of 38 students and the other section of the same class constituted the control group with 36 students. The investigator taught both the groups so as to control teacher's variability. Mean age of the students was 16 years.

Tool Used: Biology Achievement Test (BAT) developed by the investigator (2004) was used as a tool for collection of data for the present study. The researcher established the reliability of the Biology Achievement Test by test-retest method and the alpha reliability coefficient was found to be 0.88 which is considerably high and satisfactory. Content validity of this test was also established by using a table of specifications to represent the learning objectives in the questions.

Treatment: The proposed treatment of teaching biology through Computer-Assisted Instruction (CAI) was given to the experimental group students from the period January 1, 2005 to February 28, 2005. The investigator taught both the groups so as to control teacher's variability. Both the groups were taught six periods of 40 minutes duration per week. Both the groups i.e. experimental and control were taught same units of Biology content. The control group was taught by the lecture cum discussion method in a regular classroom and the experimental group had their instructions in the computer laboratory on the topics of Cell Biology and Genetics with the help of software "Understand Biology: Molecules, Cells and Genes".

RESULT AND DISCUSSION: In order to compare the effect of two different treatments i.e., CAI and lecture cum discussion method of teaching on the sample of study, Analysis of Covariance (ANCOVA) was used. Results related to the effect of Computer-Assisted Instruction (CAI) on achievement in Biology of XI grade students have been given in the tables from 1 to 4.

Table 1 showing Mean Pre-test Post-test scores of Experimental and Control Groups, Adjusted Difference on post-test scores and ANCOVA in respect of Knowledge Level of Biology Achievement Test (BAT) N=74

S.No.	Groups	Pre-test	Post-test	Adjusted Post-test means	Adjusted Difference on Post-test means	Source of Variation	df	SSy.x	MSSy.x	Fy.x	p
1	Experimental	13.27	13.88	14.32	0.62	Among	1	6.87	6.87	0.71	N S
2	Control	15.05	15.36	14.95		Within	71	68.90	9.59		

Observation of the table 1 shows that when pre-test differences of control and experimental groups in respect of knowledge level of achievement in Biology have been tested, the obtained value of Fy.x (0.71) for the difference in the post-test scores was found to be not significant at .05 level of confidence with dfs=1,71. It shows that experimental and control groups do not differ from each other with respect to knowledge level of achievement after teaching eight weeks to the students of the experimental group with the help of Computer-Assisted Instruction. Hence, it is inferred that there is no significant contribution of CAI in the improvement of knowledge level achievement in biology among XI grade students.

Table 2 showing Mean Pre-test Post-test scores of Experimental and Control Groups, Adjusted Difference on posttest scores and ANCOVA in respect of Comprehension Level of Biology Achievement Test (BAT) N=74

Comprehension Level	S.No.	Groups	Pre-test	Post-test	Adjusted Post-test means	Adjusted Difference on Post-test means	Source of Variation	df	SSy.x	MSSy.x	Fy.x	p
	1	Experimental	6.27	11.44	11.80	2.55	Among	1	117.72	117.72	14.58	≤ 0.01
	2	Control	7.34	9.58	9.24		Within	71	573.13	8.07		

Table 2 reveals that when pre-test differences of experimental and control groups in respect of comprehension level of Biology Achievement Test (BAT) have been adjusted, the obtained value of $F_{y.x}$ (14.58) for the difference in the post-test scores was found to be significant at .01 level of confidence with $dfs=1,71$.

The adjusted difference in scores on posttest for the two groups is 2.55, favouring the experimental group. Hence, it is inferred that there is a significant contribution of CAI towards the improvement of comprehension level of achievement among XI grade biology students.

Table 3 showing Mean Pre-test Post-test scores of Experimental and Control Groups, Adjusted Difference on posttest scores and ANCOVA in respect of Application Level of Biology Achievement Test (BAT) $N=74$

Application Level	S.No.	Groups	Pre-test	Post-test	Adjusted Post-test means	Adjusted Difference on Post-test means	Source of Variation	df	SSy.x	MSSy.x	Fy.x	p
	1	Experimental	1.00	3.08	3.14	1.27	Among	1	29.98	29.98	9.87	≤ 0.05
	2	Control	1.21	1.92	1.86		Within	71	215.66	3.03		

It can be observed from the table 3 that when pre-test differences of experimental and control groups in respect of application level of Biology Achievement Test (BAT) have been adjusted, the obtained value of $F_{y.x}$ (9.87) for the difference in the post-test scores is significant at .05 level with $df=1,71$.

The adjusted difference in scores on post-test for the two groups is 1.27, favouring the experimental group. It indicates that experimental group gained significantly more than their counterparts. It further indicates that Computer-Assisted Instruction (CAI) as a method of instruction was found to be a better teaching-learning strategy to develop application level of knowledge among experimental group children.

Table 4 showing Mean Pre-test Post-test scores of Experimental and Control Groups. Adjusted Difference on posttest scores and ANCOVA in respect of Biology Achievement Test (BAT) in general. N=74

TEST	S.No.	Groups	Pre-test	Post-test	Adjusted Post-test means	Adjusted Difference on Post-test means	Source of Variation	df	SSy.x	MSSy.x	Fy.x	p
BIOLOGY ACHIEVEMENT (BAT)	1	Experimental	20.55	28.41	29.47	3.61	Among	1	230.91	230.91	5.56	< 0.05
	2	Control	23.60	26.86	25.86		Within	71	2945.10	41.48		

As can be seen from the above table 4 that when pretest difference between experimental and control groups were adjusted into posttest scores, the value of ANCOVA Fy.x (5.56) was found to be significant at .05 level of confidence with dfs=1,71. The adjusted difference in post-test scores for the experimental and control groups was found to be 3.61 favouring the experimental group. Hence, it is inferred that Computer-Assisted Instruction (CAI) as a method of instruction improves significantly the total achievement in Biology of XI grade students, as evident by their post-test scores on the Biology Achievement Test (BAT).

The effect of Computer-Assisted Instruction (CAI) on knowledge level of achievement in Biology among XI grade students was not found to be significant while the effect of Computer-Assisted Instruction (CAI) on comprehension and application levels and total achievement in Biology among XI grade students was found to be significant.

These findings of the present study demand that teachers must try to improve the quality of their teaching by incorporating CAI in their teaching strategies so that higher order thinking skills can be developed among children. Therefore, the findings of this study will encourage the teachers to adopt CAI as an appropriate strategy for instruction in their classrooms. The results of this study will also induce the educational administrators and supervisors to promote the usage of CAI in the classrooms. The present study also stresses that the teaching-learning process should include specific activities that will enable students to progress from their misconceptions toward clarity of thoughts and more scientifically accepted notions. In this way this study provides a

base for those interested in the educational development to plan and conduct further researches. The findings of this study direct the teachers to prepare Computer-Assisted Instruction program for students in order to develop their higher mental abilities.

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