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A Comparative Study of Computer Assisted Instruction (CAI) and Traditional Strategies to Improve Student Learning of College Students in Jaipur Rajasthan

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Abstract

This study compared the effectiveness of computer-assisted instruction package and conventional strategy on the academic performance of college level students in Jaipur. A pre-test and post-test control group was used for the study. Fifty (50) students were randomly selected (25 males and 25 females) from two college levels students that participated in the study. The students were randomly divided into experimental and control groups respectively. Subjects in the experimental group received instruction using the Computer Assisted Instruction (CAI) software package on the Computer Assisted biology Achievement Test (CAEAT) designed to measure specific learning outcomes related to the study concept while the control group was taught using the conventional method. Both the instrument and the treatment were content and face validated. A 20 items computer Assisted biology achievement test (CAEAT) was administered to the students at pre test and post test.

Two hypotheses were postulated and tested at a significance level of 0.05. The analysis yielded the following results. (1) There was a significant difference between the achievement scores of the students who were taught vocabulary and structure using the CAI software and those who were taught using the conventional method ($t = 5.04$, $df = 19$, $p < 0.05$). (2) There was no significant difference between the mean achievement scores of students who learned vocabulary and structure using CAI software and those who did not ($t = 0.28$, $df = 19$, $P > 0.05$). Based on the results, it is recommended that teachers are encouraged to use CAI software to teach subject-related concepts as it improves learning.

Key words: CAI (Computer Assisted Instruction), CAEAT (Computer Assisted biology Achievement Test), Traditional etc.

Introduction

The purpose of this quantitative study was to determine if there were significant differences in academic success between face-to-face and online biology courses, broken down by gender, major, and age, and as measured by lecture grades, laboratory grades, and final grades. The data used in the analysis included data from 170 face-to-face and 127 online sections of biology courses from the fall and spring semesters from fall 2008 to Spring 2011.

According to Abdullahi (1982), the causes of poor performance are poor quality of teachers, overcrowding of classrooms and lack of proper instructional materials among others. Ukwuru (2011) is of the view that the main causes of students' poor performance in SSCE are due to many factors ranging from learner attitude, teacher attitude, teaching methods and materials to mathematical deficiencies. Poor performance in English

has become a major concern for the government and the sole donor 4,444 parents, teachers and researchers. Several attempts have been made to provide solutions to the existing problems. These experiments have focused more on the teaching methods used. Inci, John, Nilgun, and Ozge (2006) and Mudasiru and Adedeji (2010) both found that the use of computers in the classroom promotes science success. Although the integration of Information and Communication Technology (ICT) into the Nigerian education system is poor, the adoption of CAI as a teaching strategy is the most prominent way of using ICT globally. CAI has been widely accepted for its use because it promises to engage and actively engage learners (Ukwuru 2011).

CAI uses computers to supplement classroom instruction; it does not completely replace the classroom teacher. A computer is an electronic device or machine

that receives, processes, and outputs data with speed and accuracy. CAI uses a combination of text, graphics, sound, and video in the learning process. CAI systems are designed to automate certain forms of drill and practice instruction and teach basic skills (Timothy, 2007). There are many types of computer-based educational software in science education, such as exercises, instructional software, educational games, simulations, problem-solving software, discovery environments, etc.

According to *Ekiregwo* (2001), the advantages of CAI are:

1. Automated means that give all for instruction and response, feedback mechanisms, evaluation and assessment facilities. This means that whatever is coded or programmed is represented in a pre-existing and attractive intermediate phase that is aesthetically pleasing.
2. It makes learning stimulating, interesting and challenging.
3. This allows teachers to identify the academic strengths and weaknesses of learners.
4. It makes student learning flexible so students can work at their own pace.
5. CAI allows students to work wherever there is a computer, with or without an Internet connection.

Review of Literature

Cotton (1997), in a review of empirical studies, concluded, among other things, that using CAI as a supplement to traditional instruction produces better performance than using traditional instruction alone, and that studies of the comparative effectiveness of traditional instruction alone are not clear, and it is not clear that computer-assisted instruction (CAI and other computer applications) produces better performance than traditional instruction alone. Furthermore, students seem to learn content faster with CAI than with traditional instruction alone, retain content learned with CAI better than with traditional instruction alone, and CAI activities appear to be at least as cost-effective as, and in some cases more cost-effective than, other instructional methods such as teacher-directed instruction and individualized tutoring. Furthermore, computer-assisted instruction has been found to improve student achievement compared to traditional instructional methods in counselor education (*Karper, Robinson, & Casado-Kehoe*, 2005). However, *Mill* (1998) found that computer-based instruction was as effective as classroom instruction for fact-based learning but less effective for subjects requiring critical thinking and mathematical problem solving. Furthermore, *Akour* (2006) stated that overall learners require more time to use computer-based instruction than traditional classroom instruction. The performance of students who were taught using traditional teaching methods in combination with computers was significantly better than that of students who were taught using traditional teaching methods at the university.

Statement of the Problem

Different approaches have been used to convey the curriculum contents to students. Research has shown that the use of CAI improves students' performance,

speeds up learning, improves memory and promotes the development of better attitudes. The main objective of the education system is to provide education that meets the demands of the society and the times. To achieve this goal, the current education system needs to be made more effective and ICT-accepting. According to *Aggarwal* (2002), the overall objective of education in a country is to develop and increase the potential of its human resources and gradually transform it into a knowledge society. Every country wants to produce students who will eventually become knowledge workers and global citizens in their economy. CAI (Computer Assisted Instruction) is a very important tool in the field of education. It's advantage of providing exercises, tutorials and game simulations makes learning and teaching more attractive and interesting for students. CAI is more beneficial for both students and teachers as it allows teachers to pay more attention to individual students. Observations have shown that traditional teaching methods do not provide a variety of activities, attention span and pace of teaching that is appropriate to the students' abilities. Therefore, it is important to compare CAI with traditional teaching methods to see if CAI improves students' performance more in learning vocabulary and structures.

Aims and Objectives of the Study

This works is geared toward evaluating CAI and traditional approach of coaching in improving biology college students' overall performance in biology response charge in college level students in Jaipur Rajasthan. The particular targets have been to:

1. To expand pc software on "lexis and structure " unit with inside the difficulty of science/ biology language for college students.
2. To take a look at the relative effectiveness of coaching science / biology in phrases of strategies i.e. pc assisted education and traditional approach for the scholars of conventional institution and Experimental institution.
3. To take a look at the relative effectiveness of pc software as regards to gender of the college students in Experimental institution.

Research Hypothesis

The following speculation changed into utilized in present work

1. There may be no considerable distinction among the suggest pre-test ratings of boys and ladies the scholars of Traditional institution and experimental institution.
2. There may be no considerable distinction among the post-take a look at ratings of boys and ladies the scholars of Traditional institution and experimental institution.

Materials and Methods

Research Design

Quasi-experimental design was used for this study. Specifically, a non-randomized control group, pre-test and post-test design was adopted for the study.

Sample

The subjects of this study were third year college level biology students in Jaipur, Rajasthan. However, the

nature of the study required a purposive selection of the research sample, since a study on CAI must necessarily be conducted in colleges where students have access to computers and where students are computer literate. For this reason, Shaheed Bhagat Singh Women’s B.Ed College and Sneh T.T. College, Jaipur were specifically selected for the study. These two colleges were selected as the experimental group. A third college, Shaheed Bhagat Singh T.T. College, was also selected as the control group, since college is considered to be almost equivalent in standards to the colleges used for the experimental group. The experimental group sample consisted of 25 students, these were 13 males and 12 females and the control group consisted of 13 males and 12 females.

Research Instrument

The primary data generating instrument for this study was the CAEAT, which consists of 25 multiple choice items designed to measure specific learning outcomes related to the concepts of the study. The instrument was tested for content validity and underwent pilot studies and reliability testing (0.86) before being used as a research instrument.

The questions were followed by five lettered answer choices (A-E) of which only one was correct. Students were instructed to select only one answer choice for each question. All the answer choices were plausible responses to the question. The computer-assisted teaching package was developed by the researcher using teaching notes prepared in the traditional way (talk and chalk method). The storyboards were designed to suit the selected topics (vocabulary and structure) and developed by the researcher along with a video editing assistant using Adobe Premiere 1.5 software version. The topics covered were selected based on the college level curriculum. However, several trials were conducted before the packet was successful. It was then tested in some selected senior high schools in Jaipur. These schools used to test the packet are part of the population of the study but are not part of the schools selected for the research study.

Validity and Reliability of Research Instrument

The CAEAT package was pilot tested and found to be objective and content and structure valid by two educational experts who are lecturers at the Department of Curriculum and Instruction, Suresh Gyan Vihar University, Jaipur. An item analysis of the instrument was also conducted to determine the indicators of learning ability and discrimination. The final items of the instrument were then selected and the reliability coefficient was calculated using split-half method and Richard-Kuderson formula 21CKR-2. The value determined as the reliability coefficient was 0.86 and was considered to be completely appropriate for this study.

Method of Data Collection

The two groups (experimental and control groups) were given the CAEAT test as a pre-test. Students in the experimental group experienced the CAI package in the form of lesson plans installed on a computer under the supervision of a teacher, while students in the control group experienced lesson plans with the same content as in the traditional teaching method. People in the experimental group.

Method of Data Analysis

The results of two complete classes with the number of students of 85 and 75, respectively, later randomly divided into students of the experimental group and students of the control group, were calculated and used to test the hypotheses. These data were analyzed using means, standard deviations and t-tests. The significance level adopted for the analysis was $P < 0.05$. This level of significance formed the basis for accepting or rejecting each of the 4,433 hypotheses.

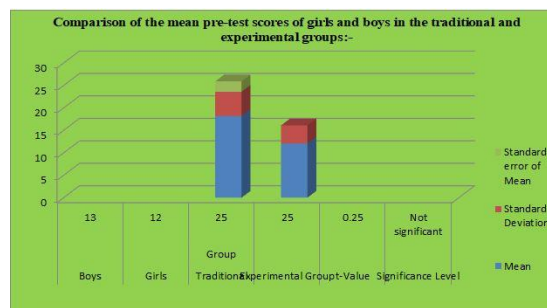
Result and Discussion

Three null hypotheses were formulated and tested to provide an answer to the research question. Analysis of the pre-test and post-test data collected using CAEAT was used to answer the research question using the two null hypotheses as a guide. Means, standard deviations and t-tests were used to analyze the pre-test and post-test data. The significance level assumed for the analysis was 0.05. This level of significance formed the basis for rejecting or not rejecting the null hypothesis. The analyzed data and results are summarized below:

Table 1 shows the performance of the experimental and control groups in the pre-test. Both the experimental and control groups took the pre-test. The test was a 20-item multiple-choice test, CAEAT. Subjects were given 50 minutes to complete the test. This test was administered to determine the academic equivalence of the experimental and control groups. The mean values of the experimental and control group students in the pretest were calculated and a t-test was calculated for the two means. Table 1 shows the mean, standard deviation, and the results of the t-test analysis when comparing the mean pretest values of the traditional and experimental groups.

Table 1. Comparison of the mean pre-test scores of girls and boys in the traditional and experimental groups

Statistics	Boys	Girls	Traditional Group	Experimental Group	t-Value	Significance Level
Number of students	13	12	25	25	0.25	Not significant
Mean			18.1546	12.0625		
Standard Deviation			5.4273	4.0236		
Standard error of Mean			2.2936			

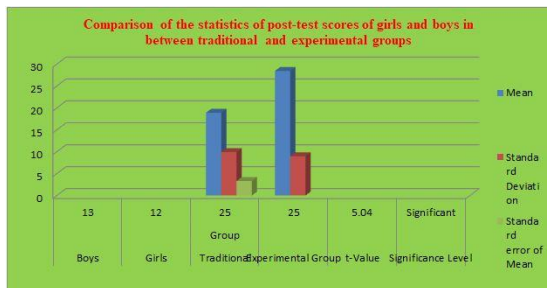


The results in Table 1 showed no significant difference between the mean pretest scores of the experimental and traditional groups at a significance level of 0.05 ($t = 0.25$, $df = 19$, $p > 0.05$). Therefore, the null hypothesis that there was no significant difference between the pretest scores of both groups was accepted. In other words, statistically there is no significant difference

between the pre-test means of girls and boys in the traditional and experimental groups.

Table 2. Comparison of the statistics of post-test scores of girls and boys in between traditional and experimental groups

Statistics	Boys	Girls	Traditional Group	Experimental Group	t-Value	Significance Level
Number students of	13	12	25	25	5.04	Significant
Mean			18.8921	28.4062		
Standard Deviation			9.8852	8.9293		
Standard error of Mean			3.3256			



The results in Table 2 show that the t-value obtained is 5.04, which is significant at 0.05 level. Therefore, the null hypothesis that there is no significant difference between the post-test of both groups is rejected. In other words, statistically, there is a significant difference between the post-test means of girls and boys in the traditional and experimental groups, which is due to the computer-assisted teaching method of the groups.

Result

1. There was no significant difference between the pre-test scores of the girls and boys in the traditional group and the experimental group.
2. There was a significant difference between the post-test results of the girls and boys in the traditional group and the experimental group.

Conclusion

The results of this study showed that computer-assisted instruction has a more positive impact on students' performance in terms of vocabulary and organization than traditional instruction. The reason for this could be that computer programs allow information to be transmitted more effectively since information can be transmitted through different media, i.e. through sound, text, animation, video, and images. In other words, it can be said that the use of computers in education is effective. The results also showed that there was no gender difference in performance between students exposed to CAI and traditional chemical reaction rate strategies.

Recommendations

The following recommendations were derived from the results of this study:

1. Curriculum designers should promote the use of computers in teaching/learning in the education system.

2. Computer education should be compulsory for teachers and students at all levels of the education system.
3. Teachers should be trained in the creation and use of computer-based instructional media so that they can use modern educational technologies appropriately.
4. Colleges must be equipped with computers, Internet access and other necessary materials for teaching and learning.

References

1. Aggarwal, J.C. *Educational Research- An Introduction*. New Delhi: Arya Book Depot; 2002
2. Kareem, L.O. *Effects of audio-graphic self-instructional packages on senior secondary school students' performance in biology in Ilorin, Nigeria*. Unpublished Ph.D. thesis of the University of Ilorin, Ilorin; 2003
3. WAEC. Chief examiner's report May/June West African Senior School Certificate Examination, Lagos: WAEC pub.; 2003
4. Akour, MAA. The effects of computer-assisted instruction on Jordanian college students' achievements in an introductory computer science course. *Electronic Journal for the Integration of Technology in Education*. 2006;5, 17 - 24.
5. Millis, B.J. & Cottell, Jr., P.G. *Cooperative learning for higher education faculty*. Phoenix, AZ: American Council on Education, Oryx Press; 2001.
6. Karper, C.; Robinson, E. H. & Casado-Kehoe, M. Computer assisted instruction and academic achievement in counselor education. *Journal of Technology in Counseling*. 2005; 4 (1).
7. Cotton, K. (1997). Computer-assisted instruction. North West Regional Educational Laboratory. Retrieved April 1, 2017,
8. Ekiregwo, P.O. Using computer assisted instruction in science class- creation of CDs and Diskettes with CAIs. A workshop paper presented at the "train-the-trainers " workshop by UNESCO/NCCE. 2001.
9. Mudasiru, O.Y. & Adedeji, O.A. Effect of Computer Assisted Instruction (CAI) on secondary school student performance in Biology IOJET: The Turkish Online Journal of Educational Technology. 2010; 9(1), 62-69.
10. Ukwuru, JO. Repositioning Chemistry Education for National Development. *Oju Journal of Science Technology and Mathematics Education*. 2011; 1(2), 147-152.
11. Morse, R. H.(1991). Computer use in Secondary Education. ERIC Clearing House on Information Resources. ED331489.
12. Timothy T. (2007). Assessing the computer attitudes of students: An Asian perspective. *Computer in Human Behaviour*. Accessed April 4, 2017 at