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Comparative Study of Computer Assisted Instruction (CAI) and Conventional Strategy in Enhancing Students' Academic Performance in Senior Secondary Schools in Oju Local Government Area



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ABSTRACT

This study compared the effectiveness of computer assisted instructional package and conventional strategy on the academic performance of students in senior secondary schools in Oju local government area of Benue state. The pretest, posttest control group design was used for the study. Forty-four (44) students were randomly selected (22 males and 22 females) from three secondary schools that took part in the study. The students were randomly assigned to the experimental and control groups respectively. The subjects in the experimental group were taught using Computer Assisted Instructional package (CAI) on Computer Assisted English Achievement test (CAEAT) designed to measure specific learning outcomes related to the concept of the study while the control group was taught using conventional method. Both the instrument and the treatment were subjected to content and face validation. A 20-item computer Assisted English Achievement test (CAEAT) was administered to the students as pretest and posttest. Three hypotheses were postulated and tested at 0.05 level of significance. From the analysis, the following findings were reached. (1) There was a significant difference between the achievement scores of students taught lexis and structure with CAI package and those taught using conventional method ($t = 4.24$, $df = 19$, $p < 0.05$). (2) There was no significant difference between the mean achievement scores of male and female students taught lexis and structure with CAI package ($t = 0.31$, $df = 19$, $P > 0.05$). Based on the results, it is recommended that teachers should be encouraged to use CAI package for teaching related concepts in the subject since it enhances learning.

INTRODUCTION

English as the mother of all subjects and a medium through which communication is made occupies a unique position in the school curriculum. It is central to all courses such as law, literature, medicine, pharmacy, agriculture, nursing, biochemistry and so on. It is a well known fact that no students can succeed in studying these courses successfully without English language. These factors, among others, have drawn attention of researchers and curriculum planners towards English language as a subject in the school curriculum (Kareem, 2003). Students' performance at SSCE exams had been very poor especially in the area of lexis and structure. Candidates that offered English language performed poorly in the areas of understanding of the concepts of lexis and structure, essay writing, comprehension and summary as well as oral communication (WAEC, 2003).

According to Abdullahi (1982), poor performance is caused by the poor quality of teachers, overcrowded classrooms, and lack of suitable and instructional materials among others. Ukwuru (2011) opined that poor achievement of students in school at SSCE is largely attributed to a number of factors ranging from the learners' attitude, teachers attitude, and curriculum method of instruction and instructional materials, mathematical deficiency among others. Underachievement in English language is of great concern to the government and the parent who are the sole financier, teachers and researchers. Several attempts have been made to proffer solution to the existed problem. These attempts are focused more on methods of teaching adopted. Inci, John, Nilgun and Ozge (2006) and Mudasiru and Adedeji (2010) all found the use of the computer in teaching to facilitate achievement in sciences. Although integration of Information Communication Technology (ICT) into Educational system is poor in Nigeria, adoption of CAI as teaching strategy is one prominent way of using ICT worldwide. Since CAI holds the promise of carrying the learners along as well as making them active participants, it, therefore, renders its usage wide acceptance (Ukwuru 2011).

CAI involves the use of computers to supplement classroom instruction. It does not fully replace the teacher in a classroom environment. The computer is simply an electronic device or machine that accepts data, processes data and gives out output with great speed and accuracy. CAI uses a combination of texts, graphics, sound and videos in the learning process. CAI system is designed to automate certain forms of drill and practice instruction in delivering basic skills (Timothy, 2007). There are different types of computer-aided

instruction software in science education including drill and practice, tutorial software, instructional games, simulations, problem-solving software and discovery environment.

According to Ekiregwo (2001), the following are the benefits of CAI:

1. Automated abilities to give instructions and all for response, feedback mechanism, evaluation and assessment facilities. That is, all coded or programmed are presented in an existing and captivating interphase that is simply beauty to behold;
2. It makes learning exciting, interesting and challenging;
3. It enables the teachers to know the academic strength and deficit of learners;
4. It makes learning flexible for student so that it is possible to work at the individual owns speed; and
5. With CAI, students can work anywhere there is computer with or without an internet connection.

In a review of empirical studies, Cotton (1997) arrived, among others, that the use of CAI as a supplement to conventional instruction produces higher achievement than the use of conventional instruction alone, research is inconclusive regarding the comparative effectiveness of conventional instruction alone and CAI alone, and that computer-based education (CAI and other computer applications) produce higher achievement than conventional instruction alone. In addition, students learn instructional contents faster with CAI than with conventional instruction alone, they retain what they have learned better with CAI than with conventional instruction alone, and CAI activities appear to be at least as cost effective as and sometimes more cost-effective than other instructional methods, such as teacher-directed instruction and tutoring. Furthermore, computer assisted instruction has been found to enhance students' performance than the conventional instructional method in counselor education (Karper, Robinson, & Casado-Kehoe, 2005). However, Mill (1998) findings revealed that CAI was found to be as effective as classroom for fact based learning, but not as effective for topics requiring critical thinking or mathematical problem solving. In addition, Akour (2006) finds that the time required for by learners to use CAI was higher overall than conventional classroom instruction. Students taught using traditional instruction

combined with the use of computer performed significantly better than students taught using traditional instruction in a college setting.

Statement of the problem

Different approaches have been used in the delivery of curriculum content to students. Research evidence shows that the use of CAI could bring about improvement in students' achievement, speeds up learning rate, enhances better retention, and encourages the development of better attitude. The main aim of education system is to provide education according to the demand of the society and time. To achieve this goal, it is necessary to make the present system of education more effectively, which is made possible to accept ICT. According to Aggarwal (2002), the whole purpose of education in a country is to develop and enhance the potential of human resource and progressively transform it into a knowledge society. Every nation wants to produce students who ultimately become the knowledge workers in their own economy to be global citizens. CAI-Computer Assisted Instruction is one device, which has great importance in the field of Education. With its advantages of giving drilling, tutorial and gaming simulation, it makes learning and teaching more encouraging and interesting for the students. CAI is also more advantageous to both students and teachers, it allows teacher to give more attention to individual students also. Observation has shown that the conventional method of instruction had not provided the varied activities, attention and lesson paced in accordance with students' abilities, it is therefore imperative to compare CAI with traditional teaching method in the learning of lexis and structure to see whether CAI will enhance students' performance better.

Aim and Objectives of the Study

This work is aimed at comparing CAI and conventional method of teaching in enhancing chemistry students' performance in chemical reaction rate in Senior Secondary Schools in Oju Local Government Area of Benue State. The specific objectives were to:

1. To develop computer program on "lexis and structure " unit in the subject of English language for Senior Secondary School students.
2. To study the relative effectiveness of teaching English language in terms of two methods i.e. computer assisted instruction and conventional method for the students of traditional group and Experimental group.

3. To study the relative effectiveness of computer program with reference to gender of the students in Experimental group.

Research hypothesis

The following hypothesis was used in present work

1. There will be no significant difference between the mean pretest scores of the students of Traditional group and experimental group.
2. There will be no significant difference between the post-test scores of the students of Traditional group and experimental
3. There will be no significant difference between the mean pretest scores of boys and girls of experimental group.

MATERIALS AND METHODS

Research design

A quasi – experimental design was employed for this study. Specifically, the nonrandomized control group, pretest, posttest design was adopted for the study.

Sample

The target population of this research was the third year senior secondary chemistry students in Oju local government area of Benue state, Nigeria. The nature of the study, however, required that the research sample was purposively selected. This is because a research on CAI must necessarily be conducted in schools where computers are available for students' use and where the students are computer literate. This was why the Benpaulian central secondary school Ichakobe and Fortune secondary School, Ibilla were purposely sampled for the study. These two schools were selected as the experimental groups. A third school, Chriso Model College, Okoyongo AINU was also sampled as the control group, as the school is believed to be more or less equivalent in standard to the schools used for the experimental group. The sample for Experimental Group was made up of 22 students. This comprises of 11 males and 11 females while the control group was made up of 11 males and 11 female students.

Research instrument

The main instrument used in generating data for this study was the CAEAT which is made up of twenty (20) multiple choice objective items designed to measure specific learning outcomes related to the concept of the study. The instrument was validated for the face and content validity and it was further subjected to pilot study, and reliability test (0.86) before using them as a research instrument.

A question is followed by five (5) options lettered (A-E) out of which only "one" was correct. Students were instructed to select only one option as answer for each item. All the options were plausible answers to the item. The computer assisted instructional package was developed by the researcher using the lesson notes prepared for the conventional (talk and chalk method). The story board was designed for the topic chosen (lexis and structure) and it was developed by the researcher with the assistant of video editor using Adobe premiere 1.5 version software. The topic treated was selected based on Senior Secondary School syllabus. However, several trials were made before the package become successful. It was then tested with few selected secondary schools in Oju town. These schools used for testing the package falls between the population of the study but not part of the schools selected for research study.



Validity and reliability of research instrument

The CAEAT Package was pilot tested and found to satisfy face, content and construct validity by two experts in education who are lecturers in the department of curriculum and teaching, Benue State University, Makurdi. Item analysis of the instrument was also carried out to determine the facility and discrimination indices after which the final items for the instrument were selected and the reliability coefficient computer computed using the split-half approach and the Richard Kuderson formula 21CKR-2).The value obtained for the reliability coefficient was 0.86 and this was considered to be quite adequate for this study.

Method of data Collection

The two groups (experimental and control groups) were subjected to test on CAEAT as pretest. The students in experimental group were exposed to CAI packages in form of lesson plan installed in computer under teacher supervision while the control group students were

exposed to the conventional teaching method with lesson plan on the same content with the experimental group.

Method of data analysis

The scores obtained from two intact classes of 88 and 73 students which were later randomly selected into 22 students experimental group and 22 students control group were computed and used in testing hypotheses. These data were analyzed using mean, standard deviation and the t-test statistical analysis. The level of the significance adopted for the analysis was $P < 0.05$. This level of significance formed the basis for accepting or rejecting each of the hypotheses.

RESULTS AND DISCUSSION

Three null hypotheses were formulated and tested to provide answers to the research question. Analysis of the pretest and posttest data collected by means of the CAEAT were used to answer the research question using the two null hypotheses as guide. Means, standard deviations and the t-test we employed in analyzing the pretest and posttest data. The level of significance adopted for the analysis is 0.05. This level of significance formed the basis for rejecting or not rejecting a null hypothesis. The summary of the data analyzed and results are presented below:

Table 1 depicted the performance of experimental and control groups on the pretest. A pretest was administered to both the experimental and control groups. The test was the 20-item multiple choice CAEAT. The subjects were allowed fifty minutes to do the test. The test was given to determine the academic equivalence of the experimental and control groups. The mean scores of students in the experimental and control groups on the pretest were calculated and the t-test computed for the two means. Table 1 shows the means, standard deviations and the result of the t-test analysis comparing the mean Pre-test scores of Traditional group & Experimental Group.

Table 1. Comparison of the mean Pre-test scores of Traditional group & Experimental Group

Statistics	Traditional Group	Experimental Group	't'-value	Level of significance
Number of students	22	22	0.23	Not significant
Mean	12.1437	12.0625		
Standard Deviation	4.5184	4.0236		
Standard error of Mean	1.0827			

The result in Table 1 indicated no significant difference at 0.05 level of the significance between the pretest mean scores of the experimental and traditional groups ($t = 0.23$, $df = 19$, $p > 0.05$). Thus the null hypothesis that there is no significant difference between the pre-tests of both groups was accepted. In other words, statistically, there is no significant difference between mean scores of the pre-tests of Traditional Group & Experimental Group.

Table 2. Comparison of Statistics for post-test of Traditional Group & Experimental Group



Statistics	Traditional Group	Experimental Group	't'-value	Level of significance
Number of students	22	22	4.24	significant
Mean	16.7812	28.4062		
Standard Deviation	8.7941	8.9293		
Standard error of Mean	2.2154			

The result in Table 2 indicated that the obtained 't'-value is 4.24 which is significant at 0.05 level. Thus the null hypothesis that there is no significant difference between the post-tests of both groups was rejected. In other words, statistically, there is significant difference between mean scores of the post-tests of Traditional Group & Experimental Group which is due to Group Computer Assisted Instruction method.

Table 3. Comparison of the pretest scores of Girls & Boys of Experimental Group

Statistics	Girls	Boys	't'-value	Level of significance
Number of students	11	11	0.31	Not significant
Mean	12.75	11.375		
Standard Deviation	4.2661	3.7749		
Standard error of Mean	4.0280			

The obtained 't'-value was 0.31 which was less than 0.05 level value. Thus the null hypothesis that there is no significant difference between the mean pretest scores of girls and boys of Experimental group was accepted. In other words statistically, there is no significant difference between the mean pretest scores of girls and boys of Experimental group.

Findings:

1. There was no significant difference between the pre-test scores of Traditional group and Experimental group.
2. There was a significant difference between the posttest scores of Traditional group and Experimental group.
3. There was no significant difference between the pre-test scores of girls and boys of Experimental group.

CONCLUSION

The results of this study showed that that computer assisted instruction has a more positive impact on the achievement of students in lexis and structure as compared to conventional teaching. The reason may be that with computer program, the communication of the information can be done in a more effective manner because it delivers the information by using various media, i.e. via sound, text, animation, video and images. In short, it can be said that if computer is used in classrooms, it could prove to be effective. The result further showed that there is no gender differential in achievement among students exposed to CAI and conventional strategy on chemical reaction rate.

RECOMMENDATIONS

From the findings of the present study, the following recommendations are made:

1. Curriculum planners should encourage the use of computer in teaching/ learning in our educational systems.
2. Computer education is made compulsory for teachers and students at all levels of our educational systems.
3. In-service training should be given to teachers on the production and the use of computerized instructional media so that they can appropriately use the modern instructional technology.
4. School should be equipped with computers and internet facilities and other necessary instructional packages for teaching and learning.

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