COMPARATIVE EFFECTS OF CONVENTIONAL AND COMPUTER ASSISTED INSTRUCTION METHODS ON STUDENTS PERFORMANCE IN BASIC SCIENCE

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Abstract

The work aimed at investigating the comparative effects of conventional and computer assisted instructional methods on students' performance in Basic Science. The study was pre-test and post-test quasi-experimental design. All the J.SS students in Onitsha education zone of Anambra State constituted the population of the study. The sample of the study was seventy-five junior secondary school students selected from two secondary schools in Onitsah education zone. The data gathered for the study were analyzed using mean and t-test. The finding of the study showed that the use of CAI as a teaching method was a significant factor in students academic achievement in Basic Science and CAI lesson package was a better alternative to the conventional method approach. The study recommended that computer assisted instruction package should be employed as a supplementary' method to conventional classroom method of teaching and learning of basic science in junior secondary school students.

Keywords: Conventional Method; Computer Assisted Instruction; Basic Science; Performance

Introduction

A critical examination of event around the world would reveal that the world is going through information technology (IT) revolution. Teaching as a profession in Nigeria today is faced with the challenges of globalization for the transformation of the academic system from the old fashion of teaching, learning, research and methodologies to those driven by the information technology which is the latest revolution changing all aspects of the learning environment (Gabasa & Usman, 2009).

Computer can provide powerful tools to help learners acces vast knowledge resources, collaborate with others, consult experts, share knowledge and solve complex problems using the three domains of leaning (cognitive, affective and psychomotor domains). Computer Assisted Instruction (CAI) is an interactive instructional technique in which a computer is used to present instructional materials, monitor learning and select additional instructional material in accordance with individual learners needs. According to Iwu (2006 p. 353) computer assisted instruction involves using software to instruct a learner, providing information and testing knowledge or skills.

On the other hand, conventional classroom method of teaching otherwise known as lecture method is an organized verbal presentation of a subject matter where the presenter dominates the exercise for long period with or without the student's involvement (Abimbade, 1999). Researchers have observed that conventional method of teaching is not an effective way of

impacting knowledge. In the conventional method, the teacher organizes resources, prepares outline and present it to the students who may have little or no interest in the subject matter.

A number of researchers have attributed the major cause of the poor students' performance in science to faulty instructional design (Seweje, 1997 and Shehu, 2007) and poor utilization of learning resources (Gambari & Gana, 2005). These findings have led a number of science educators to conclude that science subjects are not being successfully taught in our schools (Nsofor, 2003). However, the nature of instructional strategies such as the use of (Video tapes, inquiry method and computer assisted instruction) (CAI) would promote effective learning of science.

Inspite of the importance of basic science in the Nigerian educational system, the aims of which the subject is set have not been achieved (Gana 2005). The performance of students no basic science has not been satisfactory over the years.

Table below shows the performance of students, in basic science at Junior Secondary School certificate examination (JSCE) between 2005-2009.

Year of Examination	Total Number of Students sat for the Exam	Total Distinction and Credit level	Total Pass and Fail
2005	6330	1112 (27.56%)	5218 (82.43%)
2006	6657	2590 (38.90%)	4067 (61.09%)
2007	7611	3014 (39.60%)	4595 (60.37%)
2008	9250	3232 (34.94%)	6018 (65.06%)
2009	1015	3938 (38.76%)	6121 (61.23%)

Source: Anambra state Post Primary school Services Commission Onitsah zone (2010).

The performance shows that not up to 40% of the total students has a quality pass of 40% credit. 60% and above did not perform will in the examination. Earlier, Briggs (1976) had pointed out that difficult concepts might be better taught with instructional media such as video tapes, overhead transparencies and computer package. Adesanya (2002), stated that the performance of students' in any subject is hinged on the quality of instructional media provided by the teachers, availability of and access to textbooks, the attitude of students to learning, the degree of motivation and reinforcement by teachers, parents and school administration. Based on these facts, Gana (2003), suggested that there is need for massive use of instructional media in the classroom.

In an attempt to illustrate the significant role of instructional media as indicated by Agusiobo (1997), Gambari (2004) carried out a research in the use of computer assisted instruction on student\s physics achievement in senior secondary level in Niger State. He compared computer assisted instruction with traditional method of teaching and from his result, it showed that those taught physics with computer assisted instruction performed significantly better than those taught physics using conventional method.

Purpose of the Study

The purpose of this study is to ascertain the comparative effect of computer assisted learning instruction and the conventional classroom method on students' academic performance in Basic Science. Specifically, the researcher sought to:

(i) Ascertain the performance of students taught Basic Science using computer assisted instruction.
(ii) Findout the performance of students taught Basic Science using conventional method.
(iii) Findout the difference between the performance of students taught Basic Science using CAIP and those taught using the conventional method.
(iv) Ascertain the differences in the performance of male and female students taught Basic Science using CAIP.

Research Questions

The following research questions guided the conduct of the work:

(i) What is the mean performance score of students taught basic science (BS) using computer assisted instruction?
(ii) What is the mean performance score of students taught basic science using conventional method?
(iii) What is the difference between the mean performance score of students taught basic science using CAIP and those taught using the conventional method?
(iv) Is there any significant different in the performance of male and female students taught basic science using CAIP?

Reseach Hypotheses

The following null hypotheses were tested at 0.05 level of significant.

(i) There is no significant different between the performance scores of students taught Basic Science using Computer Assisted Instruction Package (CAIP) and those taught using the conventional method.
(ii) The scores of male and female students taught Basic Science using CAIP do not differ significantly.

Methodology

The research was conducted with quasi-experimental design using pre-test and post-test to determine the comparative effects of conventional and computer assisted instruction method. All the J.S.S. two students in Onitsha education zone of Anambra State constituted the population of the study. The sample of the study was seventy-five junior secondary two students selected two from secondary school in Onitsha education zone. Intact classes were randomly assigned to the two treatment groups. Each of the intact class was assigned to a treatment condition using the balloting technique. Specifically, this involved a student from a class picking from a black bag folded papers on which are written the treatment conditions (computer assisted instruction programme and conventional classroom method). The treatment condition which a student picked, placed him or her and her classmates in that treatment group.

The test instrument is made up of fifty items multiple-choice questions were selected on the topic 'digestive system' which was taught to the students. When preparing the multiple-choice questions, the researchers considered the fact that at the JSS level, the cognitive level of language to be used should in the ratio of 60% for questions of low level cognitive skills while 40% should be for high level. This means that out of the 50 items multiple choice test questions,

30 were of lower level which included questions at the knowledge and comprehension levels as recommended by National education research and Development Council. The remaining 20 questions covered applications, analysis, synthesis and evaluation which are of the high level cognitive skill. The mean scores of the pre-test were compared with the post-test mean scores to check for the initial and final outcomes. T-test was used to test the hypothesis.

Two schools selected for the quasi-experimental exercise were co-educational schools. They were Prince Memorial High School, Onitsha and our Lady's High School, Onitsha. The intact classes/groups was randomly selected from each of the two schools. At the Prince Memorial High school, JS 2B was selected out of the three arms of the JS 2 students in the school by sampling balloting. The class has 40 students. The same method was used at Our Lady's High School, Onitsha where JS 2A students were selected. It has 35 students. In order to get the two groups; that is the Computer Assisted Instruction (CAI) and the Conventional Group in each of the schools. At Prince Memorial High School, the JS 2B which was selected had 15 males and 25 females which formed group 'A' while at Our Lady's High school, Onitsha the JS 2A selected which has 15 males and 20 females formed group 'B'. The group A was taught using CAIP while the group B was taught using conventional classroom method (CCM).

The researchers involved the Basic science teacher of the school who is trained on what to do to teach the convention classroom group B in their normal lesson periods. The researcher used the lesson plan prepared by the researcher. While the experimental group were allowed to study in the school computer laboratory and the researcher used computer instructor in the school to assist where necessary.

The CAI was prepared by a programmer from Nnamdi Azikiwe University, Awka. The script was written by the researcher and the programme used the script to produce the CAI package. While the CAI group A, were allowed to work with the program in the computer laboratory, they were guided by the computer teacher on what to do. The group A used CAI and was guided by the computer teacher in the school. The CAI is self learning programme, it is only need the guide from the teacher. The students learn by themselves through the instruction provided by the computer.

The computer instructional package was installed in the computer systems of the school so that the students at their convenient time (at the availability of light) should be allowed by the computer teacher to go through the programmes again apart from the time allowed which is 40 minutes computer lesson period in the school. At the end of the instructional exercise, the researcher administered the researcher made basic science achievement test (BSAT) items to all the sampled students. That is group A and B were tested using the researcher made basic science achievement test items to ascertain their level of academic performance.

Results

Research Question 1: What is the mean performance score of students taught basic Science using computer assisted instruction programme?

Table 1: Mean and Standard Deviation (SD) of pre-test and Post-test scores of students taught by CAIP and CCM

		Pre-Test			Post-Test		
Group	Gender	N	X	S	N	X	S
CAIP	M	17	18.05	3.01	17	38.29	5.08
	F	23	17.91	3.14	23	37.13	4.49
	All	40	17.98	3.71	40	37.63	4.72
CCM	M	14	18.41	4.46	14	34.07	2.38
	F	21	17.71	4.18	21	32.86	5.27
	All	35	17.93	4.61	35	33.34	4.90

The table therefore reveals that students taught basic science using Computer Assisted instructional package (CAIP) has a mean score of 37.63 and a standard deviation of 4.72 in a RMT. This therefore implies that CAI package can be used by the students in the absence of the teacher to prepare for their respective examinations. Computer assisted instructional package can make students to be actively involved in the learning process. Active learning on the part of the students invariably lead to improve performance.

Research Question 2: What is the mean performance score of students taught Basic Science using conventional method?

The implication of this result is that student exposed to computer assisted instruction approach perform better than the students exposed to conventional method approach. Therefore, CAI is an effective educational took for technology driven teaching and learning situations.

Research question 3: What is a difference between the mean performance score of the students taught using CAIP and those taught using CCM.

As indicated on table one and stated in the research question one and two, the mean performance scores of the students taught basic science respectively with CAIP and CCM were 37.63 and 33.34. This therefore indicates a difference of 4.29 with those taught basic science through CAIP scoring higher than CCM with the above difference.

Therefore, computer based instruction provides an alternative way for learners to achieve maximally and independently in self-directed and self-paced learning experience.

Research Question 4: is there any significant difference in the performance of male and female student taught using CAIP and CCM.

The results indicated on table 1 showed that the respective mean performance scores in the RMT in basic science of male and female students taught using CAIP and CCM are 38.29 and 37.13. This shows a differential mean score of 1.16. This difference also reflected in that of those taught using the conventional method.

Hypothesis One: There is no significant difference between the mean performance scores in RMT in basic science of students taught basic science using CAIP and those taught using the conventional method.

Table 2: Showing academic performance of group A CAI and group B conventional method

Group	No of students	Mean score X	df	Probability level	SD	t-cal.	t-crit.	Decision
CAI	40	37.63	38	0.05	4.72			
			5.00			7.14	2.02	Rejected
Conventional	35	32.2	33	0.05	4.92			

From the Table 2 the t-calculated was 7.14 which is more than the t-critical 2.37. This shows that the CAI group performed better than the conventional group. Based on this, the null hypothesis was rejected meaning that there is a significant difference between the academic performance of the CAI group and the conventional group. This difference can be attributed to the use of computer in the teaching.

Discussion

His study investigated the comparative effects of conventional and computer assisted instruction method on students performance in basic science. The results of the analysis on table 1 revealed that students taught basic science using computer Assisted Instructional Package performed greater than those taught using Conventional Classroom Method.

The null hypothesis which says there is no significant difference between mean performance scores in researcher made test (RMT) in basic science of students taught basic science using Computer Assisted Instructional Package and those taught using the conventional classroom Method were rejected. This implies that there is a significant difference in the mean scores of the students taught basic science through CAIP approach. They performed better in the post-test than those taught with conventional method approach. Based on these results, the study revealed that the students that were exposed to computer assisted instruction approach performed better than the students exposed to conventional method approach. This conclusion is in line with the observation of Egbule (2008) who affirmed that the use of CAI is an effective educational tool for technology driven teaching and learning situations. The study carried out by Gambari (2004) on the use of computer assisted instruction on students' achievement in physics shows that students performance significantly better than those taught with conventional method. Egbule (2008) went on to emphasize that presenting lesson bit-by-bit or step by step makes it easier for students to follow and grasp the lesson.

The results also showed that males and females achieved comparably better, meaning that gender differences are not factors in the use of computer assisted instructional package lesson. Therefore, the male students exposed to CAI presentation showed higher academic achievement than the female but the mean do not differ significantly.

Recommendations

It was recommended that the computer assisted instructional package should be employed as a supplementary method to conventional classroom method of teaching and learning of Basic science in junior secondary school students.

The school authority should provide a generator that will provide electricity in absence of public power supply, this will ensure uninterrupted use of CAI in teaching and learning of Basic Science.

Conclusion

The study investigated the comparative effects of conventional and computer assisted instructional method on students' performance in basic science. It was found out that the use of CAI as a teaching method was a significant factor in students' academic achievement in basic science and CAI lesson package is a better alternative to the conventional method approach. It covers more units at a time and the learners achieve maximally and independently in self-directed and self-pace learning experience.

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