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CONTENTS

EFFECTS OF COMPUTER ASSISTED INSTRUCTION ON SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT LEARNING OUTCOME IN CHEMISTRY IN OSUN STATE

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Abstract

This study determined the effects of computer assisted instruction on senior secondary school students' academic achievement in chemistry in Osun State. The moderating effect of students' gender and attitude on students' achievement was also examined. The study adopted one group pretest-posttest experimental research design. Three secondary schools provided with computer tablets by the state government of Osun were purposively selected for the study. Chemistry class was randomly selected in each of the three schools making a total of 152 students (male and female) participated in the study. Students pre a nd post-test Chemistry achievement scores and Students Attitude Questionnaire on Minicomputer Tablet (SAQMT) were used to collect data. Data were analyzed using Analysis of Covariance (ANCOVA). Five hypotheses were tested at 0.05 level of significance. Results showed that Computer Assisted Instruction has no effect on students' academic achievement in Chemistry ($F_{(1,151)} = 2.129$; $P > 0.05$). It was also revealed that gender and attitude have no effect on students' achievement in Chemistry. The study therefore recommends that necessary skills in the use of computer tablet for teachers and students, which will assist teaching and learning with computer for students' achievement.

Keywords: CAI, Academic achievement, Chemistry, Senior Secondary School.

Introduction

Chemistry is a key science subject. It is a valuable subject in general and vocational subject that deals with the composition, properties and uses of substances. The objectives of learning chemistry at secondary school level among others include:

1) Providing students with basic knowledge of chemical concepts and properties through efficient selection of concepts.
2) Providing a course which is complete for students and reasonable adequate foundation for a post secondary school course.
3) Showing chemistry in its link with industry, everyday life and hazards (FRN, 2004).

Ogunleye (2007) also remarked that the nature of chemistry with particular reference to the change of matter is acknowledged in the world-over and also the knowledge of change of matter forms the centre-piece in the teaching of chemistry.

Towards the twenty-first (21^{st}) century, the advancement of new techniques and technologies under a great or strong influence of computer revolution is gradually pushing behind the traditional means of instruction. The recent moves and changes within nations and the world at large brought about changes in the contemporary education system. Hayes and Robinson (2000) submit that a growing body of research indicates that the technology in the classroom can be put in pedagogy movement.

Nelson (2001) and Ogunsola (2005) studies have shown that introduction of computer in classroom can provide powerful learning opportunities. Olagunju (2002) reports that the use of computer technology in science classroom improves teaching-learning process.

The revolutionary movement in technology supports computer enriched learning environment in classroom. In chemistry as an example, the computer has been found to provide adequate solution to several problems in teaching. The use of computer simulation in classroom is found to be appropriate when experiments are dangerous or difficult and time consuming to perform. Unlimited opportunities could be explored in teaching of chemistry using software packages and CD ROMS to enhance effective teaching of chemistry. The role

of computer is scarcely implemented in science classroom at the moment especially in chemistry.

However, for successful use of computer in classroom to foster meaningful learning in the teaching of science especially chemistry calls for teachers and students' positive attitudes towards integrating computer in the teaching and learning process. Yidrin (2000) and Abirini (2006) believe that the use of ICT tools for educational purposes depends on teachers and most especially students. Hence, the students' attitude towards computer is considered to be a key factor in enhancing teaching and learning chemistry using computer.

Hypotheses

Five null hypotheses were formulated for this study.

Ho1: There is no significant main effect of treatment on students' academic achievement in chemistry.

Ho2: There is no significant main effect of gender on students' academic achievement in chemistry.

Ho3: There is no significant main effect of attitude on students' academic achievement in chemistry.

Ho4: There is no significant interaction effect of treatment and gender on students' academic achievement in chemistry.

Ho5: There is no significant interaction effect of treatment and attitude on students' academic achievement in chemistry.

Methodology

Design

The study adopted one-group pretest – posttest experimental design.

Selection of Participants

The sample population comprised all SS II students offering Chemisty in Osun state, in which three public senior secondary schools which were provided with computer tablets by the state government of Osun were purposively selected for the study. SS II Chemistry class was randomly selected for the study from each of the

three public senior secondary schools. A total of 152 students participated in the study.

Instruments

1) Chemistry achievement scores before and after the introduction of computer tablet.
2) Students' Attitude Questionnaire on Minicomputer Tablet (SAQMT).

Research Procedure

The SS II students and teachers of the three selected schools were presented computer tablets by the state government after first terminal examination. Each computer tablet contains the programmed curriculum contents of every subject taken by students in SS II. This was used by the chemistry teachers and students during teaching. The teacher and students open to the content and make use of the tablet during classroom teaching. This was done throughout the second term. At the end of second term, the second terminal examination was conducted.

The researchers visited the three schools on resumption into the second term in the first week. One SS II chemistry class was randomly selected in each of the schools. The first term result scores in chemistry of the each of the selected chemistry class was collected from the school authority. This serves as the pretest scores for the students. The second terminal result scores of the same set of students in chemistry was collected after the second term exa nination on resumption into the third term. Thereafter, the Students' Attitude Questionnaire on Computer Tablet (SAQCT) was administered to all the students. This served as the posttest scores.

Data Analysis

The data collected were analysed using Analysis of Covariance (ANCOVA). The hypotheses were tested at 0.05 level of significance.

Results

The results of the study are presented according to the formulated hypotheses.

Hypothesis One: There is no significant main effect of treatments on students' academic achievement in chemistry.

Table 1: ANCOVA of Posttest Scores of Participants' achievement Test in Chemistry by Treatment, gender and attitude.

Source	Type III sum of squares	df	Mean square	f	Sig.	Eta square
Correct Model	2609.193[a]	12	217.433	1.313	.218	.102
Intercept	14827.134	1	14827.134	89.539	.000	.392
PRECHEM	100.188	1	100.188	.605	.438	.004
TRTGRP	705.226	2	352.613	2.129	.123	.030
GENDER	744.488	1	744.488	4.496	.036*	.031
ATTITUDE	338.811	1	338.811	2.046	.155	.015
TRTGRP *GENDER*	296.693	2	148.347	.896	.411	,013
TRTGRP *ATTITUDE*	156.497	2	78249	.473	.624	.007
GENDER *ATTITUDE*	151.849	1	151.849	.917	.340	.007
TRTGRP*GENDER*ATTITUDE	262.885	2	131.442	.794	.454	.011
Error	23017.484	139	165.693			
Total	242765.000	152				
Corrected Total	25626.678	151				

R Squared = 102 Adjusted R squared = .0.24)

Table 1 shows that there is no significant effect of treatment on students' academic achievement ($F_{(1,151)} = 2.129$; $P > .05$) in chemistry. Hence, hypothesis 1 was not rejected. Since the value of "F" is not significant, it means that the hypothesis on the main effect of treatment on students' achievement is not rejected.

Hypothesis Two: There is no significant main effect of gender on students' academic achievement in chemistry.

Table 1 revealed that there is significant effect of gender on students' academic achievement ($F_{(1,151)} = 4.496$; $P > .05$; $\eta = .031$) in chemistry. Hence, hypothesis 2 is rejected. The effect of gender on students' academic achievement in chemistry is further shown in Table 2

Table 2: Summary of Effect of Gender on Students' Achievement in Chemistry

GENDER	Mean	Std Error	95% Confidence income	
			Lower Bond	Upper Bond
MALE	36.747	1.520	33.741	39.753
FEMALE	41.711	1.776	38.200	45.223

Table 2 shows the mean scores of male (36.747) and female (41.711) students' effects on students' achievement. The difference in the mean scores of students' gender implies that gender has effect on students' achievement in chemistry with female students performing better.

Hypothesis Three: There is no significant main effect of attitude on students' academic achievement in chemistry.

Table 1 revealed that there is no significant main effect of attitude on students' academic achievement ($F_{(1,151)} = 2.046$; $P > .05$) in chemistry. Therefore, hypothesis three is not rejected. The nature of the effect of the attitude displayed by the students is further explained with Table 3 below.

Table 3: Summary of Effect of Attitude on Students

ATTITUDE	Mean	Std Error	95% Confidence income	
			Lower Bound	Upper Bound
NEGATIVE	40.902	1.833	37.278	44.525
POSITIVE	37.557	1.449	34.692	40.422

Table 3 shows the mean scores of students with negative (40.902) and positive (37.557) attitudes to computer-assisted instruction. Though, difference existed between the mean score of those with negative attitude and those with positive attitude, the difference did not produce significant effect. Hence, the use of minicomputer tablet had no effect on students' attitude to chemistry.

Hypothesis Four: There is no significant interaction effect of treatment and gender on students' academic achievement in chemistry.

Table 1 revealed that there is no significant interaction effect of treatment and gender on students' academic achievement ($F_{(1,151)}$ = .896; P > .05) in chemistry. The value of F is not significant, the hypothesis on the interaction effect of treatment and gender and academic achievement in chemistry is therefore not rejected

.

Hypothesis Five: There is no significant interaction effect of treatment and attitude on students' academic achievement in chemistry.

Table 1 shows that there is no significant interaction effect of treatment and attitude on students' academic achievement ($F_{(1,151)}$ = .473; P > .05) in chemistry. The value of F is not significant, if follows that the hypothesis on the interaction effect of treatment and attitude on students' academic achievement in chemistry is not rejected.

Discussion

According to the findings of this study, there was no significant main effect of Computer-Assisted Instruction and Conventional Method of teaching on students' achievement in chemistry. There is no gain in students' achievement in chemistry when taught conventionally and when taught using tablet. This study negates the earlier studies of Tabassum (2004), Ford, Marzzone and Taylor (2005), Basturk (2005), and Ajadi (2007) who found that students taught through CAI

as supplementary strategy performed significantly better than students taught via conventional method. However, this study supports the findings of Adeyemi (2012) who found that there was no significant difference between students taught with Computer Assisted Instruction and those via conventional method and Owusu, Monney, Appiah and Wilmot (2010) that the use of computer supplemented instruction had no significant effect on students' performance with students instructed science using conventional approach fairly performed better than those instructed by using the Computer Assisted Instruction.

The insignificant effect of CAI in this study might be as a result of the fact that the teachers and most of the students are used to the conventional method of teaching. It may also be due to lack of necessary procedures involved in the acquisition of skills needed in the use of the minicomputer tablets or the inability of the students to quickly adjust to the use of Computer Assisted Instruction due to environmental problem. This is also noticed by Adeyemi (2012).

The study found that gender effect was significant in students' achievement in chemistry. The result contradicts the findings of Aiyedun (2000) who found no significant difference in students' achievement in science on gender basis. However this finding corroborates the findings of Olowojaiye (2004), Ariyo and Ugodulunwa (2007) that existing difference occurs in students' achievement based on gender. However, while the studies reported that male students perform better than the female counterparts; this study has found a higher achievement score in female students than in male students.

Furthermore, this study found that there was no significant main effect of attitude on students' achievement in chemistry. This is in support of Ajadi (2007) finding that students' attitude does not have any effect on academic ability.

The interaction effects of treatment and gender and treatment and attitude on students' achievement on chemistry were not significant.

This is in line with Owoyemi (2007) findings that students' achievement in chemistry has nothing to do with attitude or gender.

Recommendation

Based on the findings of this study it is therefore recommended that:

1) Government should provide computer facilities for all students from junior secondary school. This will provide an enabling environment for Computer Assisted Instruction in Chemistry classroom.
2) Government should organize computer training for chemistry teachers and students for procedures needed in the acquisition of necessary skills in computer for teaching and learning.

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