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Effect of Computer Aided Instruction on Senior Secondary Students' Achievement in Reading Comprehension in Jalingo, Taraba State, Nigeria

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Abstract

This study investigated the effect of computer aided instruction on SS II students' achievement in reading comprehension in Jalingo Local Government Area of Taraba State. The study was guided by two research questions while two null hypotheses were formulated and tested at 0.05 level of significance. The research design was pre-test, post-test quasi-experimental design. The population comprised of 4,615 SS II students. A total of 80 students located in two intact classes were used for the study. Purposive sampling technique was used to sample the schools while random sampling was used to select the classes. Reading Comprehension Achievement Test (RCAT) was the instrument used for data collection. There were two groups in the study (experimental and control group) and both groups were exposed to pre-test in order to establish their homogeneity levels prior to intervention. Post-test was administered after five weeks of intervention. The experimental group was exposed to reading comprehension lessons using CAI while control group was taught using the

conventional method. Descriptive statistics of mean and standard deviation were used to answer the research questions while inferential statistics of Mann-Whitney U test and Analysis of Covariance (ANCOVA) were used to test the hypotheses at 0.05 level of significance. The result revealed that there was no significant difference between the mean achievement scores of students taught reading comprehension using CAI and those taught using the conventional methods ($p = .880$). The findings also showed that there was significant difference in the mean achievement scores of male and female students taught reading comprehension using CAI in favour of the female students ($p = .287$). Based on the findings, it was therefore recommended that teachers of English language should introduce the use of CAI in teaching reading in order to enhance students' achievement in reading comprehension. It was also recommended that textbooks writers and publishers should incorporate computer as a teaching strategy and provide the required guide for adopting it.

Keywords: Computer Aided Instruction, Students' Achievement, Reading Comprehension

1. Introduction

Reading is the process of understanding and getting meaning from text. It is also a process of critically studying and mentally digesting content or information from material for more knowledge. Reading empowers students to improve on their vocabulary for enhancement on the written language of students that read voraciously (Rathiga & Sarpparaje 2020) ^[20]. The Nigerian students depend on reading literature to improve on their command of English language and the habit of reading good text helps them to decipher new words and phrases which may be encountered in everyday conversation (Divya, 2007) ^[5]. Furthermore, there is positive improvement on the general academic performance of a student that makes out time to read interdisciplinary informative materials. The ability of a student to achieve the purposes of formal education which is anchored on self-development in order to achieve national development is highly interwoven with effective reading (Ihuoma, 2012) ^[8]. More so, academic success and self-empowerment among students is highly realisable through extensive and intensive reading. Reading enhances educational goals and consequently, good readers are always fluent in their use of language in secular and academic discussion. Cimmiyotti (2013) ^[4] posits that students need to practice reading in order to develop their phonemic awareness, phonics, fluency, vocabulary, and comprehension. The mastery of these skills will grant learners access to increasingly complex knowledge in other academic subject areas.

Comprehension is the ability to read, identify, remember, summarize and create meaning from what is read (Aliyu, 2006) ^[1]. Hence, reading is very important for a student who wants to excel academically. In the same vain, Nowicki and Lopata (2017) ^[15] posits that students, who are competent readers, as measured by their performance in reading tests, are more likely to

perform well in other subjects, such as mathematics and science. This suggests why Proudfoot (2016)^[19] maintains that ability to read proficiently is a fundamental skill that affects the learning experiences and school performance of children and adolescents.

In a second language situation, the attainment of reading comprehension has remained the ultimate desire of students, parents and the society at large, for the realization of educational goals. Therefore, it becomes important that students acquire reading skills for comprehension at literal, inferential and evaluative levels. Jude and Ajayi (2012)^[13] affirm that poor comprehension has led to poor academic achievement, which has resulted in failure, frustration and drop out from schools. Consequently, it has led to examination malpractice which has bedeviled the entire education system. Despite all measures to reverse the situation, in recent years, results in West African Examination Council (WAEC) and National Examination Council (NECO) has been the concern of stakeholder in education. WAEC and NECO Chief Examiners reports of low percentage pass have shown that there is need to inculcate reading skills in secondary school students because many students are not adequately prepared for these examinations.

Reading is one of language skill that can be a problem for students because teaching of reading is sometimes taken for granted in most of the Nigerian schools. The problem is compounded by English language teachers at the secondary levels seem not to know what to do in order to develop reading comprehension skills in students (Muodumogu 2014)^[6]. Reading problems can affect achievement across several content areas and other literacy skills needed in everyday life activities. This is why Coskun cited by Akpan (2015)^[3] suggests that reading problems have been attributed to lack of exposure to reading strategies among others. It is expected that by using the right strategies, learners' academic achievement would be enhanced.

These days, the time students spend on the computer doing so many things, is more than the time they spend reading their books. The general argument is that effective teaching and learning is impossible nowadays without the use of various techniques based on modern technologies. The use of computer is one of the powerful tools that assists teachers to enhance their professional capacity and helps students to achieve their educational goal in many ways. Since the traditional method of teaching reading comprehension has failed to provide the much-needed motivation, varied activities and individualized attention in terms of lessons paced according to individual abilities of the students are advocated (Oyetunde, 2009)^[18]. Qureshi (2020) argues that computer aided instruction is an interaction between a student, computer-controlled display and a response entry device for the purpose of achieving educational outcomes.

Many studies indicate that there has been an increase in emphasis on computer technology and its integration at all level of education. Al-Mansour (2012)^[2] states that computer allows learners to progress at their own pace and to work individually to solve problems, allows learners to know whether their answers are correct or not by providing them with the correct answers. According to Marzban (2011)^[16], computer aided language learning (CALL) techniques can enhance students' reading comprehension, in comparison with the traditional teaching approach. Faramarz, Sadeghian and Mohammed (2013) observe that

when teaching reading comprehension using computer, words can be spoken aloud by the computer by improving comprehension skills, it helps in learning the difference between words that look the same but are pronounced differently and the use of the various computer techniques will not allow students to place the wrong letter in a word. Several studies have also been conducted to examine the efficacy of the different modes of computer instruction. According to Ijiga (2014)^[9] the drill and practice video instructional mode (DPVIM) for instance, is one of the most effective in language instruction. It is designed to provide repeated drilling of the same material until a skill is not only-learned but is brought to a state where the response becomes automatic. Drill and practice video instructional mode will be used in this study because it is in line with the objectives of language skill development which is to teach language skills repeatedly in order to reach desired level of proficiency. CAI is an interactive instructional technique whereby a computer is used to present the instructional material and to monitor the learning that takes place. Computer aided instruction (CAI) stands for the type of instruction carried out with the help of a computer as a teaching aid. The major objective of CAI is to enable all learners maximize their learning achievement, characterized by adaptability of instruction to the learners' needs. In this study the researchers intend to use computer in teaching reading comprehension to enhance achievement in learners.

The gender of students may also be a factor in determining students' achievement in teaching and learning. Many researches have been undertaken to ascertain whether or not there exists any significant difference between the performance of male and female students in reading comprehension. The term that describes the difference in achievement between males and females is called "gender gap". Gender could have a prevailing effect on learning in general because "gender gap" is shown in many aspects of learning such as: interest, attitude, needs, beliefs, and motivation. Zeynali (2012)^[22] observes that a lot of studies have shown that gender influences students' academic interest, need, and achievement. Kelley (2014)^[14] states that boys receive lower achievement test scores than girls in reading in particular and language arts in general. Farajimakin (2010)^[7] compared the performance of boys and girls in Mathematics and English language. The findings showed that girls performed better than boys in tasks relating to language while boys performed better than girls in calculations.

The unabated poor performance of students in English language both internal and external examinations necessitates research into other teaching strategies such as the use of computer aided instruction (CAI). This is to say that the selection of appropriate and effective method is very vital to the success of any lesson (Iji, 2007)^[11]. Therefore, in view of the reported relevance of CAI in teaching and learning, as well as the need to reduce abysmal performance of students in reading comprehension, this study seeks to determine the effect of CAI on male and female secondary school students' achievement in reading comprehension in Taraba State.

The purpose of this study is to investigate the effect of computer aided instruction on male female SS II students' achievement in reading comprehension in Jalingo, Taraba State. The study specifically sought to find out:

1. If students taught reading comprehension using CAI would achieve higher than those taught using the conventional method.
2. If male and female students taught reading comprehension using CAI would differ in achievement test.

The following research questions guided the study:

1. What will be the difference in the mean achievement scores of students exposed to CAI and those taught using the conventional method?
2. What is the difference in the mean achievement scores of male and female students taught reading using CAI?

The following null hypotheses would be tested in the study at 0.05 level of significance:

Ho₁: There is no significant difference in the mean achievement scores of students exposed to CAI and those taught using the conventional methods in reading comprehension achievement test.

Ho₂: There is no significant difference between the mean achievement scores of male and female students taught reading comprehension using CAI.

2. Methodology

The design of the study was quasi-experimental design. Specifically, the pre-test post-test non-equivalent control group design was used. This implies that intact classes (non-randomized groups) were used for the study.

This study was carried out in Jalingo, Jalingo Local Government Area of Taraba State. Jalingo is the capital of Taraba State, northeast of Nigeria. The choice of this area was because of high rate of students' failure in English language and other subjects. This affects their performance in other subjects and leads to poor academic achievement. The target population of this study consisted of 4,615 senior secondary two (SS2) students in all the senior secondary schools in Jalingo during the 2020/2021 academic session. The sample size of the study consists of 80 SSII students which comprised 48 males and 32 females located in two intact classes in two secondary schools. Purposive sampling technique was adopted in selecting only government approved schools that have adequate computers needed for the research and experienced computer literate English language teachers teaching English at SS2 level. The intact classes were assigned to experimental and control groups.

The researchers constructed Reading Comprehension Achievement Test (RCAT) as the instrument used to collect data. The instrument contains two sections: A and B. Section A contained the bio data of the students while section B contained 5 items that tested students' reading comprehension skills such as identifying meaning, finding main idea, making inferences about content, recognizing a writer's purpose and summary.

The researchers developed 10 Reading Comprehension Lesson Plans (RCLP) that were used in the study as treatment tool. The lesson plans were based on SS2 curriculum for English Language. Five of the lesson plans were used to teach the experimental group using computer to read the comprehension passages by clicking on the while the other five lesson plans were used to teach the control group using the conventional method. The control group was given the hard copy of the comprehension passages to

read and answer questions. The reading comprehension skills that were taught include identifying meaning, finding main idea, making inferences about content, recognizing a writer's purpose and summary.

The instrument was validated by two experts in English language education and one expert in Test and Measurement, from Taraba State University, Jalingo. The experts were requested to ascertain if the instrument aligned with the purpose of the study. The observations and comments of the validators were used by the researchers to effect corrections in the instrument in order to enhance its validity. The instrument was further trial tested on 30 SSII students in one secondary school within the area of study, but outside the sampled schools to establish the reliability and to determine the time that would be adequate for the administration of the instrument during the main study. The reliability coefficient of the Reading Comprehension Achievement Test (RCAT) was calculated using Spearman Rank Order Correlation. This is because scores from the test were obtained from two independent raters to ensure inter-rater reliability. The RCAT yielded a reliability coefficient of 0.81 which was high enough to guarantee the use of the instruments for data collection.

The administration of the instrument was done with the help of the research assistants, who were experienced graduates of English language education, who currently teach English language in SS2 in the selected schools. Reading Comprehension Achievement Test was administered to all the respondents as pre-test to ascertain their performance in reading before the intervention programme. The students in the experimental group were taught reading comprehension skills of how to identify vocabulary, find main idea, make inferences about content, recognize a writer's purpose and summarise using the Computer Aided Instructional package by scrolling through using the computer mouse while the conventional method was used for the control group. After treatment, Reading Comprehension Achievement Test were administered to the respondents in a day. The instrument were administered by the research assistants. Students in both control and experimental groups were given the opportunity to read the passages and after reading they answered the questions provided in the comprehension passage. The entire study lasted seven weeks. The researchers immediately collected the instruments from the research assistants.

Data collected using RCAT were classified into pre-test, post-test for both experimental and control groups, and further classification of the data was that of male and female, since the study has gender as a moderator variable. The analysis was done with respect to the research questions and the hypotheses formulated for the study. Mean and standard deviations were used to answer the research questions. The inferential statistical tools of Mann-Whitney U test and analysis of covariance (ANCOVA) were used to test the hypotheses at 0.05 significant level. Mann-Whitney U test was used to evaluate whether the scores for the two groups differ significantly. Analysis of covariance is based on two major assumptions. They are concerned with the nature of the relationship between dependent variable and the covariate.

3. Results

The results of this study are presented below

Research Question 1

What will be the difference in the mean achievement scores of students exposed to CAI and those taught using the conventional method?

Table 1: Mean and Standard Deviation of Achievement Scores of Students Exposed to CAI and the Conventional Method

Group	N	PRE-RCAT		POST-RCAT	
		Mean	SD	Mean	SD
Control group	46	4.48	3.52	11.89	5.18
CAI	34	7.21	3.26	12.71	3.84
Difference		2.73		0.82	

Table 1 shows that the post-test mean achievement scores of students exposed to CAI is 12.71, while that of those taught using conventional method is 11.89. The difference between the post-test mean achievement scores of the CAI group and the control group is 0.82. This suggests that students taught reading comprehension using CAI have slightly higher achievement scores in reading comprehension compared to their counterparts in the conventional method.

Research Question 2

What will be the difference in the mean achievement scores of male and female students taught reading comprehension using CAI?

Table 2: Mean Achievement Scores of Male and Female Students Exposed to CAI

Gender	N	PRE-RCAT		POST-RCAT	
		Mean	SD	Mean	SD
Male	20	6.25	3.18	12.05	3.56
Female	14	8.57	2.98	13.64	4.16
Difference		2.32		1.59	

Table 2 shows that the post-test mean scores of the male students is 12.05, while that of the female students is 13.64. The difference between the post-test achievement mean scores of male and female students is 1.59 in favour of the

Table 4: Independent Samples t-test Analysis of Significance of Gender on Achievement in Reading Comprehension

Achievement Score	Levene's Test for Equality of Variances			t-test for Equality of Means			
	F	Sig	T	Df	Sig 2-tailed	Mean Difference	
Equal variance assumed	1.172	.287	-1.198	32	.240	-1.59286	
Equal Variances not assumed			-1.164		25.08	.255	-1.59286

In Table 4 Levene's test for equality of variances was used to test whether the variance (variation) of scores for male and female is the same. The test shows that the variation is the same at 0.05 level of significance (p = .287). The independent – samples t-test conducted to compare the achievement scores shows that there was significant difference in scores for male and female students. Thus, there is significant difference in the achievement scores of male and female students taught reading comprehension using CAI in favour of the female students.

4. Discussion of findings

The finding of this study revealed that there is no statistically significant difference in the students' achievement scores in reading comprehension. Though the data shows that the mean achievement scores of students exposed to CAI is slightly higher than those in the

females. This suggests that female students taught using CAI have higher achievement scores in reading comprehension than their male counterparts.

Hypothesis 1

There is no significant difference between the mean achievement scores of students exposed to CAI and those taught using the conventional methods in reading comprehension achievement test.

Table 3: Results of Two-way Analysis of Covariance of Method of Teaching on Students' Achievement in Reading Comprehension

Source Variation	Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	276.377 ^a	4	69.094	3.624	.009*
Intercept	2023.672	1	2023.672	106.128	.000*
PreCAT	49.748	1	49.748	2.609	.110**
Group	.440	1	.440	.023	.880**
Group*Gender	29.614	1	29.614	1.553	.217**
Error	1430.111	75	19.068		
Total	13687.000	80			
Corrected Total	706.488	79			

Key: * Significant, ** not significant

Table 3 shows that the F-ratio for the main effects of treatment at degrees of freedom is .023. The value of F-ratio is not significant at p=.880, which means that the null hypothesis was thus not rejected. The implication is that there was no statistically significant difference between the mean achievement scores of students taught reading comprehension using CAI and those taught using conventional method. Though the CAI group performed slightly higher than the control group, the difference was not statistically significant.

Hypothesis 2

There is no significant difference between the reading comprehension achievement mean scores of male and female students taught reading using CAI.

conventional group. When the post-test achievement scores of the two groups were compared, there was a slight increase in achievement scores for the CAI group, while there was a decline in the post-test achievement scores of the control group. The increase in achievement test scores in the CAI group is an indication that CAI enabled students to actively engage in reading comprehension which made the students to achieved better scores. It also showed that the use of CAI triggered the performance of the students. The finding confirms the result of the earlier study by Ijiga (2014) [9] which revealed that no significant effects on achievement in reading comprehension was found for Tutorial Video Instructional Mode (TVIM) which is also an interactive teaching method. However, the finding contradicts the results of Marzban (2011) [16] found that students who were taught by computer aided language learning (CALL) instructional techniques significantly

outperformed the students who were taught by the traditional teacher-centred methods of teaching reading comprehension

Another finding of this study revealed a significant difference between male and female students with the females performing better than the males. This study is in agreement with that of Ijiga and Muodumogu (2008) ^[10] which revealed the main effect of level and gender on achievement in reading comprehension was significant in favour of the female students. This finding is also in line with the findings of Iyekekpolor (2008) ^[12] who reported that male students did significantly better than female students. The study further revealed that with the use of tutorial in CAI, female students achieved higher than male students. The finding of this study however, disagrees with Muodumogu and Agbum (2016) ^[17] who found no significant difference in the mean achievement scores of male and female students in reading comprehension.

5. Conclusion and recommendations

Reading is an essential skill of language and a process of thinking actively to understand information in texts. This process involves connecting author's information and the readers' prior knowledge. It has been observed that students achieve low in reading comprehension. This is largely due to the instructional strategy adopted by the teachers in teaching reading comprehension. That was why this study investigated if the situation could be addressed using computer aided instruction as a strategy of teaching reading comprehension. From the results of this study, it is evident that the use of computer aided instruction as a learning strategy could enhance students' reading comprehension ability if the use is extended over a long period of time, it might yield better results. It is concluded that computer can be an effective teaching tool when integrated into classroom practices for teaching reading.

It was recommended that; curriculum planners should incorporate the use of computer as a teaching strategy into the curriculum of English language and encourage the implementation right from the primary level of education. Furthermore, textbooks writers and publishers should be encouraged to incorporate computer as a teaching strategy and provide the required guide for adopting it.

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