

INVESTIGATION OF EFFECTS OF COMPUTER ASSISTED INSTRUCTION WITH ANIMATION ON ACADEMIC ACHIEVEMENT IN ALTERNATIVE CURRENT OF SECONDARY SCHOOL STUDENTS IN MINNA METROPOLIS, NIGER STATE, NIGERIA.

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This study investigates the Effects of Computer Assisted Instruction with Animation on Academic Achievement in Physics among Senior Secondary School Students. Quasi-experimental design (pre-test, post-test, non-equivalent control group design) was specifically used for the study. The population of the study was 2,550 SS II students. Four schools were purposively selected from Minna Metropolis. The sample used for the study was 230 SS II students consisting of 121 male and 109 female students from four intact classes that were randomly assigned in to experiment and control groups for the study. The schools comprise two mixed schools; one girls' school and one boys' school. Physics Alternating Current Achievement Test (PACAT) was used for the study. Two null hypotheses were formulated and tested at $P= 0.05$ level of significance. The CAI package and research instrument were validated by experts in Department of Physics, Educational Technology Department and Science Education Department Federal University of Technology (FUT) Minna. The data obtained from the test were analyzed using Kuder-Richardson (KR-21) to determine the reliability of the instruments and reliability coefficient of 0.66 was obtained. Mean and standard deviation were used to answer research questions. While t-test was used to analyze hypotheses one and two. The results of the study indicated that students exposed to Computer Assisted Instructional Package with Animation (Experimental group) performed significantly better than those students exposed to Computer Assisted Instructional Package without Animation (control group). Also, there was no significant difference in terms of gender. Based on the findings, it is recommended that the ministry of Education should provide instructional materials among others, such as Computer Assisted Instruction with Animation in teaching of the Physics Students.

Keywords: Computer Assisted Instruction, Animation, Achievement, Alternative Current

Introduction

Physics is the study of matter and its properties in relation to energy. It is among the core subjects for science students in schools (Gana, 2015). Physics is also recognized as one of the core science subjects that senior secondary students offer in Nigerian senior secondary schools as stated in the National Policy on Education, (FRN, 2004). Physics is also of paramount importance and a requirement for further learning, training and development of many science related professional courses such as Medicine, Pharmacy, Nursing, Biophysics, among others (Nahel, 2004 & Larkum, 2011). Odigie in Umar (2011) observed that Physics is the pre-requisite subject for many fields of learning that contributes immensely to the technological growth of the nation. Despite all these, and other numerous importance of Physics in the area of human and national development, Physics as a subject has an atrocious set back. As stated in the Physics academic performance statistics of students in the National Examinations Council (NECO 2003-2013), Chief Examiner's Reported is shown in the Table 1.

Table 1: NECO Analysis of Academic Performance of Candidates SSCE

Year	Total number of candidates that sat for the examination	Distinction (a1)	Credit (c4)	Pass mark (e8)	Fail (f8)
2003-2013	463,073	7.20%,	16.25%,	0.64%	29.49%
2016	463,073	0.074%,	9.60%,	4.20%	

Hence, the poor academic performances of students in Alternating Current might be attributed to many factors which include among others, inappropriate use of teaching strategies such as use of Computer Assisted Instruction, Computer Assisted Simulation and use of media or instructional materials. It would be improper to continue with the conventional method of teaching and learning which has not been helpful in promoting meaningful learning of Alternating Current (Singh, 2005). The use of innovative instructional strategies as well as instructional media that will bring about meaningful learning of Alternating Current has become imperative. CAI has the potential to improve leaning, therefore, it can be employed in the classroom in teaching Alternating Current effectively (Grabe, 2007)

Several strategies such as computer simulations were employed to improve students' academic performance in school subjects in Nigeria among others is the recent method which involve the use of Computer Assisted Instruction (CAI)

with animation in classroom instruction (Grabe & Grabe, 2007). Animation is the art of creating moving objects' images with the use of computers. Therefore, Animation package involves the determining of computer assisted instruction with objects' images and creating its effect on students' academic performance. Also one of the objectives of Physics curriculum is for the teachers to apply knowledge of computer to teach students in the classroom (Hencer & Tuzeman, 2008).

According to the Federal Ministry of Education (FME, 2009) Nigerian Senior Secondary School Physics Curriculum (2009) is aimed at enabling students to achieve the following objectives. To:

- develop interest in the subject Physics;
- acquire basic theoretical and practical knowledge and skills in Physics;
- develop interest in Science, Technology and Mathematics (STM);
- be aware of the fact that fundamental idea of Physics evolve from a process of inquiry, which will enable them to develop scientific attitude which are transferable to other life situations;
- apply skills to meet social needs of creating employment and wealth;
- be positioned to take advantage of numerous career opportunities offered by Physics;
- be adequately prepared for further studies in Physics and
- remedy students misconceptions in Physics.

These aims mentioned can only be realized if students' academic achievement in Physics is improved. Therefore, the need for innovative strategy to be employed in the teaching of Physics. Computers Assisted Instruction with animation package is one of the innovations of technology that can have positive impacts on the method of teaching. New discoveries always emerge on earth and the basis of all technological advancement is science, Science Teachers Association of Nigeria; (STAN, 2015).

The adoption of sciences and technology in national life marks the difference between developed and developing countries, thus classification of nations according to the economic status, basically reflect the scientific and technological development (Ajagun, 2000) Ajagun (2000) and Chado (2010) shared their view and added that the wealth, creativity and influence of power of any nation depend on the capacity to utilize science and technology for the betterment of the citizens.

1.2 Objectives of the study

The objectives of this study are to find out the effect of Computer Assisted Instruction with Animation on academic achievement of secondary school students (SSII) in selected Physics concepts. Specifically the study addresses the following objectives:

- i. Investigates the effects of Computer Assisted Instruction package (CAI) with animation and without animation on secondary school students' achievement in alternating current concepts.
- ii. Examine the influence of gender on the academic achievement of students taught alternating current concepts using Computer Assisted Instruction package (CAIP) with animation and without animation.

Research Questions

The following research questions are stated for the study:

1. What is the difference in the mean academic achievement scores of students exposed to Computer Assisted Instructional Package (CAIP) with animation and those taught without animation in senior secondary physics?
2. What is the difference in the mean academic achievement scores of male and female students taught Alternating Currents using Computer Assisted Instructional Package (CAIP) with animation and those students taught without animation?

Research Hypotheses

The following null hypotheses are formulated and tested at $P= 0.05$ level of significance.

HO₁: There is no significant difference in the mean academic achievement scores of students taught alternating currents using Computer Assisted Instructional Package (CAIP) with animation and those students taught CAIP without animation.

HO₂: There is no significant difference in the mean academic achievement scores of male and female student taught alternating current concepts using Computer Assisted Instructional Package (CAIP) with animation and those students taught without animation.

Methodology

The research design adopted for this study is the quasi-experimental design. A pretest, posttest non-equivalent control group design was used. The illustration of the design is represented as figure 1:

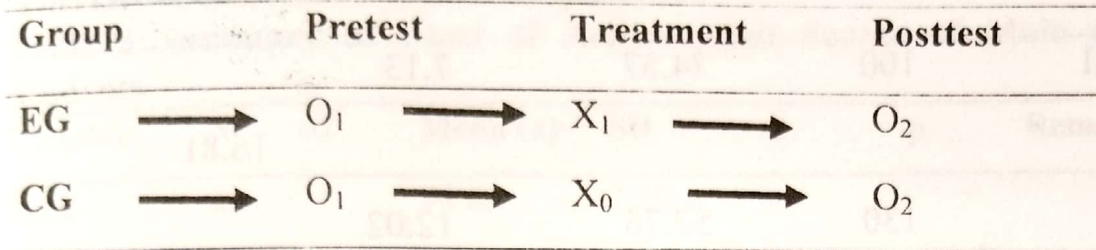


Figure 1: Research Design

Key;

EG = Experimental Group

CG = Control Group

X₁ = Treatment (CAI with Animation)

X₀ = No Treatment (CAI without Animation)

O₁ and O₁ are pretest for experimental and control groups respectively

O₂ and O₂ are post-test for experimental and control groups respectively

The design was used among the two groups that is one group with CAI package with animation another group with CAI package without animation. The experiment carried was out in senior secondary school (SSII) Physics students, Niger state.

Results

Pre-test Analysis

Table 1: Summary of Pre-test t-test of Experimental and Control Groups

Groups	N	Mean (\bar{x})	SD	Mean Difference
Experimental	100	56.01	8.551	16.81
Control	130	56.38	9.603	

NS: Not Significance

Table1 shows the result of pre-test score of experimental and control groups. The Table1 reveals the mean score of experimental group of 56.01 and the control group with a mean score of 56.38. This shows that the two groups are equivalent

at pre-test. It therefore means that the experimental and control groups are homogenous.

Table 2: Summary of Mean and Standard Deviation of Experimental and Control Groups

Groups	N	Mean (\bar{x})	SD	Mean Difference
Experimental	100	74.57	7.13	16.81
Control	130	57.76	12.02	

Table 2 shows the mean and standard deviation of experimental group and the control group as follows: experimental group $\bar{x} = 74.57$, $SD = 7.13$; and control group $\bar{x} = 57.76$, $SD = 12.02$ respectively.

Table 3: Summary of Mean and standard Deviation of Male and Female Students

GENDER	N	Mean(\bar{x})	S D	Mean Difference
Male	62	74.83	7.29	0.70
Female	38	74.13	6.92	

Table 4 shows the mean and standard deviation of experimental group male and female students as follows: experimental Group Male $\bar{x} = 74.83$, $SD = 7.29$ and Female $\bar{x} = 74.13$, $SD = 6.92$ respectively.

Table 4: Summary of t-test Comparison of the Posttest Achievement Scores of Animation Group and Without Animation

Variable	N	df	Mean (x)	SD	t	p	Remark
Experimental	100		74.57	7.13			
		228			12.403	0.01	Significant
Control	130		57.76				

*= Significant at 0.05 level

From Table 4, the results yielded a t-value, $t = 12.403$, $df = 228$, $P = 0.01$. Since $P < 0.05$; the null hypothesis is rejected. Therefore, there is significant difference between the groups taught with CAIP application on the Posttest academic achievement scores. This implies that a significant difference exists between the two groups (Animation and Without Animation groups).

Table 5: Summary of t-test of Achievement Scores of Male and Female Students

Variable	N	df	Mean (x)	SD	t	p	Remark
Male	62		74.83	7.29			
		98			0.474	0.636 ^{ns}	Not Significant
Control	38		74.13	6.92			

ns: Not Significant at $p > 0.05$

Table 5 Presents t – test result of the Posttest achievement scores of male and female students taught alternating current using computer assisted instruction package (CAIP). The results yielded an t-value, $t = 0.636$, $df = 98$, $p = 0.636$. Since $P > 0.05$; the null hypothesis is retained. This indicates that there is no significant difference in the achievement scores of Male and Female students taught Alternating Current using (CAIP).

Discussion

The result in Table 4 is significant because $P < 0.05$ and hypothesis one (H_{O1}) is rejected. Therefore, the (CAIP) application produces a significant effect on the Posttest academic achievement scores of students when covariate effect (pretest) was controlled. This implies that a significant difference exists between the two groups (Animation and the Without Animation groups). This is in agreement with Grabe and Grabe (2007) who found that technologies can play a role in student skills, motivation, and knowledge. Also, the findings as revealed in Table 4 is in line with the findings of Akçay et. al., (2007) who explain that using computers increases motivation and desire for the lectures and laboratory in the process of learning.

These results agree with the earlier findings of Singh et. al., (2005) that CAI generally has a positive effect on learning. Simeon and Simeon (2013), also added that instructional package would help learners to have understanding and retention of the concept taught.

Conclusion

Based on the finding of this study, it is concluded that, the use of computer assisted instructional package (CAIP) with animation has great impact on the experimental students that use computer assisted instruction package (CAIP) with animation. It also indicates that, there is no significant difference in the achievement scores of male and female students taught Alternating Current using computer assisted instructional package (CAIP) with animation and those students taught without animation.

Recommendations

- i. In view of the fact that the CAI with and without animation has significant difference in the academic performance of students, its educational benefits should be expounded and an instructional design should be made available for use by curriculum planners, instructional designers and all stakeholders in education.
- ii. Ministry of education should provide instructional materials such as Computer Assisted Instruction with animation in teaching of Physics students.

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