

Effects of Computer Assisted Instructional Package on Junior Secondary School Students Achievement and Retention In Geometry in Minna Niger State, Nigeria.

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ABSTRACT: *The study determined the effectiveness of Computer- Assisted Instructional package (CAIP) on achievement and retention in geometry among junior secondary schools in Minna Metropolis. Two research questions were raised and two null hypotheses were tested. The study adopted the pre-test-posttest - control group design. Simple random sample of eighty(80)students were drawn from four junior secondary schools in Minna Metropolis. The researcher developed computer assisted instructional package on geometry which was used as treatment instrument for experimental group while control group were exposed to traditional teaching method. The instrument for data collection was Geometry Achievement Test. A 40-items multiple-choice objective type achievement test covering ten selected topics in Geometry was used. A reliability coefficient of 0.75 was obtained using Pearson's product moment correlation coefficient(r).The t-test statistics was used to analyze the hypothesis. The findings revealed that experimental group performed better than the control group . It was recommended that government should organized seminars, workshops and symposium for teachers on the development of computer assisted instructional package to enhance learning among students.*

KEY WORDS: *Computer Assisted Instruction, Achievement, Retention and Geometry*

I. INTRODUCTION

The technological advancement of the world today became feasible through the study of science. Science can be seen as the branch of study in which facts are observed, classified and quantitative laws formulated (Alio, 2004).Science is also the systematic study of the empirical world in order to understand and control it. Science is also seen as the organized body of knowledge, which ensure the ability to acquire skills. It is a search for meaning or exploration of events in nature (Nwosu, 2001) in (Ifeako, 2006). It is a well known fact today that science has become an integral part of man's life. Science and Technology influence man in all aspects of life including feeding, clothing, shelter, healthcare as well as the leisure. The Science and Technology related subjects that would enable the students have a substantial understanding of science and be able to apply scientific knowledge in solving problems in their changing society are Mathematics, Physics, Biology, Health sciences , Introductory Technology, Chemistry to mention but a few.

Mathematics is the science of space and numbers. The study of space is called Geometry, the study of numbers is called Arithmetic, while the hybrid of geometry and Arithmetic is called Algebra. Mathematics therefore, can be said to be the bedrock of technology. For proper understanding of science, mathematics play a major role, hence referred to as the queen of all sciences (Odili, 2006).

Despite the importance attached to mathematics and its crucial role in technology, student sees it as a difficult subject and as such show little or no interest in the subject. The major problems faced by most students is inability to remember what they have learnt. This problem is often caused by too much theoretical expressions or formulae by the mathematics teachers while learner's remain passive listeners (Odili,2006).

The report of the Chief Examiners, West African Examination Council(WAEC,2004) lamented that there was no significant improvement in the performance of candidates in Mathematics.. It was observed that some aspect of the syllabus were poorly handled by the candidates .The areas where the candidates performed poorly includes: circle theorem, Areas of circle, sector, segments and construction. In another related observation by the Chief Examiner (WAEC,2002) that the problems affecting mathematics achievement can be related to teachers' methods of presenting the contents to the students.

Computer Assisted Instruction is a new teaching and learning strategy in which the topics to be taught is carefully planned, written and programmed in a computer which could be run at the same time in several computer units and it allows each students to one computer terminal. The instructions are also programmed in a computer disc (CD), this could be played in either audio or video system for the student to learn the programmed at his /her leisure time and at his/her own pace. The potential benefit of Computer Assisted

Instruction (CAI) can not be underestimated in the contemporary world. There is a lot of established findings on the instructional value of computer, particularly in advanced countries. There are now several CAI packages on different subjects. It is obvious that current trend in research all over the world is the use of computer facilities and resources to enhance students' learning. Chang (2000) in Yusuf (2009) opined that "many exercises that depart from traditional method are now readily accessible on the web (p.521), even though teachers do not use these facilities".

Jenk & Springer (2005) opined that how CAI is delivered can affect its effectiveness, and that new studies are needed to clarify the effect of CAI in contemporary student environment. Instructional material and strategies have been found to aid academic achievement and retention such strategy as Computer Assisted Instruction. Orisebiyi (2007), who investigated the effect of computer assisted package on student's achievement and retention in biology found CAI to be effective on student's achievement and retention in Integrated Science. However from the reviewed, it was observed that many of the studies were focused on some parts of Mathematics such as Algebra, Statistics, word problem and quadratic equation, not much on geometry using CAI Package.

However, retention as defined by Hornby(2001) is the ability to remember thing. For the purpose of this study, retention is defined as the ability to keep or retain the knowledge of geometry learnt and to be able to recall it when requires. Retentions in mathematics is not acquired by mere rote-memorization but through appropriate teaching method (Iji,2002, chianson,2008). According to the finding of Iji (2002) and chianson (2008), those students in the experimental group retained more of the learnt geometry than those in the control group.

Mkpa(1981) in Iji (2010) states that retention is the continued capacity to behave in particular way that has been learned. Also Obodo (1990) in Iji (2010) assert that retention is measured in collaboration with achievement. His study on differential effects of three teaching models on performance of Junior Secondary School students in some algebraic concepts showed equal retention. This indicates that each of the models, which were effective in students' achievement in algebra, could as well help the students retain algebraic concepts effectively. However, this study aimed at investigating the effects of Computer Assisted Instructional package on students achievement and retention in Geometry among Junior Secondary School Students in Minna.

I.1 STATEMENT OF THE PROBLEM

Learning of geometry may not be easy, and a large number of students failed to develop an adequate understanding of geometry concepts, geometry reasoning, and geometry problem solving skills. The lack of understanding in learning geometry often cause discouragement among the students, which invariably lead to poor performance in geometry. A number of factors have been put forward to understand why geometry learning is difficult, such as geometry language, visualization abilities, and ineffective instruction (Cangelosi,1996). Poor reasoning skills are also another area of concern among secondary school students. Many are unable to extract necessary information from given data and many more are unable to interpret answers and make conclusions. Traditional approaches in learning geometry emphasize more on how much the students can remember and less on how well the students can think and reason, thus learning becomes forced and seldom brings dissatisfaction to the students (Cangelosi,1996). Therefore, this study investigated the effects of CAI software on students achievement and retention in geometry.

I.2 PURPOSE OF THE STUDY

The purpose of the study is to develop and determine the effects of CAI on junior secondary school achievement and retention in geometry.

The specific objectives of this study are to:

1. To determine the effects of computer assisted instruction on junior secondary school Students' achievement in geometry.
2. To determine the effects of computer assisted instruction on junior secondary school Students' retention in geometry.

I.3. RESEARCH QUESTIONS

The following research questions were pursued.

1. Is there any difference in the mean achievement scores of students taught geometry using computer assisted instructional package and those taught the same geometry using traditional method?
2. Will there be any difference in the mean retention scores of the students taught geometry using computer assisted instruction and those taught geometry using traditional method?

I.4 NULL HYPOTHESES

HO₁: There is no significant difference between the mean achievement scores of students taught geometry with computer assisted instruction and those taught with traditional teaching method.

HO₂: There is no significant difference between the mean retention scores of students taught geometry using Computer Assisted Instruction and those taught geometry using traditional teaching method.

I.5 SCOPE OF THE STUDY

The study focused on the effects of Computer Assisted instruction (CAI) on the achievement and retention in geometry among Junior Secondary Schools (JSS11) students. It was limited to Junior secondary school students in Minna metropolis, Niger state. The geometric topics taught during the study comprises of introduction to geometry, quadrilateral and their properties, polygons and Areas of plane and solid shapes.

II. METHODOLOGY

The research design for this study was pretest-posttest and post-posttest control group design . The target population was four-thousand three hundred and eighty-three (4,383) JSS from twenty-two (22) junior secondary schools in Minna Metropolis.

The sample for this study was made up of 80 students using simple random sampling techniques(hat-draw method). A breakdown revealed that the experimental group consist of 40 students with an equal gender balanced of boys(n=20) and girls(n=20), while the control group had an equal gender balance of boys (n=20) and girls(n=20) respectively. The experimental group was taught geometry using Computer Assisted Instructional package(CAIP) which covered ten topics, while control group was taught same topics using traditional method.

II.1 RESEARCH INSTRUMENTS

The instruments for this study are Geometry Achievement Test(GAT) and Computer Assisted Instructional package(CAIP).

II.2 GEOMETRY ACHIEVEMENT TEST (GAT).

The research instrument for data collection for the study was Geometry Achievement Test(GAT).This is an achievement test drawn from past JSSCE/NECO question papers(2006-2011). The test consist of forty(40) objective questions with four options. The test carried a total of one hundred (100) marks, each correct answer carried 2.5 marks.

II.3 COMPUTER- ASSISTED INSTRUCTIONAL PACKAGE

Computer Assisted Instructional package (CAIP) on geometry is a self-instructional and interactive package. It contained ten lessons structured in units, each unit lasted 40 minutes. The topics covered in the package were introduction to geometry, quadrilateral, polygon, Areas of geometric shapes, Areas of Triangle, Areas of Rectangle, Areas of parallelogram, Sum of interior angle, surface area of a Cylinder and surface area of a cone. The topics were drawn from the geometry contents of Nigerian junior secondary school Mathematics curriculum for JSS11. The package was developed by the researcher with the assistance of a professional programmed developer.

II.4 VALIDITY OF THE INSTRUMENTS

The computer Assisted Instructional Package (CAIP) , Geometry Achievement Test (GAT) and lesson notes were validated by experts. A panel of three(3) experts from mathematics/computer Department and two Mathematics teachers from JSS Minna Metropolis validate the instruments. They considered the audibility, simplicity of the package as well as its suitability for the level of the subjects. They verified the extent to which the items of each unit were considered to testing the topic they were meant to test ,and check the possible errors and suggested answers. Base on the comments, corrections and advise of the experts, the original package was edited by the researcher for the final draft. The package, thus validated was then used for the study.

II.5 RELIABILITY OF THE INSTRUMENT

A pilot test was conducted using test-retest method to ascertained the reliability of the Geometry Achievement Test instrument. The instrument had reliability coefficient of 0.75 using Pearson's Product moment correlation.

II.4 METHOD OF DATA COLLECTION.

The Mathematics teachers in the sampled schools were trained as research assistants in the use of the computer assisted instructional package. The study covered six(6) weeks. There was an orientation with the mathematics teachers and the students in each sampled school. This training and demonstration lasted for a week. When the

teachers and students were adequately briefed, trained and have demonstrated competency on operational guide to instruction, the experimentation in the study then commenced.

The experimental group students were exposed to Computer Assisted Instructional package which had been installed on desktop computer, while control group students were taught using traditional teaching method on the same contents used for experimental group. At the end of the treatment the GAT was administered as the post-test to measure the achievement of the students in geometry in each school. After two(2) weeks of administering the post-test, the same test was administered for the measurement of post-posttest (retention) of the students in geometry. The GAT was given as the retention test. The retention test was administered the same manner post-test was administered. The test was conducted at the same time with the help of research assistants in each school and the script were collected immediately for scoring. The t-test was used to test all the Null hypotheses using Statistical Package for Social Sciences (SPSS) version 16 at 0.05 alpha level.

III. RESULTS

Hypothesis one (HO₁): There is no significant difference in the mean achievement scores of students taught with computer assisted instruction and those taught with traditional teaching method.

Table 1: t-test comparison of experimental and control group on posttest scores.

GROUPS	N	df	Mean (X)	SD	t-values	P
EXPT.	40	78	65.63	18.82	2.19*	0.03
CONT.	40		56.93	16.60		

***Significant at the 0.05 level**

Table 1 present the t-test comparison of the posttest mean scores of experimental and control groups. The mean score for experiment group was 65.63 and that of the control group was 56.93. The calculated t-value 2.19 with p-value 0.03 less than 0.05 alpha level. This indicates that there is statistically significant difference between the mean score of the experimental group (65.63) and the control group (56.93) ($p < 0.05$). Hence, HO₁ was rejected. The experimental group exposed to CAI performed significantly better than the control group that was taught with traditional method.

Hypothesis two (HO₂): There is no significant difference in the mean retention scores of the students taught geometry with CAI and those taught with traditional teaching method.

Table 2. t-test comparison of the post-posttest (retention) scores of the experimental and control group.

GROUPS	N	df	Mean(X)	SD	t-value	P
EXPT.	40	78	66.63	18.54	2.24*	0.03
CONT.	40		54.75	16.94		

***Significant at the 0.05 level**

Table 2 shows the t-test comparison of the post-posttest mean scores of experimental and control groups. The mean score for the experimental group was 66.63 and that of the control group was 54.75. From the table, the t-value of 2.24 is significant at ($P = 0.03$). This indicates that there is statistically significant difference between the mean score of the experimental and control group at 0.05 level, ($P < 0.05$). Hence, there is significant difference between the retention of students taught geometry with CAI and those taught with traditional teaching method.

III.1 SUMMARY OF THE FINDINGS

The summary of findings for this study are :

1. There is significant difference between the mean achievement score of junior secondary school students taught geometry with CAI and those taught with lecture method.
2. There is significant difference between the mean retention score of junior secondary school students taught geometry with CAI and those taught using lecture method.

III.2 DISCUSSION OF THE RESULTS

Table 1 shows the comparison of post-test mean score of experimental and control groups. There is significant difference between the achievement of students taught with CAI and those taught with traditional method. The result is in agreement with the findings of Basturk,(2005); Robinson(2005); Akour (2006); Orisebiyi (2007); Yusuf (2010) who found and reported there was significant difference in the performance of students taught with CAI. Contrary to the above finding , the result is in contrast to the previous findings of Bayraktar (2008); Etukudo (2002) among others who could not found any significant difference between the students exposed to CAI and those exposed to traditional method.

Table 2 shows the comparison of post- posttest mean (retention) score of experimental and control groups. There is significant difference between the retention of student taught geometry with CAI and those taught with traditional method. The result is in agreement with the findings of Adeniyi (1997); Tabassum (2004) Gbodi & Laleye (2006); Orisebiyi (2007) who found significant differences in the retention of students taught with CAI. Also, the findings of Udousoro (2000); Egunjobi (2002) and Etukudo (2002) confirmed that CAI proved to be effective in enhancing students retention.

IV. CONCLUSIONS

It was concluded that computer assisted instruction in geometry enhances the achievement and retention of junior secondary school students in Minn, Niger state.

V. RECOMMENDATIONS

On the basis of findings from this study , it is recommended that:

There should be continuous training in computer to ensure awareness and literacy through series of symposia, seminars, conferences to instill computer literacy among Nigerians. Teachers and students especially of Mathematics and science should be made to learn how to write simple computer program, in order to aid fast integration of skills in developing CAI by teachers.

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