Effect of Computer Assisted Instructional Package on Secondary School Students' Achievement in Arithmetic Progression in Port Harcourt Local Government Area, Rivers State.

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Abstract
The study investigated the effect of computer assisted instructional package on secondary school student's achievement in arithmetic progression in Port Harcourt Local Government Area, Rivers State, Nigeria. This adopt quasi experimental design and a sample of Forty (40) senior secondary class two (ss11) students (20 male and 20 female). 50 items multiple choice objective type on achievement test covering four topics in arithmetic progression was used to collect data for the study and an Arithmetic Progression. Achievement Test (APAT) was used as test Research Instrument. A trial test has carried out and a reliability coefficient of 0.68 was obtained using test-retest method from pilot and analyzed using Person's Product Moment Correlation. Coefficients. Four research questions went reuse and four null hypothesis were formulated to guide the study. Were used in the study. Four research questions were raised and four null hypotheses were formulated to guide the study's' Research questions were answered using mean and standard deviation while t-test was use in testing the hypothesis at 0.05 level of significant. The result from the study showed that students who were taught arithmetic progression with computer assisted instructional packages achieved higher score than those with lecture method. Some of the recommendation made include: Senior secondary schools should be provided with computer to make students get use to computer package. Mathematics teachers should use computer software in teaching of mathematics to enhance student's achievement in mathematics. Teachers should be trained and retrained on the use of computer for mathematics learning so that he/she can develop any computer assisted instructional package.

Introduction
The benefit of technology to the world today became possible through the study of science and mathematics. Mathematics has become the vital intellectual discipline of all technological societies and it is indispensable in helping the individual to think more clearly about the values involved in this fast changing world (Udousor & Abimbade, (1997). Mathematics is widely used throughout the world, in human life and many fields. It is a vital tool in science, commerce and technology.

The importance of mathematics to nation building has led the Federal Government of Nigeria to make mathematics a core subject to be offered by students at all levels of education in Nigeria (FRN, 2013). Furthermore, Okafor (2002) note that mathematics is compulsory for entry requirement into university education. One is expected to have a credit in mathematics to qualify for study. Some of the roles of mathematics according to Nurudeen (2007), include: its ability to enhance the thinking capabilities of individuals by making them to be more creative, reasonable, and rational as well as imaginative.

Mathematics therefore, can be said to be the bedrock of technology. Mathematics is essential in everyday life activities and holds an important position in the curriculum of Nigerian school system. Despite the relevance and importance of mathematics as a school subject, there are research evidences to show that mathematics is one of the most poorly taught, mostly hated and terribly understood subject in schools (Asikhia 2010). Studies have also shown that Nigerian students' achievement in secondary school mathematics has been relatively low over the years (Obodo, 2004).

According to Adedayo (2001), the problem of failure at this level has always been attributed to teacher's failure to use appropriate method of teaching and teachers lack of knowledge of technology. Okafor (2002) identify poor teaching methods as the major factor contributing to the poor performance of students in mathematics. Onyezuligbo (2003) also observes that poor study habit contributes to students poor performance in mathematics. Okoli (1995) notes that the mathematics classroom in Nigeria has been typified by traditional patterns of teaching and learning which have remained unchanged. On this, Michael (2002) also noted that poor textbooks and lack of computer technology in schools are also responsible for poor performance of students in mathematics

Accordingly, Ogoni (2003) suggests that teachers need resources that can assist them to carry out their duties efficiently. The major problems faced by most students are inability to remember what they have learnt. This problem is often caused by too much theoretical expressions or formulae by the mathematics teachers while learners remain passive listeners (Odili, 2006). The report of the Chief Examiners, West African Examination Council (WAEC, 2006) lamented that there was no significant improvement in the performance of candidates in Mathematics. It was observed that some aspect of the course outline were poorly handled by the candidates. In another related observation by the Chief Examiner (WAEC, 2002) the problems affecting mathematics achievement can be related to teachers' methods of presenting the contents to the students.

Aduwa (2007) noted that the computer is capable of activating the senses of sight, hearing and touch of the user. This indicates that the computer has the capacity to provide higher interactive potential for users to develop their individual intellect and creative abilities. What many students had to do by hand, students today can use Computer assisted instructional software to do the symbolic manipulations. In doing so, computer is used as instructional material, add enrichment, broadens the mathematical background of the students and stimulates curiosity in new ideas. The importance of instructional material in teaching is numerous. One of which is that it helps the teacher to communicate ideas; it provides discovery activities for the student. It equally adds reality to learning. It makes real, abstract concepts.

According to Dike (2002), instructional materials are resources which a class teacher can use in teaching in order to make the content of his lesson understandable to the learner. The computer being used as instructional material will enhance students" understanding of mathematical concept; keep students busy and active in the class. Computer-Assisted Instruction (CAI) is an interactive instructional method whereby a computer is used to present the instructional materials and monitor the learning that takes place. It uses a combination of text, graphics, sound and video in the learning process Onasanya, Daramola & Asuquo, (2006). Computer-based learning has the potential to make easy development of students" decision-making and problem-solving skills, data-processing skills, and communication capabilities. By using computer, students can gain access to expansive knowledge links and broaden their exposure to diverse people and perspectives. For instance, Yigit (2005) found in his study that

computer-assisted instruction has had a positive impact on student's perception about computer supported instruction as well as on their academic achievement.

Computer Assisted Instruction (CAI) can refer to virtually any kind of computer use in educational settings including drill and practice, tutorials, simulations, instructional management, supplementary exercises, programming, database development and other applications (Cotton, 2001). The Association of Education Communications and Technology has defined Computer Assisted Instruction (CAI) as a method of instruction in which the computer is used to instruct the student and where the computer contains the instruction which is designed to teach, guide and test the students until a desired level of proficiency is attained. Mills (2001) revealed that CAI was found to be as effective as classroom instruction for fact-based learning, but not as effective for topics requiring critical thinking or mathematical problem-solving. In addition, the time required by learners to use CAI was overall higher than conventional classroom instruction. Chang, (2001).reported a significant increase in scores on a measure of academic achievement when CAI on arithmetic was used to teach addition and subtraction. These studies indicated that CAI could have a positive effect on secondary students" skills and achievement. Students receiving computer-based instructions tended to learn more and faster. Their gains exceeded those in schools using the traditional method. Students receiving CAI based instruction also enjoyed their classes more and had better attitudes towards computer. Studies have shown that students who went through active-engagement computer-based activities did better than students who went through traditional instruction (Steinberg, 2000). In this regard, Venkataiah (2004) observed that Computer-Assisted Instruction (CAI) is an interaction between a student, a computer and a software programme guided by the teacher for the purpose of enhancing learning outcomes. Even though CAI was expensive and mechanical, it was considered to be a better teaching machine because of its flexibility and versatility. Furthermore, it provided integrated experiences which varied from abstract to concrete; helped the teacher to reduce repetition of words; improved students manipulative skills; improved visual perceptions and retention of information by the learner.

Computer-Assisted Instruction (CAI) is used to indicate the application of the computer in the teaching and learning process. Tabassum (2004) indicated that it is the approach where the computer acts as a tutor, teaching new skills or concepts or providing practice for learners. Lecture Method is teacher-centred method, which is seen as the traditional talk – chalk method of teaching. Here, teacher does the talking while students serve as receiver only by listening and taking down notes. Obeka (2009) described lecture method as a teacher-centred method. This lead to a classroom- teaching environment, which is teacher dominated, didactic, textbook bound and examination-oriented.

Lecture method is a popular method of teaching whereby the teacher dominates the period by doing the talking and student sitting and listening to him. Kelly (2009) affirmed that lecture method, sometimes called the traditional method or expository method of teaching involves the teacher using verbal presentation of ideas or concepts. In this method, the teacher does much of the activity in form of talking and writing on the board while the students listen.
Skinner stated the two improvements to the learning process brought about by the teaching machine as follows: immediate reinforcement and individualization. He noted that individualization allows the learner to work on his/her own and also at his/her own pace. Skinner's interest was on linear teaching program which requires presentation in small bits, logical sequence and immediate response from the learner

Crowder brought in the idea of personalization. His idea of personalization was that the sequence of progressing is not linear but is determined by the learner's state of assimilation of the material presented, so that it could be different for each individual.

Piaget was concerned primarily with cognitive development and the formation of knowledge. His research led him to conclude that the growth of knowledge is the result of individual constructions made by the learner

Learners are active throughout the learning process: they apply current understandings and modify new learning.

1.1   Statement of the Problem

The teaching and learning of Mathematics in secondary schools still continue to be a crucial problem to mathematics teachers due to the abstract nature of the subject. Poor achievement of students and lack of retention in mathematics is a known fact and of great concern to educators. Researchers are making great effort to see if there will be improvement on students" achievement in mathematics by adopting various methods of teaching mathematics. Their aim of using various methods is because poor method of teaching mathematics has been identified as one of the reasons for poor achievement of students in mathematics. Okafor (2002) identify poor teaching methods as the major factor contributing to the poor performance of students in mathematics. However, Abimbade & Egunjobi, (2003) state that effective application of computer assisted instruction in the Nigeria educational system could provide a significant impact to our educational problems. The use of Compute assisted instruction (CAI) could bring about improvement in students' achievement, speeds up learning rate, enhances better retention, and encourages the development of better attitude. Now, the question is what could be the effect of computer assisted instructional package on students' achievement when adopted in teaching arithmetic progression?. Hence, there is need to really find out, whether the use of computer assisted instructional package on arithmetic progression could produce any difference in the performance of students in mathematics. It is on this background that the researcher sought to find out if really computer assisted instructional packages have any effect on the performance of students in mathematics in using arithmetic progression as a case study.

Purpose of the Study

The purpose of the study is to determine the effects of compute assisted instructional package on secondary school achievement in arithmetic progression. The specifically the study sought to:
1.   Determine the academic achievement of students taught Arithmetic progression using CAI and those taught with lecture method.
2.   Determine the mean achievement scores of male and female students exposed to computer assisted instructional package (CAL).

Research Questions

The following research questions were formulated to guide the study.
1.   What is the academic achievement of students taught Arithmetic progression using CAI and those taught with lecture method?
2.   What are the mean achievement scores of male and female students exposed to computer assisted instructional package?

Hypotheses

H$_{O1}$:   There is no significant difference in the mean achievement of students score taught Arithmetic progression using CAI and those taught with lecture method.

H$_{02}$:   There is no significant difference between the mean achievement scores of male and female students who were taught with computer assisted instructional package?

Methodology
Design of the Study
The research design adopted in this study was a quasi-experimental design with one experimental group and control group. Students in both groups were pre-tested on their academic performance in arithmetic progression before the treatment Quasi experimental. The treatment were computer assisted instructional package which was administered to the experimental group only, while the control group were taught arithmetic progression with lecture method. Thereafter, a post-test was given to both groups to find out the effects of computer assisted instructional package on students' performance in arithmetic progression.

Population of the Study
The population of the study comprise all Senior Secondary School two (SS 2) students in 15 secondary schools in Port Harcourt Local Government Area of Rivers State. According to available record in Rivers State Post Primary School Board, there are total of 1,172 students in senior secondary school in Port Harcourt Local Government Area of Rivers State. As at the time of this research.

Sample and Sampling Technique
The sample for the study consisted forty (40) senior secondary school two (SS II) students from Community Secondary School Amadi-Ama in Port Harcourt Local Government Area of Rivers State. The school was purposively selected for being a coeducational school. A random sampling technique was used to select 20 male and 20 female students in senior secondary school two(SSII) from the intact class of A&B Arms in Community Secondary School Amadi-Ama in Port Harcourt Local Government Area of Rivers State.

Instrument for Data Collection
The instrument for data collection was Arithmetic Progression Achievement Test (APAT), made up of fifty (50) multiple choice questions designed to measure the specific objectives related to the concept of the study and are selected from past question papers of West African Examination Council (WAEC) .

3.6   Validity of the Instrument
To ensure both face validity of the instrument to this research work since WAEC has already validated the content, the researcher give the research instrument titled "Arithmetic Progression Achievement Test" (APAT) to my supervisor, one expert in mathematics, education two experts in test and measurement for their opinion and correction.

Reliability of the Instrument
The Arithmetic Progression Achievement Test (APAT) was pre-tested with ten (10) students in another school within the study area but not part of the selected school using a simple random sampling and a reliability coefficient 0.68 was obtained using Pearson Moment Correlation Coefficient.

Administration of Instrument
The data for testing the hypothesis were collected from the pre-test and post-test given to the students. The tests were scored over one hundred percent (100%). The experimental group were be taught Arithmetic Progression (AP) with computer assisted instructional package for

a period of five (5) weeks while the control group were taught the same with lecture method. The total number of lessons within the five (5) weeks were fifteen (15) period lasting for 40 minutes each. After the duration of 5 weeks, post-test was given to both groups at the same time using paper and pencil objective test.

Method of Data Analysis
The score were that obtained from the pre-test and post-test of both the experimental and control groups were used in testing the hypothesis . Research questions were answered using mean and standard deviation. Hypothesis were tested using t-test statistical analysis at the level of significant which formed the basis for accepting or rejecting each hypothesis. So, the decision rule is when the t-calculated is less than t-critical is accepted and when t-calculated is greater than t-critical then decision rule is rejected.

Data Analysis and Result
Research Question 1: What is the academic achievement of students taught Arithmetic progression using CAI and those taught with lecture method.

Table 1:   Mean Achievement and Standard Deviation of Students Performances in the Experimental and Control Groups

Variable	N	Mean	SD	MD
Experimental Group	20	62.10	9.65	21.60
Control group	20	40.50	7.80	
TOTAL	**40**			

Table 1 showed the mean achievement scores and standard deviation of student's performance in the experimental and control groups. Students in the experimental group had a mean achievement score of 62.10 and standard deviation 9.65 while the control group had a mean achievement score of 40.50 and standard deviation 7.80. This indicates that there is significant difference between the mean scores of the experimental group (62.10) and the control group (40.50). The mean difference is 21.60 in favour of experimental group. Therefore, the answer to the research question one is that there exist significant differences in favour of experimental group. To test whether there was a significant difference or not in the mean score of the experimental and control groups, H_{O1} was used.

Research Question 2: What are the mean achievement scores of male and female students' exposed to computer assisted instructional package only?

Table 2:   Mean Achievement Scores of Male and Female Student Exposed to Computer Assisted Instructional Package

Variable	N	Mean	SD	MD
Male	10	69.30	6.40	4.50
Female	10	64.80	6.10	
Total	**20**			

Table 2 showed the mean achievement score and standard deviation of male and female student's performance when exposed to computer assisted instructional package. The male student had a mean score of 69.30 and standard deviation 6.40 while the female students had a mean score of 64.80 and standard deviation of 6.10. . This indicates that there is significant

difference between the mean scores of the experimental group (69.30) and the control group (64.80). The mean difference is 4.50 in favour of male. Male students exposed to CAI had a higher mean score than the female, an indication that the students performed better on exposure to CAI. This implies that the treatment had an impact on the male group. Therefore, the answer to the research question one is that there exist significant differences in favour of male group. To test whether there was a significant difference or not in the mean score of the experimental and control groups, H_{O4} was used.

Hypothesis 1: There is no significant differences between the mean achievement scores of student who were taught with computer assisted instructional package and those who were taught the same arithmetic progression by lecture method.

Table 3: **T-test Analysis of the Posttest Means Achievement and Standard Deviation of Students Performances in the Experimental and Control Groups**

Variable	N	$\overline{X}$	Df	Standard Error	t-cal	t-crit	Decision
Experimental group	20	62.05	38	0.900	23.33	2.02	Reject
Control group	20	40.50					
Total	**40**						

Table 3. above shows that there is a significant difference between the mean achievement scores of students in the experimental and control groups at 0.05 level of significance, since the t-calculated value 23.33 is greater than the t-critical value of 2.10, this indicate that students who were exposed to the CAI significantly performed better in their achievement when compared to students in the control group who were not exposed to the treatment. Therefore, the null hypothesis 1. Rejected, that there is no significant difference in the academic achievement between students taught using CAI and those taught using Lecture method. The result is a clear indication that students exposed to the Computer-Assisted Instruction (CAI) method were better in their performance than those exposed to Lecture Method.

Hypothesis 2: There is no significant difference between the mean achievement scores of male and female student who were taught with computer assisted instructional package only.

Table 4: T-test Analysis of Male and Female Student's Performance of Experimental Group

Variable	N	$\overline{X}$	Df	Standard Error	t-cal	t-crit	Decision
Male	10	69.30	18	1.315	3.04	2.10	Rejected
Female	10	64.80					
Total	**20**						

Table 4.8revealed that there was a significant difference between the achievement scores of male and female student is the experimental group at 0.05 level of significance since t-calculated value of 3.04, is greater than t-critical value of 2.101. Hence, this indicate that male students who were exposed to the CAI significantly performed better in their achievement when compared to female students who were not exposed to the CAL. Therefore, the null hypothesis 4 rejected, that there is no significant difference in the academic achievement between female students taught using CAI. The result is a clear indication that male students

exposed to the Computer-Assisted Instruction (CAI) method were better in their performance than the female.

4.2   Summary of the Findings
The following below are the finding from the study based on data collection and analyzed and hypothesis tested.
There was a significant difference between the mean achievement scores of student who were taught with computer assisted instructional package and those who were taught the same arithmetic progression by lecture method.
There was a significant difference between the mean achievement scores of male and female student who were taught with computer assisted instructional package.

4.3   Discussion of Findings
The discussion is presented in line with the objective of the study

The Academic Achievement of Students Taught Arithmetic Progression using CAI and those Taught with Lecture Method
Table 1 showed the mean achievement scores and standard deviation of student's performance in the experimental and control groups. Students in the experimental group had a mean achievement score of 62.10 and standard deviation 9.65 while the control group had a mean achievement score of 40.50 and standard deviation 7.80

The test for hypothesis1 reveal that: There is a significant difference between the mean achievement scores of student who were taught with computer assisted instructional package and those who were taught the same arithmetic progression by lecture method. The finding is table 3 showed that t-calculated value of 23.33is-greater than t-critical value of 2.10, at 0.05 level of significance based on this, the null. This indicates that there was a significant difference between the achievement score of student who were taught with computer assisted instructional package and those who were taught the same arithmetic progression by lecture method. This implies that student taught with computer assisted instructional package performed better than those taught with lecture method. This result was in agreement with Ozofor (2001) which stated that students performed better with computer assisted instruction than with lecture method. Anemelu (2012) also support the finding that student taught with computer assisted instructional package performed better than those taught with lecture method. The reason for the achievement of this finding could be that some student had advantage on computer activities before the experiment was carried out.

The Mean Achievement Scores of Male and Female Student Exposed to Computer Assisted Instructional Package only
Table 2 showed the mean achievement score and standard deviation of male and female student's performance when exposed to computer assisted instructional package. The male student had a mean score of 69.30 and standard deviation 6.40 while the female students had a mean score of 64.80 and standard deviation of 6.10.
Hypothesis 2 which state that: There is no significant difference between the mean achievement scores of male and female students who were taught with computer assisted instructional package. The result in table 4 showed that t-calculated value of 3.04 is greater than the t-critical value of 2.10 at 0.05 level of significance. Based on this, the null hypothesis 2 was rejected. This indicates that there was a significant difference between the mean achievement scores of male and female student who were taught with computer assisted instructional package. This

implies that the male student performed better than the female student in the experimental group.

The result was in agreement with Chebet (2006) which stated that a boy has a strong affinity and interest towards mathematics than girls. However, the finding is contrary to Tuatongha (2007), Anemelu (2012) Oluwele & Ahmed (2015) which stated that there was no significant difference between the mean achievement scores of male and female student taught with computer assisted instructional package. Although is in agreement with Chebet (2006), also in my own finding there is slight significance difference because the boys have stronger affinity to computer assisted instructional package in mathematics than that of the females.

Conclusion
Based on the result of this finding, the following were deduced that computer assisted instructional package has a significant beneficial influence on the learners of arithmetic progression than the lecture method. The used of CAL package does not discriminate between genders in academic achievement thus CAL is gender friendly. Hence CAL have effect on student achievement in mathematics.

5.4   Recommendations
The following recommendations were made:
1.   Senior secondary schools should be provided with computer to make students get use to computer packages.
2.   Mathematics teachers should use computer software in teaching of mathematics to enhance student's achievement and make learning of mathematics interesting.
3.   Teachers should be trained and retrained on the use of computer for mathematics learning to enable them develops computer assisted instructional packages for affective teaching.

Suggestion for Further Study
Below are the suggestions for further studies
1.   Similar study can be carried out within the same state
2.   Similar study can be carried out on other topic is mathematic.

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