

EFFECT OF COMPUTER ASSISTED INSTRUCTION AND LECTURE METHOD IN TEACHING MATHEMATICS ON SENIOR SECONDARY SCHOOL STUDENTS' PERFORMANCE IN SOKOTO METROPOLIS, SOKOTO STATE

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Abstract

This research focused on effects of CAIM and lecture method in teaching Mathematics on Senior Secondary School students' performances. The research design for the study was experimental research design. The sample comprised 371 SS II students, randomly selected from Six (6) secondary schools where the two methods were adopted in teaching Mathematics (i.e. The Computer Assisted Instruction Method (CAIM) and Lecture Method (LM). The Student Mathematics Performance Test (SMPT) was designed, validated and used for collecting data. The data was analysed using independent t-test for the hypotheses. The findings revealed a significant difference in the mean achievement scores of subjects exposed to experimental treatment using CAIM and students taught using lecture method. There was significant Differences between Male and Female exposed to the same treatment using CAIM material. It was found that Male students perform better than female students. The research therefore recommended the use of CAIM in Government schools. It should put more effort toward the provision of ICT facilities and training of teachers for better performance in Mathematics.

Introduction

Mathematics is generally regarded as the foundation for scientific and technological development (Kurumah and Imoko 2008). Harbor-Peter, in Iyekekpolor and Solomon (2008) stated that Mathematics is not only a foundation to science but also to technology, which is the bedrock of modern development. In view of its importance for technological development and its usefulness in everyday living, Nigeria as a nation made Mathematics a core and compulsory subject in all its educational level i.e. Primary, Secondary, and in some courses of Tertiary institutions.

Unfortunately, over the years, the performance of Nigerian secondary schools students in Mathematics in both external and internal school examinations have been disappointing, (Ukeje in Iyekekpolor and Solomon, 2008). For these reasons educators have been looking for ways to improve the performance of students and revise their negative perception about the subject. One of the tools that is being integrated into the realm of teaching is the Information and Communication Technology (ICT)

According to Blurton (1999) ICT mediated instruction refers to instruction delivered via a technological channel such as television, radio, computer and internet. ICT has proved to be a valuable aid to solving problems and accomplishing task in business, industry, education, government and many other human endeavours (Moursund 2003). However the use of ICT in education is relatively new in Nigeria, (Bilesanmi-Awoderu, 2006). Despite being at its infancy stage, the use of ICT in education is receiving certain degree of support from various sectors including the government.

One of the subjects where the use of ICT is being studied and used at this time is Mathematics. Since Mathematics is abstract in nature, teachers are constantly looking for

ways or tools to help their pupils /students in understanding the skills and concepts of the subject or topics. Bawa and Abubakar (2008) noted that teaching aids are resources or materials which are real and meant to facilitate teaching and learning process (ICT is included) to make the teaching skills more understandable through the active involvement of the learner. In addition, ICT is seen as a tool that will be able to help student with problem – solving which is the basic skill needed in Mathematics.

Furthermore Ittigson and Zewe (2003) noted that the technology is essential in teaching and learning Mathematics and enhances students understanding of basic concepts. Also British Educational Communication and Technology Agency BECTA (2003) summaries the key benefit for the use of ICT as it promotes great collaboration among students and encourage communication, the sharing of knowledge, rapid and accurate feedback to students and this contributes toward positive motivation, it also allow them to focus on strategies and interpretations of answers rather than spend time on tedious computational calculations. ICT also supports constructivist's pedagogy, where a student uses technology to explore and reach an understanding of mathematical concepts. This approach promotes higher order thinking and better problem solving strategies.

Solomon and Tsue Avan (2008) on their study on effect of Computer Assisted Instruction (CAI) on students' achievement in Mathematics the researchers try to examine the influence that CAI in collaboration with traditional (lecture) method of teaching would have on the male and female secondary students in mathematics and find out that the students exposed to CAI performed better than those exposed to LM. Also Male learners performed better than female learners.

Pope (2001) in an investigation in to the effectiveness of teaching Mathematics at key stage 3 and 4 with 9 graphic calculators, eight teachers from four comprehensive schools were provided with class set of graphic calculator a PC link and view screen. The graphic calculators (GCS) had been programmed with same software application intended to support the leaning of mathematics at key stages. Teachers made regular use of the calculator programs, the graphic facilities, large screen facilities and data handling capabilities. Despite the study, running for only two terms, it proved feasible to integrate the calculator in to teaching all classes from year 7 to year 11. Teachers and students were enthusiastic about the potential of the calculators and quickly found and number of different ways to exploit them. In Iji and Udom (2007), observed that computer when used in teaching and learning encourages students' problems, solving behaviour, Iji specifically discovered that the teaching of problem solving becomes much easier and less burdensome in Mathematics classroom, as noted by Etukudo and Utin (2006) in their research the effectiveness of basic program package in teaching graph of quadratic expression on secondary school student performance,

According to Onasaya, Daramola and Asuaquo (2006) in their research on the effect of computer assisted instructional package on secondary school students' performance in introductory technology in Ilorin, The researchers found out that students using the CAI package performed better than those using the conventional (lecture) method and that student shows more interests in their lesson as a result of visualization. Furthermore, a review of 219 studies on the use of technology in education consistently found that students in technology

rich environments experienced positive effects on performance in all subject areas (Bee and Chia, 2008).

Solomon and Tue Avan (2008) stated that the effective application or use of ICT in Nigerian educational system could provide a significant impact. This suggests that ICT should be carefully studied in order to determine its actual contribution in teaching and learning. It is against this background, this study was intended to examine the relative effectiveness of ICT package in teaching and learning with conventional (lecture) method of teaching Mathematics among senior secondary schools in Sokoto.

Statement of the Problem

Generally, students have fear and hate Mathematics which has resulted to lack of interest and poor performance in the subject (Kurumeh 2008). This may be the reason why many have negative attitude or poor perceptions toward the subject, which most likely lead to the poor performance in Mathematics. Government, parents, teachers and general public are looking for a way to improve students' performance and positive attitude towards the subject. This becomes imperative because Mathematics is a core subject that helps in Scientific and Technological Development of every nation.

However, the use of Information and Communication Technology (ICT) as a tool for teaching and learning is a newly integrated idea that has been introduced in Nigeria and Sokoto State in particular. Therefore, there is need for a proper investigation / research for the effective use of ICT in teaching and learning of Mathematics,

Furthermore the gender effect on the part of Science and Mathematics is one of the areas where many research have been done with the aims of finding ways to increase the female participation in Science and Mathematics in particular. Some researchers attribute the low participation and poor attitude towards Science and Mathematics of female students as lack of interest in the subject (Orode, 2006). Thus as ICT mode of instruction is newly integrated tools for teaching and learning in Nigeria and Sokoto State in particular. There is need to investigate if it has any effect on gender when ICT is use in classroom instruction.

Thus this research study therefore, was aimed at finding out to what extent ICT tools or mode of instruction affect Students performance in Mathematics at Secondary School level in Sokoto State. It will also determine whether it could have any effect on gender.

Objectives of the Study

The objectives of this study are to find out:

1. The relative effectiveness of using CAIM in teaching and learning Mathematics with lecture method in students' performance among Secondary School Students of Sokoto State
2. Whether there is a gender difference in the performance among Students taught using CAIM in Sokoto State.

Research Questions

1. Is there any significant difference between mean performance scores in pre-test of experimental (Group A) and control (Group B)?
2. Is there any significant difference between mean performance scores of students taught Mathematics using Computer assisted instruction method (CAIM) and those taught using lecture method (LM)?
3. Is there any significant difference between mean performance scores of Male and Female Students taught using CAIM mode of instructions?

Research Hypotheses

Based on the above research question raised, the following hypotheses have been generated.

- Ho₁:** There is no significant difference in the mean performance scores in the pre-test of experimental and control group.
- Ho₂:** There is no significant difference in the mean performance scores of student taught Mathematics using CAIM and those taught using lecture method (LM).
- Ho₃:** There is no significant gender difference between the mean performance scores of Male and Female students taught using CAIM mode of instructions.

Methodology

Research Design

The research design for this study was experimental research design. The researcher used the pre-test , post-test method to conduct the research , because the method is one of the best method for the experimental study that deals with relationship among variables, testing of hypothesis and making generalization (Sambo, 2008)

Sample and Sampling Technique

The target population of the study consist all SS II students from public secondary school in Sokoto metropolis. Given the large size of the population and limitation of fund it will be unrealistic to cover the total population. Therefore Krejcie and Mogans (1970) table was used and the needed sample was found to be 371 students. The sample was selected using random sample sampling method, where 2 in each category of state owned schools were purposely selected.

Instrument for data collection

The instrument for data collection was Student' Mathematics Performance Test (SMPT), which consist of 20 multiple choice questions. The questions was obtained from SSCE & NECO examination base on the topic covered, in order to determine students' Performance if any when ICT package was used. Expert from Usmanu Danfodiyo University at Faculty of Education and Extension Services validated the instrument. The level of consistency was obtained using Kuder Richardson formulae (KR20) and the value of reliability index was found to be 0.78. For the administration of the instrument A pre-test was given for both

Group A and Group B to determine the level of homogeneity in the two groups. A post-test was also given for the both groups (i.e. A and B) after a treatment was given base on the two teaching strategies, i.e. Computer Assisted Instruction Method (CAIM) and Lecture Method (LM). CAIM was programmed in a Compact Disk Derive Read Only Memory (CD ROM), which was used with the aid of projector to deliver the lesson for group A. For the Lecture Method (LM) a usual lesson plan was used (for Group B) so that to determine the difference in the performance if any between the two groups and gender (Male and Female) in the experimental group (Group A).

Method of Data Analysis

The researcher used t-test, statistical analysis to answer the research hypotheses at 0.05 level of significance.

RESULTS

H₀₁: There is no significant difference between the pre-test score of the experimental and control group

Table 1: A summary of test for homogeneity in the pre-test of Group A and Group B

Group	N	Mean (X)	S.D	df	t-cal	t-crit	P-Value
Group A	186	7.41	4.61	369	0.063	1.9600	0.950
Group B	185	7.44	4.28				

In Table 1 Group A had a mean (x) value of 7.41 while Group B obtains a mean (x) of 7.44, with a standard deviations of 4.61 and 4.28 respectively. And t-cal. of 0.063 with 369 degree of freedom at 0.05 level of significant, where p- value was found to be 0.95. Since $p > 0.05$ level of significant, then the null hypotheses was accepted and conclude that There is no significant difference between the pre-test score of the Group A(Experimental)and Group B(Control)

H₀₂: There is no significant difference in the mean achievement scores of students taught mathematics using CAIM and those taught using lecture method (LM) of teaching.

Table 2: T- Test of difference between mean of Group A (experimental) and Group B (control group)

Group	N	mean(X)	S.D	df	t-cal	t-crit	P-Value
Group A	186	12.1774	4.8396	369	6.942	1.9600	0.000
Group B	185	8.5243	5.2874				

On table 2 show the mean score of students in Group A (12.1774) is higher than Group B (8.5243) which shows that Group A performed better than Group B. Even testing the hypotheses shows that t-cal. (6.942) is greater than t-crt. (1.9600),and a p-value of (0.0000) was obtained, which is less than 0.05 level of significance i.e. $p < 0.05$, it follows that the null

hypothesis was rejected. And conclude that there is significance difference between the performance of Group A (Experimental) and Group B (Control group).

H₀₃: There is no significant difference in the mean achievement scores between Male and Female students taught using ICT mode of instruction.

Table 3: T-test of difference between mean of Male and Female students taught using CAIM mode of instruction

Group	N	mean (x)	S.D	Df	T-cal	P-value
Male	93	13.150	4.18	183	2.139	0.034
Female	93	11.698	5.03			

The Table 3 shows the mean score of Male students in Group A (13.150) is higher than Female students (11.698) in the same group, it follows that Male student do better than their Female counterparts when CAIM was used. As its shown in testing hypothesis, where t-cal.(2.139) at 0.05 level of significant with 184 degree of freedom and p- value of 0.034, which is less than 0.05 level of significance. Therefore Since $p < 0.05$ the null hypothesis is rejected. And conclude that there is significance difference between Male and Female students taught using CAIM mode of instruction. Therefore findings research is in conformity with the majority of other research findings which concluded that Male students perform better than Female students in Mathematics.

Discussion of the Findings

The finding of this research revealed that there is a significant difference in the mean scores of the students taught using Computer Assisted Instruction Method (CAIM) and those students taught using Lecture Method (LM) of teaching. And that Male students performed significantly better than Female students taught using CAIM mode of instruction.

This better performance discovered in this study agreed with the findings of Solomon and Tsue Avan (2008) where they discovered that students exposed to CAI method of teaching Mathematics performed better than student exposed to TIM, and that Male students performed better than Female students exposed to CAI in the Federal Unity College of the North –East Geo-political zone of Nigeria. It also agreed with the findings of BECTA (2003), who discovered in relative effectiveness of ICT and conventional method that those taught using ICT mode performed better than those taught using conventional method, and that pupils using ICT focused more attention on interpretation than those using paper in United kingdom and also Pope (2001), Iji and Udom (2007) in their research for the influence of ICT and students' achievement in secondary school Mathematics. They discovered that Students' Mathematics achievement improved due to the use of ICT in Mathematics classroom at Ikot Ekpene in Akwa Ibom State.

And also Etukudo and Utim (2006) in their research. For the effectiveness of basic program package in teaching graph of quadratic expression on secondary school students performance in Egbema/Ndomi local government of Rivers State, and Anthony (2009) all find out that ICT improves positive learning when it is used appropriately in the classroom instruction.

Recommendations

Based on the findings of the research work and interpretation of the results concluded that use of the ICT mode of instruction is an important tool for better performance in Mathematics. The following recommendations are made.

1. That the government should make provision for the introduction, implementation and funding of CAI in Nigerian schools to remedy the current low performance.
2. There should be more training and retraining of teachers as the new curriculum introduces the use of ICT in both secondary and primary schools.
3. The professional bodies like Mathematical Association of Nigeria(M. A. N), should conduct more researches , workshops and find more Mathematical software(package) that are relevant in our schools for effective teaching.
4. The State Ministry of Education should take necessary steps in the implementation and adaptation of ICT in schools by taking the perception of the teachers in the State.

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