The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2016

Volume 4, Pages 378-384

ICEMST 2016: International Conference on Education in Mathematics, Science & Technology

MAXIMIZING THE GAINS OF COMPUTER ASSISTED INSTRUCTION IN MATHEMATICS TEACHING

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ABSTRACT: The use of computer Assisted Instruction has positive effect in the academic achievement of students in Mathematics. Against this background, the study sought to determine the extent of the utilization of Computer Assisted Instruction in the teaching of Mathematics in the Secondary Schools in Nigeria. The study was carried out in Ika South and Ika-North East Local Government Areas of Delta state, Nigeria. All the Mathematics teachers in the schools were used for the experiment. They were 80 Mathematics teachers made up of 42 males and 38 females. A descriptive survey design was adopted while the research instrument was questionnaire. Five research questions guided the study and the research questions were addressed using graphs, percentage and frequency counts. Three hypotheses were formulated which were tested with t-test statistical tool at 0.05 level of significance. The result of the study indicated that teachers possess knowledge of computer and they have computer sets in their schools but no power supply for their usage. Furthermore, the teachers do not teach Mathematics contents using computer. It was also found that Gender and School location (Urban and Rural Areas) have no influence in the use of Computer Assisted Instruction. Adequate recommendations were made, among which; are that Mathematics teachers should be giving In-Service training by Government on the use of computer to teach Mathematics, they should be encouraged to use computer in the teaching of Mathematics and that schools should be provided with adequate power supply.

Keywords: Maximizing, computer, mathematics, teachers.

INTRODUCTION

In Nigeria, Mathematics is a compulsory subject at the Nursery, Primary and Secondary educational levels. As a result, great emphasis is placed on its teaching and learning. The all-important subject plays significant role in the development of Science and Technology which is the key of National Development (Onwuka and Koko, 2010). In otherwords, no Mathematics, no Science and no Technology.

In the world today, Information, Communication and Technology (ICT) has become a vital tool in the infrastural and economical development of nations(Olowo and Bitrus,2012). To them, ICT is the Scientific, technological and engineering tool used in handling of information, processing applications related to computer. House(2003) noted the motivational power of computer towards the teaching and learning of Mathematics and averred that children enjoy learning Mathematics with computer which accelerates into higher academic achievement. Similarly, Dugdale (1990) and Etukudo (2009) also asserted that the use of computer Assisted Instruction has a significant positive effect in the academic achievement of students in Mathematics.
As indicated in the National Policy on Education by Federal Republic of Nigeria (2004), one of the National educational goals is "the training of the mind in the understanding of the world around". The National Policy further stressed the fact that in order to realize fully the potentials of educational contributions to the development of the nation, modern educational techniques shall be increasingly used and improved upon in schools at all educational levels. Globally, the modern educational technique is the use of Computer Assisted Instruction in the teaching and learning process.

In Nigeria, the performance of Mathematics is poor at all educational levels; particularly at secondary school level and teacher rates high among other factors militating against poor performance(Agashi and Enemali, 2015). The use of Computer Assisted Instruction(CAI) with all its benefits improves students performance. No educational level can arise above its teachers and teachers hold the key to National development. Against this background, one would want to investigate into the extent of application of Computer Assisted Instruction in the

- Selection and peer-review under responsibility of the Organizing Committee of the conference

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teaching of Mathematics in the Nigeria secondary schools. In other words to investigate whether they are computer literate and to verify the extent of the application of their knowledge in teaching Mathematics. Additionally, gender analysis was carried out in order to verify if female and male Mathematics teachers exhibit differential knowledge in using CAI to teach Mathematics. The researcher also investigated whether the teachers in urban and rural schools possess the same knowledge of CAI in Mathematics.

Statement of Problem

Mathematics is an important and compulsory subject in Nigeria at the nursery, primary and secondary educational levels. The performance of students at these levels has been poor. Many reasons have been adduced for the poor performance, among which teachers factors rates the highest.

Federal Government of Nigeria(FGN) has laid emphasis on the use of modern educational techniques of teaching which can accelerate to improved performance. The use of Computer Assisted Instruction in the classroom is one the modern educational techniques. The problem therefore is: "how many secondary Mathematics teachers are computer literate and arecomputer instruction in teaching Mathematics"?

Purpose of Study:

The purpose of the study is to investigate the extent of the usage of Computer Assisted Instruction in the teaching of Mathematics in the classroom.

Specifically, the Study Focused on:

1. The extent Mathematics teachers possess the knowledge of computer.
2. The availability of computers and power supply in the schools.
3. The application of CAI in the teaching of some specified Mathematics topics.
4. Differential analysis of female and male Mathematics teachers in using CAI.
5. Differential analysis of urban and rural Mathematics teachers in the use of CAI

Research Questions:

1. To what extent do Mathematics teachers posses knowledge of computers?
2. To what extent are computers available in schools?
3. What is the level of mathematics Teachers' competence in the use of computers in teaching Mathematics?
4. Will there be difference between Male and Female Mathematics Teachers in the use of computers in teaching Mathematics?
5. Will there be difference between Urban and Rural Mathematics teachers in the use of Computers in teaching Mathematics?

Hypothesis:

Ho1: There is no significant difference in the use of Computers by Mathematics Teachers in the teaching of Mathematics.
Ho2: There is no significant difference between Male and female Mathematics teachers in the use of computers in teaching mathematics.
Ho3: There is no significant difference between Urban and Rural Mathematics teachers in the use of computers in teaching Mathematics.

METHODOLOGY

The Research design adopted for this study was a descriptive survey design. The study was carried out in Delta State and two local Areas were used for the study. They are Ika North-east and Ika South. All the Mathematics teachers in the two the local Government Areas were used. They are 17 public secondary schools in ika south, while Ika North-east has 16.

The Instrument used for data collection was questionnaire; made up of 20 items with "Yes" and "No" as options. The instrument was validated by experts in Mathematics Education. The experts' views and suggestions were employed and affected in getting the final draft of the instrument. The questionnaires were administered to the Mathematics teachers in the 33 public secondary schools.
In analyzing the data collected, three research questions were answered and graph, while 2 were answered with frequency count. The 3 null hypotheses were tested using t-test statistical tool at 0.05 significant level.

INTERPRETATION OF RESULT

Research Question 1

To what extent do mathematics teachers possess Knowledge of Computer?
Using simple percentage, the graph below shows the responses of teachers on their knowledge of Computer.

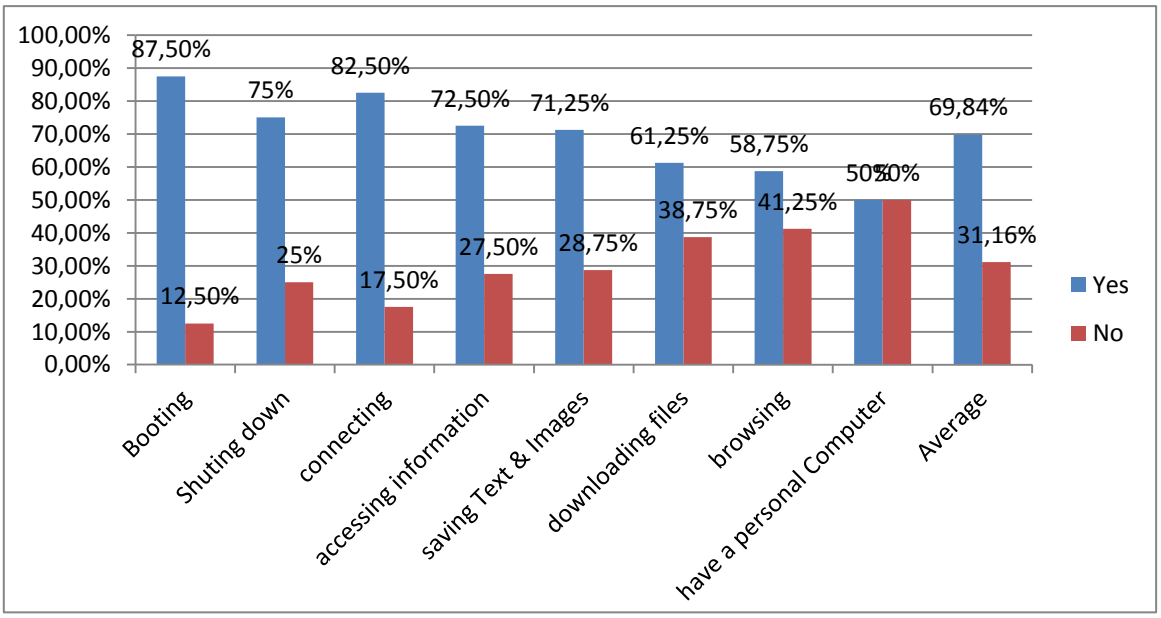

Figure 1: Mathematics teachers Knowledge of Computer

The knowledge of mathematics teachers on computer was accessed using different items in the scale. On the ability of mathematics teacher to boot a computer, the figure 1 shows that 87.50% of the teachers accessed could boot a computer while 12.50% of them cannot. Although 87.50% of the mathematics teachers can boot a computer, only 75% can shut down a computer, while 25% cannot shut down a computer properly. The figure shows that 82.50% of the teachers can connect a computer, 72.50% of them can access information on the computer. In using the computer to save text and images, 71.50% can do that while only 61.25% can download file using a computer; 58.75% can browse using the computer and only 50% of the teachers accessed had personal computer. In all, it was observed that mathematics Teacher have a good Knowledge of computer. As more than 50% (69.84%) of the teacher accessed had a good knowledge of computer.

Research Question 2

To what extent are computer available in Schools?

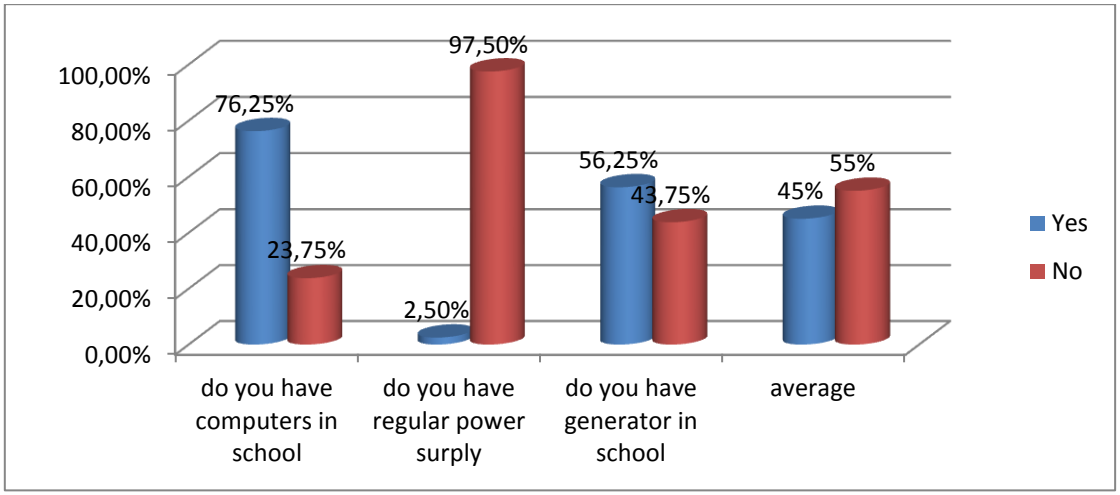

Fig 2. Availability of Computers in schools.

In answering the questions, if computers are available in schools, the figure shows that 76.25% of the teachers accessed had computers in their schools, but only 2.50% had regular power supply to use them and 56.25% had

generators their schools to use these computer. From the figure 2, it will be concluded that though computer are available in schools, they are not being used due to lack of power supply.

Research Question 3:

What is the level of Mathematics Teachers' Competent in the use of computers in teaching mathematics?

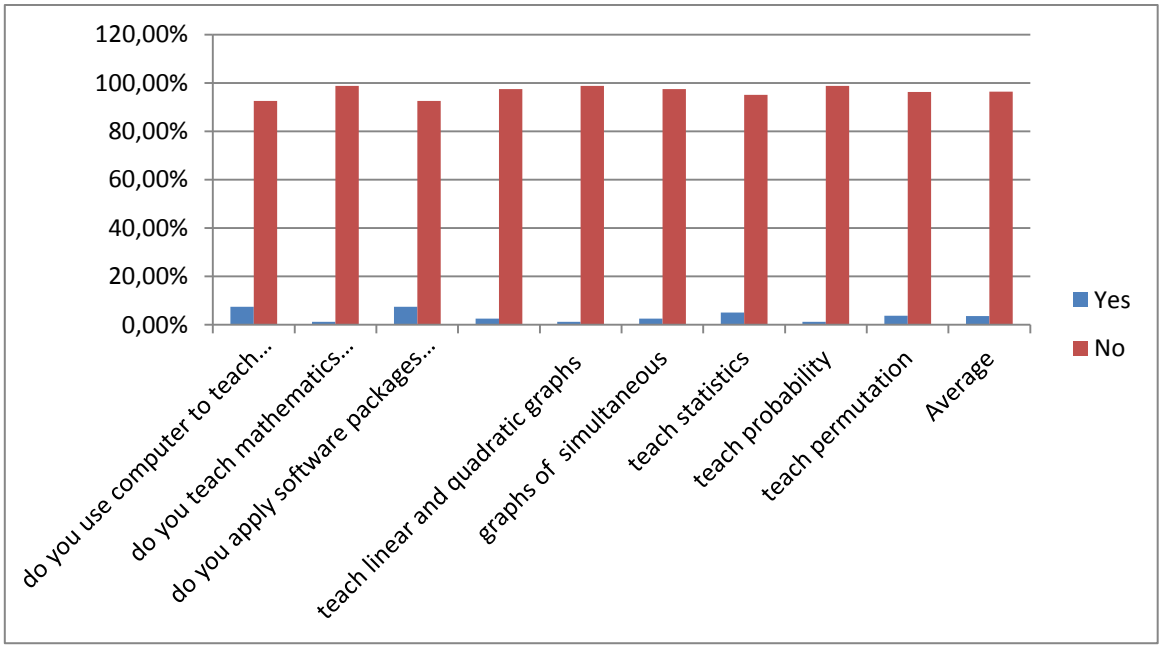

Figure 3: Mathematics Teachers Competence in the use of computer to teach mathematics

From the figure, only 7.5% of the teachers can teach Mathematics with computer while only 1.25 teaches Mathematics using projector. Further more, in the area of contents teaching, the result indicates that 2.5% teach quadratic equations using computer, 1.25% teach quadratic graphs while 2.5% of the teachers use computer in teaching simultaneous equations. Similarly, 5% of the teachers teach Statistics using computer, 1.25% teach Probability and 3.75 teach Permutation and Combination using computer. On the average, 3.61% of the teachers teach Mathematics contents in the classroom while 96.39% do not. Hence, one may conclude that, though computers are available in the schools but the Mathematics do not use computer to teach Mathematics.

Research Question 4:

Will there be any difference between male and female mathematics teachers in the use of computers in Teaching Mathematics?

Table 1: Difference between male and female mathematics teachers in the use of computer to teach mathematics

	Items	Male		Female	
		Yes	No	Yes	No
1	Do you use computers to teach mathematics?	3	39	2	36
2	Do you teach Mathematics with a computer using projectors?`	1	41	0	38
3	Do you apply software packages such as Microsoft Word & Excel in teaching maths?	5	37	1	37
4	Do you teach linear and quadratic equations using computers?	2	40	0	38
5	Do you teach linear and quadratic graphs using computers?	2	40	0	38
6	Do you teach graph of simultaneous equations using a computer?	1	41	1	37
7	Do you teach statistics- mean, median, mode, using a computer?	3	39	1	37
8	Do you teach probability using a computer?	1	41	0	38
9	Do you teach Permutation and Combination using a computer?	2	40	1	37
	TOTAL	20 (5.29%)	358 (94.71%)	9 (1.75%)	336 (98.25%)

From the Data in Table 1, it was observed that both male and Female Teachers were not good at using computer to teach mathematics. As Items 1 – 9 had very low number of teachers answering yes in both male and female mathematics Teachers. The yes answer for male teachers is only 5.29% while that female teachers is only 1.75%. both of them is low. The answer to the research question 4 is : there is no difference between male and female mathematics teachers in the use of computer in teaching of mathematics.

Research Question 5:

Will there be any difference between urban and rural mathematics teachers in the use of computers in Teaching Mathematics?

Table 2: Difference between urban and rural mathematics teachers in the use of computer to teach mathematics

	Items	Urban		Rural	
		Yes	No	Yes	No
1	Do you use computers to teach mathematics?	4	22	2	52
2	Do you teach Mathematics with a computer using projectors?	1	25	0	54
3	Do you apply software packages such as Microsoft Word & Excel in teaching maths?	3	23	3	51
4	Do you teach linear and quadratic equations using computers?	1	25	1	53
5	Do you teach linear and quadratic graphs using computers?	1	25	1	53
6	Do you teach graph of simultaneous equations using a computer?	2	24	0	54
7	Do you teach statistics- mean, median, mode, using a computer?	3	23	1	53
8	Do you teach probability using a computer?	1	25	0	54
9	Do you teach Permutation and Combination using a computer?	2	24	1	53
	TOTAL	18 (7.69%)	216 (92.31%)	9 (1.85%)	477 (98.15%)

From the Data in Table 2, it was observed that both Teachers from urban and rural schools were not good at using computer to teacher mathematics. The urban Mathematics teachers that teach Mathematics using computer is 7.69% while rural Mathematics teachers is only 1.85%; both are low. The answer to the research question 5 therefore is: there is no difference between mathematics teachers from urban and rural schools in the use of computer in teaching of mathematics.

Hypothesis One:

There is no significant difference in the mean score in the use of computer by mathematics Teachers
Using one sample t-test, the hypothesis one was tested

Table 3: One sample t-test of the difference in the difference in the mean score in the use of computer by mathematics Teachers

N	Mean	Std. Deviation	T	df	sig	Remark
80	1.3638	.18960	-6.428	79	0.000	Rejected

Using the average mean of 1.50 as cut off (or bench mark), the table 3 shows that there was a significant difference in the mean score in the use of computer by mathematics teachers [$t(79) = -6.428$; $\rho = 0.00$; Mean value = 1.3638]. The null hypothesis is therefore rejected and the alternative holds true. The result therefore implies that there is a significant difference in the mean score in the use of computer by mathematics Teachers. The mean value of 1.3638 was not up to the benchmark. This shows that mathematics teachers are not competent in using computer to teach mathematics.

Hypothesis Two:

There is no significant difference between male and female mathematic teachers in the use of computer in teaching Mathematics

Table 4: Difference in the mean score in the use of computer by mathematics Teachers based on Gender

Sex	N	Mean	Std. Deviation	t	df	sig	Remark
Male	42	1.0556	.17908	1.212	78	0.230	Accepted
female	38	1.0175	.09143				

The table 4 shows that there is no significant difference between male and female mathematic teachers in the use of computer in teaching Mathematics [t(78) = 1.212; ρ = 0.230]. The null hypothesis is therefore accepted. The result maintains that there is no significant difference between male and female mathematic teachers in the use of computer in teaching Mathematics.

Hypothesis Three:

There is no significant difference between the urban and rural Mathematics teachers in the use of computer in the teaching Mathematics.

Location	N	Mean	Std. Deviation	t	df	sig	Remark
Urban	26	1.0769	.22171	1.30	78	0.204	Accepted
Rural	54	1.0185	.08290				

The table 4 shows that there is no significant difference between the urban and rural Mathematics teachers in the use of computer in the teaching Mathematics [t(78) = 1.30; ρ = 0.2o4]. The null hypothesis is therefore accepted. The result maintains that there is no significant difference between the urban and rural Mathematics teachers in the use of computer in the teaching Mathematics.

DISCUSSION

A look at the analysis of the result in table 3, with the one sample t-test, indicates a significant difference in the mean score in the use of computer by Mathematics teachers. This shows that Mathematics teachers are not competent and they do not use computer in the teaching of Mathematics. The result is in consonance with the findings of Pelgrum and Plomp(1993). They found that only a small proportion of teachers used ICT to teach Mathematics. However, it is at variance with that of Odogwu and Mbah(2015) who carried out their study in Lagos state of Nigeria. Findings of study indicates that majority of the teachers have positive attitudes towards the use of ICT and the teachers are competent in the use of computer in the classroom.

On gender, the result of the t-test indicates no significant difference between male and female Mathematics teachers in the use of Computer Assisted Instruction in teaching Mathematics in the classroom. The result also differs from the study carried out by Odogwu and Mbah(2015); their findings showed a significant gender difference in Mathematics teachers attitudes towards the use of computer .which means male and female teachers do not have the same attitude. Infact, their result indicates that female Mathematics teachers have more positive attitudes towards the use of computer than the male teachers. Similarly, on school location, there was no significant difference in the use of CAI between urban and rural Mathematics teachers. The Mathematics teachers do not use CAI in teaching Mathematics; irrespective of the location of the school.

CONCLUSION/RECOMMENDATIONS

The study investigated the utilization of Computer Assisted Instruction{CAI} by the Mathematics teachers in the classroom. The study revealed that the Mathematics teachers possess the knowledge of computer, and there are computer sets in their schools but they do not have power supply, most of the time for operation. The findings of the study further indicated that inspite of the computer knowledge they possess, they are not competent to teach Mathematics contents using Computer Assisted Instruction. Based on this, the following recommendations were made.

1. In-Service training should be provided for Mathematics teachers whereby they can practice the contents of secondary school Mathematics using Computer.
2. Mathematics should endeavour to teach Mathematics contents with CAI.
3. There is need to improve on power supply by the authorities responsible for providing learning facilities in schools.
4. Mathematics teachers should be encouraged to use CAI in the classroom by the Government by providing some incentives. This will definitely improve their attitudes, positively.

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