

IMPACT OF INTEGRATING ICT ON PUPILS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN PRIMARY SCHOOLS IN AFIJIO LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA

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Abstract

This study investigated the impact of integrating ICT on pupils' academic achievement in mathematics in primary schools in Afijio Local Government Area, Oyo State, Nigeria. The quasi-Experimental research design was employed in this study. The targeted population consists of the Primary Schools Pupils in Afijio Local Government Area, Oyo State. One hundred Pupils (50 males and 50 females) from one school for the treatment group in a school and one hundred Pupils (50 males and 50 females) were selected for the Control Group in another school. Stratified Random Sampling was used to ensure the generalization and the accuracy of the data. The instrument used was the Mathematics Achievement Test (MAT) consists of 20 multiple-choice questions. The instrument was given face and content validity by two experts. The reliability of the instrument was established using the Test-Retest Method. The result of the test was analyzed using Pearson Product Moment Correlation (PPMC), the reliability coefficient of the instrument was found to be 0.91. The mean, standard deviation and mean difference was used to analyze the research questions. The study revealed that there is a difference in the mean scores of the pupils taught with ICT and those taught without ICT, and there is a difference in the mean scores of the female and male pupils taught with ICT and those taught without. The study concluded that there is a significant role that ICT plays in improving Pupils' academic achievement in mathematics. Based on the result, it was recommended among others that efforts should be made by the government to make ICT facilities available and to provide teachers with the skills and knowledge of how to implement ICT in teaching of mathematics to primary school pupils.

Keywords: *Academic Achievement, Mathematics, Integrating, ICT and Pupils*

Introduction

Teaching is a challenging profession in our society today where knowledge is expanding rapidly. Modern technologies demand the use of Information and Communication Technology (ICT) (United Nations Educational, Scientific and Cultural Organization UNESCO, 2002). ICT has become within a short time one of the basic building blocks of modern society. Many countries including Nigeria now regard understanding ICT and mastering its basic concepts as part of the core of education (UNESCO, 2002). There are developments in the education sector, Nigeria inclusive which indicate some level of ICT application in the primary schools. The Federal

Government of Nigeria, in the National Policy on Education produced by the Federal Ministry of Education (FME, 2004), recognizes the prominent role of ICTs in the modern world and has integrated ICTs into education at all levels in Nigeria. To actualize this goal, the document states that the government will provide basic infrastructure and training at the primary schools. At the primary school level, computer education has been made a pre-vocational elective and is a vocational elective at primary schools. It is also the intention of the government to provide necessary infrastructure and training for the integration of ICTs in the primary school system. The National policy on education (FME, 2004) on primary education also recognizes the prominent role of information technology in knowledge advancement and therefore noted that Government shall provide necessary infrastructure and training for the integration of Information Technology (IT) in the school system. Concerning this, the first mission statement of the national policy for information technology is to use IT for education. It further has as one of the general objectives to integrate IT into the mainstream of education and training. According to Adediran & Morenikeji, (2011), this will undoubtedly be an innovation in the educational system. The use of computers in education is not a new phenomenon. The late 1980s saw a growing shift towards computer-integration which emphasized on the curriculum and not the tools. Its proponents felt that Pupils would learn new skills as they needed them to make the computer work for them. The computer could now be viewed more like a partner as opposed to a competitor and could be treated in a more natural manner (Lockard & Abrams, 2014). According to Olokola, Abdullahi & Omosidi (2014), most teachers leave teacher training institutions with limited knowledge of ways technology can be effectively used in their professional practice. In this age of digitization, being able to effectively apply technology should be high on the list of what teachers at all levels of our education should know and be able to do in any instructional transaction. There is substantial evidence that, if used appropriately for specific purposes in specific contexts, technology can be an effective tool in supporting teaching and learning.

Olakulehin, (2017) Opines that the way Information Communication Technology (ICT) has been used in the education can be divided into two broad categories

- i. ICT for Education and
- ii. ICT in Education.

ICT for education refers to the development of information and communication technology specifically for teaching/ learning purposes, while ICT in Education involves the adoption of general components of technologies in the teaching process, more specifically, often for the training of teachers in the use of technology for teaching. Similarly, UNESCO (2004) classifies ICT in education into three broad categories:

- i. Pedagogy
- ii. Training, and

iii. Continue education.

Pedagogy is focusing on the effective learning of subjects with the support of the various components of ICT. Olakulehin (2017) emphasizes that the pedagogic application of ICT involves effective learning with the aid of computers and other information technologies as learning aids, which play complementary roles in the classroom, rather than supplementing the teacher.

According to Kajuru & Bello (2012), mathematics was always found to be central in everything people do in their daily routines, such that it was assumed to be developed in response to the needs of the society and whose competence is vital to every person for them to have a meaningful and productive life. As such mathematics could be found in virtually every sphere of human endeavour (Tsafe, 2012). Mathematics has an important role in the progress of civilization; whereby through mathematics, a man was raised from the primitive stage when he finds it extremely difficult to even count to such an advanced stage of development, Bature (2012). Similarly, mathematics was described to be the language and currency of science and technology in every discipline in the world today (Ale & Adetula, 2015). In this respect, it serves as the instrument through which exchange of currency between individuals, organizations, companies and even countries could be possible without any barrier in the process – a phenomenon termed as globalization in another perspective.

However, mathematics is equally important in economic development and sustainability. This is because most of the economic policies taken by a country rely to a greater extent on some indices and these indices are being prepared in mathematical terms. This was captured by Adewumi & Adu (citing Mirowski, 2011) in lucid “Mathematics involves reading and interpreting tables, charts and graphs; computing discounts and markups; solving problems related with percentage, ratio and proportion; determining unit costs, total costs, scaled costs for receipts; budgets; financing; credit; cost compared to cash; understanding income, payroll, taxes and deductions; studying Federal Income Tax Annual Reports; comparison of various methods of financial investments; understanding sales tax, utility tax, property tax and miscellaneous taxes; comparisons of insurance programmes; knowledge of cost of manufacturing and analyzing business achievement”. There is an indication that mathematics is inseparable to every economic policy that is to be formulated by any government because all the data to be used in the policy rely on mathematics language and terminologies to be interpreted.

Therefore, the impact of ICT on teaching and learning in Nigeria and any other developing society especially in Primary school cannot be overemphasized. It is very pertinent if one can note that technological advancement has shown lights to the dark paths of Pupils all over the globe. As part of the IT curriculum, learners are encouraged to regard the computer as tools to be used in all aspect of their studies. In particular, they need to make use of multimedia technologies to communicate ideas, describe projects and order information in their academic work.

Statement of the Problem

Before the present century where the advance of Information Communication Technology has taken the lead in reducing the stress of human beings especially Pupils, mathematics have been taught in abstract sense where a student has little or no idea of what the ICT is all about. These have limited the understanding and assimilation of subject content by the Pupils. Lack of exposure to ICT gadgets in its real sense leaves the Pupils in dark, only imagining what it may look like. The process of implementing the ICT in its real sense i.e. Computer-Aided Instruction (CAI) makes the teaching and learning process easier and enhances Pupils' receptivity which has a great impact on their academic achievement especially in mathematics. These summed up to the reason why I embarked on this study "The impact of integrating ICT on Pupils' academic achievement in mathematics in primary schools" which is to expose and justify the impact of ICT on primary schools in Afijio Local Government Area, Oyo state Nigeria.

Purpose of the Study

The following are the objectives of this study:

- i. To examine the difference in the mean score of mathematics pupils taught with ICT and those taught with a conventional method.
- ii. To examine the difference in the mean score of male and female pupils taught with ICT.
- iii. To examine the difference in the mean score of male and female pupils taught with a conventional method.

Research hypotheses

The following hypotheses were tested at 0.05 level of significant:

- H₀₁: There is no difference in the mean score of mathematics pupils taught with ICT and those with a conventional method.
- H₀₂: There is no difference in the mean score of male and female pupils taught with ICT.
- H₀₃: There is no difference in the mean score of male and female pupils taught with a conventional method.

Significance of the study

The significance of the study is centred on the teachers, parents, Pupils, school administrators, and curriculum planners. The use of various ICT-based software and Computer-Based tutoring programs can aid the teachers in teaching the Pupils and also aid them in student's assessment and testing.

The joy of every parent is to see the child perform wonderfully well both in school and at home.

Since the ICT tool can positively aid Pupils' learning outcome, it will foster the happiness and wellbeing of the parents at home. This study can also influence the ICT literacy level of parents at home since they would want to procure ICT tools for the student's practice at home thereby having computers installed and used at home.

ICT knowledge and computer education will help the child to be literate otherwise informed and belong to this present innovative and ICT-driven society. It will also help him to be equipped for future challenges envisaged in the digitized future century. Hence, the child will be able to fit in appropriately into our highly, dynamic and enthusiastic modern world.

Curriculum planners will be made to design a curriculum that will implement effective approaches to ICT technology-driven education at the 21st century in schools syllabus contents which will improve Pupils' skills and competencies for employability and self-sustainability. ICT is presently a useful tool in promoting and enhancing qualitative curriculum planning. ICT tools are being used to determine the best input for the Pupils to aid a reasonable learning outcome which will enhance the realization of the purpose and goal of education.

Methodology

The study employed a quasi-experimental research design, where the experimental design allowed for the study of the population at one specific time and the difference between the individual groups within the population to be compared. In this type of research, independent variables are manipulated to observe the effects on the dependent variables. It serves to determine possible outcomes given certain conditions. There are two groups – an experimental or treatment group and the control group. The experimental group receives the treatment that is, uses of Computer Assisted Instruction (CAI) while the control group does not. The research study is quasi-experimental pre-test post-test control design geared towards finding out the impact of integrating ICT on Pupils' academic achievement in mathematics in Primary Schools in Afijio Local Government Area, Oyo state Nigeria.

The targeted population consists of the Primary Schools Pupils in Afijio Local Government Area, Oyo State. The total population of Pupils in these schools is 6866 Pupils as provided by Oyo State Ministry of Education, Afijio Area Office (2019). The study is restricted to only public primary schools which excludes all private schools within the area of study.

The sample size for the study was 200 pupils generated from each intact class of the two selected schools. That's one hundred Pupils (50 males and 50 female) from one school for the Treatment group and one hundred Pupils (50 males and 50 female) were selected for the Control Group. Stratified Random Sampling was used to ensure the generalization and the accuracy of the data and the availability of the ICT facilities which is needed to carry out the research work.

The two schools selected for the study are St. Andrew primary school, Akinmoorin and St. Catholic primary school, Awe.

A self-structured questionnaire tagged "Mathematics Achievement Test (MAT)" consists of 20 multiple choice questions based on the topic selected for the research is used as a research instrument. Each question carries one (1) mark, equal marks were allocated to the questions totaling to 20 marks.

The instrument and marking scheme was given face and content validity, accuracy and clarity by two experts in the field of measurement and evaluation at Department of guidance and counseling, University of Ibadan, Oyo State, Nigeria.

The reliability of the instrument was established using the Test-Retest Method. Abojupa community primary school pupils were used to test reliability. The result of the test was analyzed using Pearson Product Moment Correlation (PPMC), the reliability coefficient of the instrument was found to be 0.91

Researchers took permission from the authorities of the schools under study. The head teachers handed the researchers over to the assistant head teachers who assisted the researchers during the research. Service of four (4) research assistants was also sought. The procedure for the research is as follows:

Week 1 - Pre-experimental activities and selection of school

Week 2 - Training of Research Assistants

Week 3 - Pretest Administration

Week 4-11 - Treatment and follow-up

Week 12 - Posttest Administration

Total - 12 weeks

Treatment Procedure (Week 4 - 11)

t-test statistic was used to analyze the research hypotheses.

Results

The data collected from the study were analyzed and presented as follows:

H₀₁: There is no difference in the mean score of mathematics pupils taught with ICT and those with a conventional method.

Table 1: mean, standard deviation and t- test statistic of Pupils taught with ICT and those taught without ICT.

Group	No	\bar{x}	S.D	t-cal	t_α	df	Remarks
with ICT	100	7.80	4.33	4.62	1.68	198	Reject the null hypothesis
With conventional method	100	7.00	4.50				

The table shows that t-calculated is more than t- tabulated, we therefore reject the null hypothesis that there is no different in the mean score of pupils taught with ICT and those with conventional method. This implies that the experimental group taught with the use of ICT performs better than the control group taught the same concepts using the conventional lecture method. Responding to the research question in view, the result above shows that there is a difference in the mean scores of the Pupils taught with ICT and those taught without ICT.

H₀₂: There is no difference in the mean score of male and female pupils taught with ICT

Table 1: mean, standard deviation and t- test statistic of male and female taught with ICT.

Group	No	\bar{x}	S.D	t-cal	t_α	df	Remarks
Male	100	6.76	2.36	4.56	1.68	198	Reject the null hypothesis
Female	100	5.01	1.45				

From Table 2, the null hypothesis was rejected and the alternative hypothesis was accepted that there is difference in the mean score of male and female taught with ICT. It showed that the female pupils taught with the use of ICT (Experiment Group) perform better than the Male Pupils in the same group. Responding to the research question in view, the result above shows that there is a difference in the mean scores of the Female Pupils taught with ICT and the Male Pupils in the same group.

H₀₃: There is no difference in the mean score of male and female pupils taught with a conventional method.

Table 1: mean, standard deviation and t- test statistic of male and female taught with conventional method

Group	No	\bar{x}	S.D	t-cal	t_α	df	Remarks
Male	100	6.16	2.36	3.96	1.68	198	Reject the null hypothesis
Female	100	6.01	1.45				

From Table 2, the null hypothesis was rejected and the alternative hypothesis was accepted that there is difference in the mean score of male and female taught with conventional method. It indicated that the Female Pupils taught without ICT (Control Group) performs better than the Male Pupils in the same group. Responding to the research question in view, the result above shows that there is a difference in the mean scores of the Female Pupils taught without ICT and the Male Pupils in the same group.

Discussion of findings

Analysis of Table 1 clearly shows that there is a difference in the mean scores of the Pupils taught with ICT and those taught without ICT. The achievement of the Pupils in the experimental group appears to be better than the Pupils in the control group; this implies that the experimental group taught with the use of ICT performs better than the control group taught the same concepts using the conventional lecture method. From the above assertion, it can be concluded that ICT plays a great role in improving learning and achievement of the Pupils. This verifies the view of Esu (2016) who states that; instructional materials are valuable assets in learning situations because they make lessons practical and realistic. They are the pivots on which the wheels of the teaching-learning process rotate. Since its concretizing issues, it then facilitates revision (recall) activities and provides very unique opportunities for self and group evaluation for the teacher and the Pupils alike. It captures the student intellect and eliminates boredom; make the work easier, neater, and boosting for clarity and more appeal thereby impacting on Pupils' academic achievement

The deduction from Table 2 shows that there is a difference in the mean scores of the Female Pupils taught with ICT and the Male Pupils in the same group which indicates that the Female Pupils taught with the use of ICT (Experiment Group) performs better than the Male Pupils in the same group. This is in contrast to what Shashaani (2017) Opines in Ikpeama (2013) that the

male's Pupils in terms of their achievement, when taught using ICT or Computer-Aided Instruction, performs more than the female student

The Analysis in Table 3 shows that there is a difference in the mean scores of the Female Pupils taught without ICT and the Male Pupils in the same group. This implies that the Female Pupils taught without ICT (Control Group) performs better than the Male Pupils in the same group. Which is in contrast to the findings and conclusion of Belts (2013), where findings indicated that there were differences in Pupils' achievement by gender? Data found that 80% of male pupils perform better than their female counterpart when taught without ICT. It can be described that male Pupils showed higher achievement than female Pupils. From the analysis carried out above, the studies have shown that the impact of ICT is evident considering the difference between the mean score of the experiment and control group. Further, the studies also indicate that the female Pupils perform better than their male counterpart in mathematics in primary schools regardless of the use of ICT or not.

Summary and Conclusion

This study investigates the impact of integrating ICT on Pupils' academic achievement, in mathematics in primary schools in Afijio local government area, Oyo state Nigeria.

Some literature relevant to the study was reviewed. Most of that literature concluded that the academic achievement of Pupils can be enhanced with the integration of ICT in the teaching and learning process. Three research questions were formulated to guide the research; two hundred (200) Pupils were selected from the two schools sampled for the study. The population for the study was split into experiment and Control group, and multiple-choice test questions were designed to collect data and two hundred (200) Pupils were given the test question. The study answered three research questions and Mean, mean difference and standard deviation were used in the analysis of the data. The result of the findings showed that;

- i. There is a difference in the mean scores of the pupils taught with ICT and those taught with conventional method.
- ii. There is a difference in the mean scores of the female Pupils taught with ICT and the Male Pupils in the same group.
- iii. There is a difference in the mean scores of the female Pupils taught with conventional method and the Male Pupils in the same group.

Recommendations

Information and Communication Technology has been noted to help in facilitating educational development in society. If accurate, reliable and fast information must be obtained, the use of ICT becomes a necessity. Based on the findings, the following are recommended:

- i. ICT professionals should be employed in the primary schools in Afijio Local Government Area so that they will conduct computer training to teachers and staff of the schools.
- ii. Every school within Afijio Local government should be equipped with ICT gadgets which will help teachers in conveying learning content more easily.
- iii. The use of ICT in teaching and learning process should be mandated and encouraged in primary schools.
- iv. Pupils should be encouraged and enticed towards developing interest in ICT as it is the hub of our modern society.
- v. Teachers should be admonished to pay close attention to the male Pupils to ensure their participation in the class acts as the result of this study has indicated that their achievement is low when compared with the female counterpart.
- vi. Female Pupils should be encouraged to keep the fire burning as they are coming out of the African mentality that they are weak and unimportant in terms of contributing to the society educationally.

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