IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON TEACHING AND LEARNING OF MATHEMATICS IN SENIOR SECONDARY SCHOOLS IN ENUGU EDUCATION ZONE

BY

DR. JOY CHINELO ANYAFULUDE

DEPARTMENT OF EDUCATIONAL FOUNDATIONS,
FACULTY OF EDUCATION
ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY (ESUT),
ENUGU

Abstract

The purpose of the study was to ascertain the impact of ICT on teaching and learning of mathematics. Two research questions and two hypotheses were posed to guide the study. A descriptive survey design was adopted in the study. A sample size of 122 respondents made up of 17 mathematics teachers and 105 mathematics. Students were drawn using stratified random sampling techniques from six senior secondary schools in Enugu Education zone. Classified by gender, the sample was made up of 51 males and 71 females The instrument used for data collection was a 12 item questionnaire. The instrument had face validity and a reliability coefficient of .87 obtained using Cranach alpha's method. Mean statistics was used to answer the research questions while the hypotheses were tested at .05 significance level using Z- test statistics. The result of data analysis showed that: ICT as instructional materials has helped to a great extent in teaching and learning of mathematics. Also ICT has promoted research by mathematics teachers and students. The respondents classified by gender, differed only on the extent to which ICT has promoted research by mathematics teachers and students. Major recommendation made in the study was that functional ICT facilities should be provided in secondary schools to promote teaching, learning and research in mathematics and other subjects.

Introduction

The use of Information and Communication Technology (ICT) in teaching is a relevant and functional way of providing education to learners in order to assist them imbibe the required capacity for the world of work. Very few jobs today do not require the use of skills in technology, collaboration and team work, all of which can be acquired through teaching with ICT. This ICT is fundamentally changing the way people live, learn, and work (Aladejana, 2007).

Information and Communication Technology (ICT), within a very short time, has become one of the basic building blocks of modern society. Many people now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education along reading, writing and numeracy. One of the most obvious trends in educational institutions in recent years is the increasing use of technology to support instruction and learning. ICT has transformed the means by which persons inform themselves, remain up to date with world events and areas of personal interest, as well as further learning. For many, people books and journals are no longer the first and primary source of information or

learning. We now regularly rely on images, video, animations and sound to acquire information and to learn. Increased and improved access to the internet has accelerated this phenomenon. We now acquire and access information in ways fundamentally different from the pre-ICT era.

There have been numerous surveys designed to give information on the extent to which schools are developing the capacity to integrate ICT into learning, teaching and management processes. The evidence gathered has shown a steady increase in the number of computers and other technologies over time, with most schools achieving the baseline targets for computer-to-pupil ratios. This finding to a degree, masks considerable variation within and across school with regard to regular access to reliable technologies and broad band connectivity.

Evidence of the role on teaching and learning indicates that where the use of ICT is most effective in enhancing the learning experience, teachers have been able to integrate a number of technologies such as lap tops, interactive white board and the internet. Such combinations of hardware, software and connectivity allow them to develop innovative approaches to teaching and learning (Becta, 2007).

Information and communication technology can be referred to as all devices and principles involved in information processing as well as electronic communication (Haag and Keen, 1996). ICT includes all the hardware and software needed for these processes as well as in teaching and learning. According to Olagunju (2003), information technology is the integration of computer technology, mainly in the form of internet and information management. It provides opportunities for the user to handle texts and images, numbers and graphs, sound and music as well as enable them process information the following ways: storage and organization, retrieving, storing and analyzing, presenting and communication. In other words, access to information through computer-based technologies, a network of interconnected computer is known as internet.

Mathematics as a science subject demands a lot of abstract thinking for its understanding. It deals with a mixture of number, symbol, technical and conventional words and requires the learners to store and manipulate many bits of information in memory. At times, the mathematics teachers, may not have enough knowledge and this makes them think both vertically and horizontally as they deal with mixture of part and whole numbers. Most students find it difficult to solve mathematical problems because of the abstract nature of the subject and the materials available are obsolete. Above can lead to poor academic achievement and retention on part of the students.

However, mathematics as a unique subject promotes the acquisition of specialized science skills and knowledge. It is a subject that grew up with civilization as man's quantitative need increased. It arose out of practical problems and mans need to solve these problems. Its teaching is to bring about scientific thinking in students.

Investigations reveal that secondary school students' achievement in mathematics in both internal and external examinations have been consistently poor (Alio, 1997, Anih, 2002). This state of affairs is being blamed on mathematics teachers' use of traditional instructional strategy which have been found to be generally ineffective. The need to inject dynamism in the teaching of mathematics and perhaps foster students' achievement in the subject has given rise to current research on the use of innovative strategies for mathematics instruction. One of these involves the use of ICT in teaching

and learning of mathematics. If mathematics teachers and students in senior secondary schools are exposed to video and computer usage in classroom teachings, teaching and learning of mathematics will be very effective.

The common life experience of female does provide some foundation for the belief that social aspiration and rewards for males and females in our society should have some effect on their respective intellectual developments. The reluctance to hardwork of the majority of females in our society should have some effects on their intellectual development. Hence, girls differ from boys in the age at which they develop logical thinking (Piaget and Inhelder, 1958). Consequently sex differences or gender factors affect impact of ICT on teaching and learning which is the focus of this study.

The culture of ICT is fast penetrating into all spheres of human life. Through the use of ICT e.g CD rom and power point, the teaching and learning of mathematics is made interesting. According to Osunade (2003) internet is a valuable source of information for students looking for ideas for project and assignments. There was therefore the need to establish the efficacy of ICT on teaching and learning of mathematics in secondary schools. The study was conceived against a background of looking at ICT as a medium of instruction in teaching and leaning in secondary schools.

Purpose of the Study

The study ascertained the extent the use of ICT as instructional materials has helped in the teaching and learning of mathematics. It also found out the extent ICT promoted research by mathematics, teachers and students.

Research Questions

1. To what extent has the use of ICT as instructional materials helped in the teaching and learning of mathematics?
2. To what extent has ICT promoted research by mathematics teachers and students?

Hypotheses

1. There is no significant difference between the mean scores of male and female respondents on the extent to which use of ICT as instructional materials has helped in the teaching and learning of mathematics.
2. There is no significant difference between the mean scores of male and female respondents on the extent to which ICT has promoted research by mathematics teachers and students.

Method

The study adopted descriptive survey design. This research design was adopted because it involves the assessment of public opinions and attitudes using the questionnaire methods (Glbert, 1994). A Stratified random sampling techniques was used to draw a sample of 122 respondents made up of 17 mathematics teachers and 105 SS 1 mathematics students from six secondary school in Enugu education zone. Among the teachers, 9 were females while 8 were males. The students consisted of 43 males and 62 females. Hence by gender, the sample was made up 51 males and 71 females.

The instrument for data collection was a 12 – item questionnaire. Items 1 to 4 addressed research question 1, items 5– 8 addressed research question 2 while items 9 – 12 addressed research question 3. The reliability of the instrument was determined

using Cronbach Alpha and reliability coefficient of 0.87 obtained. Mean statistic was used to answer the research questions while the hypotheses were tested at .05 significance level using Z – test statistics preferred because the sample was above 30.

Results

Research Question 1: To what extent has use of ICT as instructional materials helped in the teaching and learning of mathematics?

Table 1: Mean response on the extent use of ICT as instructional material has helped in teaching and learning of mathematics.

All items above show that use of ICT as instructional material helped to a great extent in teaching and learning of mathematics with grand mean score of 3.40.

S/N	ITEM	VGE	GE	LE	VLE	MEAN	GRAND MEAN
1	ICT as instructional materials facilitates the learning of mathematical concepts	70	20	32	-	3.31	3.40
2	ICT helps to assimilate facts easily in mathematics	10	90	10	12	2.80	
3	ICT aids achievement and retention in mathematics	75	27	20	-	3.45	
4	ICT helps to overcome abstract nature of mathematics	100	22	-	-	3.82	

Research Question 2

To what extent has ICT promoted research by mathematics teachers and students?

Table 2:

Mean response on extent ICT promoted research by mathematics teachers and students.

S/N	ITEM	VGE	GE	LE	VLE	MEAN	GRAND MEAN
5	ICT promotes research in mathematics	20	70	2	30	2.66	2.96
6	ICT facilitates research project s in mathematics	50	50	22	-	3.23	
7	ICT maximizes achievement in research in mathematics	31	90	-	1	3.24	
8	ICT leads to excellent research work in mathematics	11	80	16	15	2.71	

Grand mean of 2.96 which indicates great extent shows that ICT promoted research by mathematics teachers and students

Hypotheses

Ho_1: There is no significant difference between the mean scores of male and female respondents on the extent to which use of ICT as instructional materials has helped in the teaching and learning of mathematics.

Table 3:

The t-test of mean rating of male and female respondents on the extent to which use of ICT as instructional materials has helped in the teaching and learning of mathematics.

Group	N	Mean	z-calculated	Z-critical	Decision
Male	51	2.93			
Female	71	3.11	0.67	1.96	NS

From table 3 above, z-calculated was 0.67 which is Fairless than the z-critical value of 1.96. This implies that there is no significant difference in the mean response score of both male and female respondents. The mean response score of the male was 2.93 and that of female was 3.11 hence, both group opined that use of ICT as instructional materials has helped to a great extent in the teaching and learning of mathematics. Hypothesis 1 is therefore accepted as stated.

Hypothesis

Ho_2: There is no significant difference between the mean scores of male and female respondents on the extent to which ICT has promoted research by mathematics teachers and students.

Table 4:

The t-test of mean rating of male and female respondents on the extent to which ICT has promoted research by mathematics teachers and students.

Group	N	Mean	z-calculated	Z-critical	Decision
Male	51	3.62			
Female	71	2.61	2.74	1.96	NS

The z-calculated was 2.74 which is greater than z-critical of 1.96. This implies that there was a significant difference between the mean responses of male and female respondents on the extent to which ICT has promoted research by mathematics teachers and students. Males, with a mean of 3.62 said very great extent while females with a mean of 2.61 said great extent. Hence, hypothesis two is rejected as stated.

Discussion

From the result of data analysis from research question one and three, it was observed in this study that the use of ICT as instructional materials helped to a great extent in the teaching and learning of mathematics irrespective of sex of respondents (students and teachers). This result is in consonant with the finding of a study conducted by Thierer, (2000) in which it was found that when properly used by both sexes, information and communication technology hold great promise to improve teaching and learning in addition to shaping work force opportunities. This is evidenced using ICT either as a tool in a practical investigation or as substitute for the laboratory based elements of an investigation which can aid theoretical understanding. Electronic communications should be used not just to disseminate information but to create a community of learners. The result of data analysis from

research question two revealed that ICT promoted research to a great extent by mathematics teachers and students. This result is in agreement with the findings by Belts (2003) that ICT has a greater role to play in a curriculum that places greater emphasis on research, scientific reasoning and analytical skills. However, from table 4, there was a significant difference between the mean response score of male and female respondents. While male respondents said very great extent, the females said great extent. Apparently, this seems to indicate that male mathematics teachers and students make use of ICT in research more than their female counterparts.

Recommendations

The following recommendations were made;

1. Functional ICT facilities should be provided in all secondary schools to facilitate teaching and learning as well as research in mathematics and other subjects.
2. Mathematics teachers should be encouraged to utilize the benefits of ICT in conducting researches with particular emphasis on the female folks.

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