

Constraint to the Use of Information Technology in Teaching Mathematics in Secondary Schools

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Abstract

This study was designed to investigate the problems and prospects of using ICT in teaching of mathematics in secondary school in Aguata Educational Zone, Anambra state. The design of the study was a descriptive survey design. By application of stratified random sampling technique, a total of 28 public secondary schools were drawn from three Local Government Areas in the zone. Some 280 mathematics teachers (10 from each school) were used as respondents for the study. Four research questions were posed. The instrument for the study was a four-point scale questionnaire. Answers to the research questions were analyzed using mean. The findings of the study show that most of the ICT facilities for teaching mathematics are inadequate, mathematics teachers are not given enough technical and financial support. The result also indicates that ICT removes barriers by providing instant feedback for lesson taught. Recommendations include that the school principal should make the available ICT facilities accessible to both teachers and students and see that the ICT facilities within their custody are in good shape and ICT literacy should be considered a must for recruitment of mathematics teachers.

Keywords; Teaching, ICT, Mathematics, Secondary School

Introduction

Over the past two decades, information Technology (IT) was broadened to become information and communication Technology (ICT) and has become better established within schools (Abbot, 2001). Many claims have been made about its potential contribution to students learning. Akaenyi and Madichie (2010) defined ICT as the use of computer and computer technology in information to produce, store, communicate and process information. Ittigson and Zewe (2003) said that Technology is essential in teaching and learning of mathematics. ICT improves the way mathematics should be taught and enhances students understanding of basic mathematics concepts. Becta (2003) summarized the key benefit of ICT to include - ICT promote greater collaboration among students and encourages communication and the sharing of knowledge; ICT gives rapid

and accurate feedbacks to students and this contribute towards positive motivation. It also allows them to focus on strategies and interpretation of answers rather than spending time on tedious computational calculations. This approach promotes higher order thinking and better problem solving strategies which are in line with recommendations forwarded by the National Council of Teachers of Mathematics (NCTM); students would use technology to concentration on problem solving processes rather than on calculations related to the problems (Ittigson and Zewe, 2003).

The government has made a huge investment in ICT in schools over the past few years and is committed to maintaining it. The rate at which secondary school subjects, especially mathematics have taken up the use of ICT to support teaching and learning has not been as rapid as might have been expected. Thomson (2004) commended initiatives on the use of ICT to improve the quality of teaching and learning of mathematics. Many mathematics teachers are unaware of the benefit of ICT. As a result of this, many teachers are unable to employ ICT to meet the different needs of students. However, ICT is a very powerful resource which mathematics teacher need to consider when planning their lessons for students both inside and outside mathematics lesson.

More so, parents, students and teachers have a right to expect that teaching of all subjects in the curriculum should make the best possible use of ICT resources and that means that the selection and deployment of ICT resources should be made to fit the needs of the subject and not the reverse. The test of whether it makes sense to deploy ICT in mathematics is a simple one: "does it enhance students' effective learning of mathematics"? Experience shows that the effective use of ICT in mathematics teaching gives a powerful context which contributes to and promotes learning. The key to this is how you plan to integrate the use of appropriate ICT tools. When used well, such tools make the students the active participants in learning. Ofsted (2010) stated that good teaching using ICT begins with clarity of purpose in its use. Most often this comes with experience, thoughtful planning and collaboration of teachers integrating ICT into a scheme of work. It is therefore the aim of the study is to find out the constraint to the use of ICT in teaching of mathematics in secondary school.

Statement of problem

Today's students are expected to learn and use ICT in mathematics to prepare them for their future, the work force and the challenges of everyday life. However, studies shows that secondary school mathematics teachers are still not effectively making use of computer technology (ICT) in their classroom. Despite the critical role of ICT in sectors like banking,

construction transport and communication, it has not been fully adopted in the teaching and learning processes in most developing countries like Nigeria.

While there is a wide range of innovations in ICT to support effective and quality of delivery of educational services, there is considerable technology lag in the Nigeria educational institutions. Use of ICT in education at all levels is limited by poor ICT infrastructure, weak policy and regulatory framework, limited number of teachers who are ICT proficient, low telecommunication services penetration and poor quality services (Abdulrazak, 2005). Access to ICT facilities is presently one of the major educational challenges in Nigeria and other African countries. With changes in modern technologies learners need to be equipped with updated knowledge that will make them adapt to the changing world. Therefore, it is based on this that the researchers want to find out the constraints of using Information and Communication Technology (ICT) in teaching mathematics in secondary school in Aguata educational zone in Anambra State.

Purpose of the study

The purpose of this study is to find out the constraints of using Information and Communication Technology (ICT) in teaching mathematics in secondary school in Aguata educational zone in Anambra State.

Specifically, the study sought to:

1. Identify the extent to which ICT facilities are available for use in teaching of mathematics in secondary school.
2. Ascertain the extent to which mathematics teachers use the available ICT facilities at their disposal for teaching of mathematics.
3. Determine if there is enough ICT technical and financial support for mathematics teachers on the use of ICT in teaching of mathematics.
4. To identify the benefits of using ICT in teaching mathematics.

Significance of the Study

The findings of this study will be of great benefit to all: the teachers, the students and the government. It will help the teachers to make adequate use of available ICT for the teaching of mathematics owing to its numerous benefits in teaching. The students will also benefit by being proficient in the use of internet and other ICT faculties in learning of mathematics, which in turn will help them to adapt to technological advanced society. The study will also help to enlighten the government on the need to equip schools adequately with ICT facilities.

Research Questions

The following research questions guided the study:

1. To what extent are ICT facilities available for use in teaching and learning of mathematics in secondary school?
2. To what extent do mathematics teachers use the available ICT facilities at their disposal for teaching of mathematics?
3. To what extent are ICT technical and financial supports provided for mathematics teachers on the use of ICT in teaching of mathematics?
4. What are the benefits of using ICT in teaching and learning mathematics?

Methodology

The research was a descriptive survey aimed at investigating the challenges and prospects of using Information and Communication Technology (ICT) in teaching and learning of mathematics in secondary school in Aguata educational zone in Anambra state. The zone comprises Aguata, Orumba South and Orumba North Local Government Areas, with forty nine public secondary schools under its supervision (Aguata = 22, Orumba South = 13 and Orumba North = 14). By application of stratified random sampling technique, 12, 8 and 8 secondary schools were respectively drawn from each of these Local Government Areas making it a total of 28 schools, and these were used for the study. Ten mathematics teachers were drawn from each of these of these sampled schools making a total of 280 mathematics teachers that constituted the respondents for the study. The instrument used for the study was a questionnaire developed through extensive literature and based on four research questions.

Instrument was face-validated by three experts, one from School of Sciences, and two from Measurement and Evaluation in the Department of Psychology, Federal College of Education (Technical) Umunze, Anambra State. The researchers used test re-tests technique in order to test reliability of the research instruments. Pilot study was carried out using three schools in the local government area which is different from the one used in the study. The test re-test method was used to establish the general consistency. A reliability of 0.75 was achieved and deemed fit for the research. Services of some Research Assistants were employed in collecting all the data. Data collected were analyzed using mean values.

Results and Discussion

Research Question 1

1. To what extent are ICT facilities available for use in teaching and learning of mathematics in secondary school?

Table 1: Response Scores of ICT Facilities Available for use in Teaching of Mathematics in Secondary School

S/N	ITEMS	VHE	HE	LE	VLE	N	X	REMARK
1	Laptop computers	33	82	115	50	280	2.1	Low extent
2	Desktop computers	99	115	50	16		3.1	Low extent
3	Graphical calculators	66	99	82	33		2.7	high extent
4	Overhead projector	33	33	115	99		2.0	Low extent
5	Internet Facilities	66	33	117	99		2.2	Low extent
6	Relevant software	-	-	165	115		1.6	Low extent
7	Scanners	-	66	165	49		1.8	Low extent
8	Printers	-	33	148	99		1.8	Low extent
9	Local Network	33	99	66	82		2.3	Low extent

Findings in table 1 above, shows that mathematics teachers agreed that most of the ICT facilities are used at low extent. This findings is in line with the words of Ozoji (2003) that most secondary schools have either insufficient or no ICT tools to cater for the ever increasing population of students and where they are available, they are by implication a matter of out of bound to the students. He also stated that most secondary schools do not have software for the computers to function. This was also in line with findings of Royal Society (2008) that some of mathematics ICT tools are not available in schools, such as dynamics geometry, internet facilities, and Overhead projector, etc.

Therefore, the ICT facilities for teaching of mathematics in school are grossly inadequate for any meaningful teaching to take place.

Research Question 2

To what extent do mathematics teachers use the available ICT facilities at their disposal for teaching of mathematics?

Table 2: Response Scores on the Extent to which of Mathematics Teachers use of Available ICT Facilities at their Disposal for Teaching of Mathematics

S/N	ITEMS	VHE	HE	LE	VLE	N	X	REMARK
10	I always use graphical calculators for graph	33	66	49	132		2.0	Low extent

	plotting					280		
11	I always use internet to find research materials for mathematics lesson	115	99	49	17		3.3	High extent
12	Overhead projector are always used to present mathematics lesson	-	17	33	230		1.2	Low extent
13	I use spreadsheet program for solving mathematics problem	49	66	98	67		2.3	Low extent
14	I always use educational software for teaching mathematics	-	-	17	263	1.1	Low extent	

The result from table 2 indicates that mathematics teachers’ competence and experience in the use of ICT in teaching of mathematics is at low extent in the sense that they lack the ICT pedagogical skill. This is in agreement with Wilson (2000) who stated that without the teacher who is knowledgeable enough and ICT driven, instructional aides cannot create change and progress in mathematics lesson. It was in the use of internet that most of them are conversant with.

Research Question 3

To what extent are ICT technical and financial supports provided for mathematics teachers on the use of ICT in teaching of mathematics?

Table 3: Response Scores of ICT Technical and Financial Supports Provided for Mathematics Teachers on the use of ICT in Teaching of Mathematics

S/N	ITEMS	VHE	HE	LE	VLE	N	X	REMARK
15	Funds are provided for seminars/conferences on ICT usage in teaching mathematics	-	32	150	98	280	1.8	Low extent
16	Teachers always undergo a course on pedagogical issues related to ICT use in teaching mathematics	17	66	133	64		2.1	Low extent
17	Financial allowances are made available as incentive for mathematics teachers on the use of ICT	33	50	99	98		2.0	Low extent
18	Adequate finance/fund are	31	62	154	33		2.3	Low extent

	provided in school for adequate maintenance and procurement of ICT equipment in school							
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The analyses from table 3 above revealed that mathematics teachers are not given enough technical and financial support. It was revealed also that in-service training for mathematics teachers are rarely organized in ICT. This result was in disagreement with Askar and Usluel (2003) who stated that Teacher Association principal aim for the New Opportunity Fund (NOF) funded ICT training for mathematics teachers to equip them with the necessary knowledge, skills and understanding to make sound decision about when not, and how to use ICT in mathematics effectively.

Research Question 4

What are the benefits of using ICT in teaching and learning mathematics?

Table 4: Response Scores on the Benefits of Using ICT in Teaching and Learning Mathematics

S/N	ITEMS	SA	A	D	SD	N	X	REMARK
19	Using ICT in mathematics lesson makes learning to be student centered	117	129	34	-	280	3.4	Accepted
20	It gives student confidence to explore and try out mathematics problem	82	132	49	17		3.0	Accepted
21	Students find learning in a technological enhanced setting more stimulating than in traditional classroom	181	65	34	-		3.6	Accepted
22	ICT has advantage of flexibility of anytime and anywhere access	165	66	33	82		3.4	Accepted
23	ICT in mathematics support online library	129	83	68	-		3.3	Accepted
24	ICT provides immediate feedback to students as instructions are going on	198	33	33	16		3.5	Accepted

The findings from table 4 above shows that the use of ICT in teaching mathematics has lots of benefits - it gives the student confidence and motivation to explore try out mathematical problems. The result also indicates that ICT removes barriers by providing instant feedback for lesson taught. This was in line with Guardian news (2014) that ICT is crucial to

building confidence, enjoyment in mathematics lessons. Also Guardian news (2014) supported that the benefit of ICT in mathematics by stating that it removes barriers by providing instant feedback and is nonjudgmental. He went forward to state that it uses tools that in many cases are more familiar to children than to their teachers.

Conclusion

Sequel to the analysis obtained, it was deduced that there are lots of barriers to effective use of ICT in teaching mathematics in secondary schools; which include inadequate ICT facilities, lack of the required competence and experience by mathematics teachers in the use of ICT, inadequate training and financial support for mathematics teachers.

Nevertheless, it was seen that the use of ICT in teaching mathematics has numerous benefit, such as making teaching process more effective as well as enhancing the students' ability in understanding basic mathematics concepts.

Recommendation

Based on the finding of the study;

1. Government should equip all the secondary schools with a well-furnished ICT laboratory with technicians.
2. The school principal should make the available ICT facilities accessible to both teachers and students and see that the ICT facilities within their custody are in good shape.
3. ICT literacy should be considered a must for recruitment of mathematics teachers.
4. Government should organize and sponsor mathematics teachers to conferences, workshops and seminars to update their knowledge in modern trends in technology.

References

- Abbot, C. (2001). *ICT: Changing Education*, London, Routledge.
- Abdulrazak, S. A. (2005). "Emerging Academic and Research Agenda" In *Re-invigorating the University mandate in a globalizing environment: Challenges, Obstacles and Way Forward 26-27th May 2005*, Conference Proceedings. Nairobi: Birds Printers
- Akaenyi, I. W. and Madichie, J. C. (2010). *The impact of information and communication Technology (ICT) on the environment: A Review*. A paper presented at the Annual conference of Chemical Society of Nigeria Anambra state chapter. Held at Federal College of education (Tech.), Umuze Anambra state

- Anwanwu, J. M. (2002). The Effectiveness of Instructional Material in Teaching Mathematics. Thesis unpublished. Imo state university
- Becta, I. (2003). What The Research Says about Using ICT in Mathematics; UK. Becta ICT research
- Guardian News (2014). Teaching Mathematics with ICT US: American Institutes for research
- Ittigson, R. J. and Zewe, J. G. (2000). Technology in the mathematics classroom: Issues and solutions: Hershey: Information Science Publishing.
- Iyamu, C. et al (2005). Advancing Innovation, Science, Technology and Mathematics. Main report. Canberra department of education science and training
- Ofsted (2010). Supplement on secondary mathematics (HM1705). www.ofsted.gov.uk. Retrieved 24/10/2018
- Thomson, S. (2004). ICT use and Familiarity at School and Home. ACER Research Monograph No 62. Melbourne