

THE RELEVANCE OF ICT IN TEACHING AND LEARNING OF MATHEMATICS IN COLLEGE OF EDUCATION, IKERE EKITI

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Received Dec. 31, 2017

Accepted Feb. 03, 2018

ABSTRACT

The study investigated the relevance of ICT in teaching and learning of mathematics in College of Education, Ikere-Ekiti, Ekiti State, Nigeria. The study adopted descriptive survey of research design. The population of the study consisted of all students and lecturers of mathematics related departments in College of Education, Ikere-Ekiti which comprises students and lecturers of Mathematics/ Chemistry, Mathematics/ Physics, Mathematics/Biology, Mathematics/Computer Science, Business Education, Mathematics/ Economics and Mathematics/ Integrated Science. The sample of eighty (80) students and twenty (20) lecturers was drawn for the study. Four (4) research questions were raised for the study. Two different questionnaires (one for students and the other for the lecturers) were used to elicit relevant information from the respondents. The data obtained were analyzed using Chi-Square (X^2) statistical analysis at $\alpha = 0.05$ level of significance. The findings of the study revealed that: availability of ICT facilities influences teaching of Mathematics in College of Education, Ikere-Ekiti; utilization of ICT facilities influences teaching of Mathematics in College of Education, Ikere-Ekiti; availability of ICT facilities influences academic performance of students in Mathematics in College of Education, Ikere-Ekiti; and utilization of ICT facilities influence academic performance of students in Mathematics in College of Education, Ikere-Ekiti. In the light of the findings from this study, it was recommended that Mathematics Lecturers should encouraged the students to use ICT facilities to solve mathematics problems and that students must be properly orientated on the numerous benefits and opportunity that ICT offers in enhancing their academic performance in mathematics and science in general.

Keywords: ICT, ICT facilities, Lecturers, Mathematics, Performance, Students.

Introduction

Mathematics is the science of number and space and the language of science and technology. It is an essential requirement by every field of intellectual endeavour and human development to cope with the challenges of life. It is also described as the queen and tool of all school subjects, since it cuts across the school curricula (Fajemidagba, 2006 and Akudolu, 2003).

Life without the knowledge of mathematics would have been very difficult because mathematics is an important subject for the aspiration of scientific and technological development. No nation in the world has ever developed technologically without putting mathematics in the foremost position (David, 2011). According to Daloung (2011), most advances in science and technology owe their origin to mathematics which is often referred to as the language of science and technology. For example, the computer which is the greatest discovery of the last century owes its origin to mathematical theories.

Whatever problem is solved today by applying computer technology has been solved by mathematics in the past. No wonder, the place of Mathematics amongst the subjects taught in Nigerian schools is well recognized (Adenegan, 2007). With the current need for science and technology in developing nations like Nigeria, the teaching and learning of mathematics need to be improved. Our immediate society cannot afford to lag behind in the scheme of development. Hence, the need to update ourselves so as to bridge up with the trend of development as it obtains in the other parts of the world.

Formerly, the term IT was used to mean ICT, the term which was synonymous with computer but as the passage of time, it covered other equipment created to enhance acquisition, storage and dissemination of information materials. Most of this equipment was initially confine to the vicinity of offices. Libraries in the course of time embraced the use of this equipment to carry out their day-to-day activities as usage was adapted to carry out some routine activities. It functions does not end there. The current issue is the use of ICTs in the classroom by the teachers. This includes specifically the use of computers, Internet, telephone, digital camera, data projector, etc. As the world continues to revolve around technology, teachers need to continue incorporating these new technologies into their teaching.

The importance of ICT is quite evidence from the educational perspective. Though the chalkboard, textbooks, radio/television and film have been used for educational purpose over the years, none has quite impacted on the educational process like the computer. While television and film impact only on the

audiovisual faculties of users, the computer is capable of activating the senses of sight, hearing and touch of the users. ICT has the capacity to provide higher interactive potential for users to develop their individual, intellectual and creative ability. The main purpose of ICT “consists in the development of human mental resources, which allow people to both successfully apply the existing knowledge and produce new knowledge” (Shavinina, 2011).

Obi (2003), conducted a study on information technology skills needed by College of Education lecturers for effective instruction in the college of Education in Enugu State, her result revealed great needs by College of Education lecturers for information technology skills. Oyebisi (2012), conducted a study to determine the extent of application of information technology in Lagos, Ibadan and Oshogbo, and discovered that information technology has invaded the business office and College of Education lecturing strategies.

Knelleher (2000) in his studies asserted that although ICT cannot replace the normal classroom teaching, it can foster deeper understanding of science and mathematics concepts and provide new and authentic teaching and learning activities that could motivate the learners.

The introduction of ICT into Colleges of education clearly changed the way education is conducted. It paves the way for a new pedagogical approach, where students are expected to play more active role than before (i.e. getting more involved in the learning process, being active participants of knowledge creation not mere recipients of knowledge). Using information and known ICT tools in education, students should be able to communicate, create preservatives in PowerPoint, and interact with colleagues and teachers using technology. According to Yusuf (2005), ‘culture and society which are major factors of education, have adjusted to meet the challenges of the knowledge age’. These prevalence and rapid development in ICT has transformed human society from the information age to the knowledge age. The use of ICT in colleges of education by staffs and students is becoming a necessity as it can be used to improve the quality of teaching and learning in any tertiary institution.

Computers are seen to have the potential to make a significant contribution to the teaching and learning of mathematics. In particular, when students are working on computers, it is generally recognized they are more able to focus on patterns, connections between multiple representations, interpretations of representations and so on. Busari (2006) is of the view that poor reading skills of science and technology students, the state of laboratory facilities, and dearth of science text books affect effective teaching and learning of science subjects. If Mathematics lecturers and students in higher institutions are exposed to video and computer usage in classroom teachings, would it bring about an impact in teaching and learning of Mathematics? Hence, this research study intends to investigate the relevance of ICT to teaching and learning of Mathematics in College of Education Ikere-Ekiti.

ICT is an invaluable intervention of this modern time. Its inherent attributes such as accuracy, high speed performance, reliability and capability to store very large amount of data have made it possible for its applicability to all human endeavours including teaching, learning and research in educational institutions. This study is specifically set out to critically appraise the role of information, communication technology as a change agent for higher education in Nigeria. It also examines the implication and challenges of ICT on the development of higher education in Nigeria. In specific term, this study intends to provide solution to the following identified problems;

- i) Students’ poor knowledge of the use of information and communication technology in learning mathematics.
- ii) Inadequacy of ICT facilities and laboratories in higher institutions of learning.
- iii) How efficient is the Information, Communication Technology in performing its lofty role as a change agent for higher education in Nigeria?
- iv) The constraints to effective utilization of Information, Communication Technology as a change agent for higher education in Nigeria. Hence, this study is poised to the relevance of ICT in teaching and learning of Mathematics in College of Education Ikere- Ekiti.

Research Questions

The following research Questions were generated for the study:

1. Would the availability of ICT facilities influence teaching of Mathematics in College of Education, Ikere-Ekiti?
2. Would the utilization of ICT facilities influence teaching of Mathematics in College of Education, Ikere-Ekiti?
3. Would the availability of ICT facilities influence academic performance of students in Mathematics in College of Education, Ikere-Ekiti?

4. Would the utilization of ICT facilities influence academic performance of students in Mathematics in College of Education, Ikere-Ekiti?

Methodology

The study was carried out using a descriptive research survey design. The design enabled the researchers to collect data using questionnaire directly from the sample selected for the study.

The population of the study consisted of all students and lecturers of mathematics related departments in College of Education, Ikere-Ekiti which comprises of students and lecturers of Mathematics/ Chemistry, Mathematics/ Physics, Mathematics/Biology, Mathematics/Computer Science, Business Education, Mathematics/ Economics and Mathematics/ Integrated Science.

Purposive and stratified random sampling techniques were used to select the sample of eighty (80) students and twenty (20) lecturers was drawn for the study which comprises of students and lecturers of Mathematics/ Chemistry, Mathematics/ Physics, Mathematics/Biology, Mathematics/Computer Science, Business Education, Mathematics/ Economics and Mathematics/ Integrated Science.

The instrument for the study was questionnaires designed by the researchers based on students and lecturers' knowledge and usability of ICT oriented software in teaching and learning of mathematics. Two different questionnaires (one for students and the other for the lecturers) were used to elicit relevant information from the respondents. Section A of the questionnaire was on respondents' personal information. Section B consisted of items that are arranged in four point Likert scales of: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD).

The face and content validities were ascertain by two (2) tests and measurement experts from mathematics department, College of Education, Ikere- Ekiti, while the construct validity was determined by the researcher using Cronbach Alpha. The result of the estimate was 0.71 and this index is considered high and significant enough for this kind of study.

The data obtained were subjected to appropriate statistical test. Chi-square test of independence was used to test the four (4) research questions generated at 0.05 level of significance using SPSS.

Results

Research Question 1

Would the availability of ICT facilities influence teaching of Mathematics in College of Education, Ikere-Ekiti?

Table 1:
Chi-Square Analysis of data on the influence of availability of ICT facilities on Teaching on Mathematics in College of Education, Ikere-Ekiti.

S/N	ITEMS	X ² -Cal	X ² -tab	df	Remark
1	ICT facilities are not available in the College	10.47	7.81	3	*
2	School library are not well equipped with ICT facilities				
3	Mathematics laboratories and classrooms are not well-equipped with ICT facilities				
4	Availability of ICT facilities has nothing to do with the teaching of Mathematics				
5	Availability of ICT facilities in the College ICT centre inspired me to teach Mathematics.				
6	College in general lacks modern ICT facilities.				
7	Inadequate ICT facilities in the College are affecting teaching of Mathematics negatively.				

$P < 0.05$ level of significance, * = Significant

Research Question 2

Would the utilization of ICT facilities influence teaching of Mathematics in College of Education, Ikere-Ekiti?

Table 2: Chi-Square Analysis of data on the influence of utilization of ICT facilities on the teaching of Mathematics in College of Education, Ikere-Ekiti.

S/N	ITEMS	X ² -Cal	X ² -tab	df	Remark
1	Use of ICT facilities helps in effective learning of Physics.	12.64	7.81	3	*
2	Use of ICT facilities gives effective teaching many concepts in Mathematics.				
3	Use of ICT facilities stimulates my interest in the teaching of Mathematics.				
4	Use of ICT facilities enhances my better use of appropriate method of teaching Mathematics.				
5	Use of ICT facilities in the College inspired me to teach Mathematics.				
6	Use of ICT facilities in the College cater for individual differences in teaching Mathematics.				
7	Use of ICT facilities in the College assists me in teaching Mathematics.				

$P < 0.05$ level of significance, * = Significant

Research Question 3

Would the availability of ICT facilities influence academic performance of students in Mathematics in College of Education, Ikere-Ekiti?

Table 3: Chi-Square Analysis of data on the influence of availability of ICT facilities on academic performance of students in Mathematics in College of Education, Ikere-Ekiti.

S/N	ITEMS	X ² -Cal	X ² -tab	df	Remark
1	ICT facilities are not available in the College	9.25	7.81	3	*
2	School library are not well equipped with ICT facilities				
3	Mathematics laboratories and classrooms are not well-equipped with ICT facilities				
4	Availability of ICT facilities has nothing to do with learning of Mathematics				
5	Availability of ICT facilities in the College ICT centre inspired me to study Mathematics.				
6	College in general lacks modern ICT facilities.				
7	Inadequate ICT facilities in the College are affecting me negatively.				

$P < 0.05$ level of significance, * = Significant

Research Question 4

Would the utilization of ICT facilities influence academic performance of students in Mathematics in College of Education, Ikere-Ekiti?

Table 4: Chi-Square Analysis of data on the influence of utilization of ICT facilities on academic performance of students in Mathematics in College of Education, Ikere-Ekiti.

S/N	ITEMS	X ² -Cal	X ² -tab	df	Remark
1	Use of ICT facilities helps in effective learning of Mathematics.				
2	Use of ICT facilities gives effective mastering of concepts in Mathematics.				
3	Use of ICT facilities stimulates my interest in Mathematics.				

4	Use of ICT facilities helps my better understanding of Mathematics.	16.00	7.81	3	*
5	Use of ICT facilities in the College inspired me to study Mathematics.				
6	Use of ICT facilities in the College cater for individual differences learning of Mathematics.				
7	Use of ICT facilities in the College assists my academic performance in Mathematics.				

$P < 0.05$ level of significance, * = Significant

Discussion of Findings

As shown in Table 1, a Chi-Square (X^2) of independence was performed to examine the influence of availability of ICT facilities on the teaching of Mathematics in College of Education, Ikere-Ekiti. Table 1 reveals that x^2 -calculated was 10.47 and x^2 - critical was 7.81 in research question one. Showing that x^2 -calculated is greater than x^2 -table value at 0.05 and $df = 3$ (i.e.. $x^2_{-Cal} > x^2_{-tab}$). The result is significant; this implies that availability of ICT facilities influences teaching of Mathematics in College of Education, Ikere-Ekiti, Ekiti State, Nigeria. This corroborated with the findings of Oyebisi (2012) that application of information technology is useful in colleges of Education and it also supported the findings of Obi (2003) that information technology skills is needed by Colleges of Education lecturers for effective instruction.

Also, as shown in Table 2, a Chi-Square (X^2) of independence was performed to examine the influence of utilization of ICT facilities on the teaching of Mathematics in College of Education, Ikere-Ekiti. Table 2 reveals that x^2 -calculated was 12.64 and x^2 - critical was 7.81 in research question two. Showing that x^2 -calculated is greater than x^2 -table value at 0.05 and $df = 3$ (i.e.. $x^2_{-Cal} > x^2_{-tab}$). The result is significant; this implies that utilization of ICT facilities influences teaching of Mathematics in College of Education, Ikere-Ekiti, Ekiti State, Nigeria. This corroborated with the findings of Oyebisi (2012) that application of information technology is useful in colleges of Education and it also supported the findings of Obi (2003) that information technology skills is needed by Colleges of Education lecturers for effective instruction.

Moreover, as shown in Table 3, a Chi-Square (X^2) of independence was performed to examine the influence of availability of ICT facilities on the academic performance of students in mathematics in College of Education, Ikere-Ekiti. Table 3 reveals that x^2 -calculated was 9.25 and x^2 - critical was 7.81 in research question three. Showing that x^2 -calculated is greater than x^2 -table value at 0.05 and $df = 3$ (i.e.. $x^2_{-Cal} > x^2_{-tab}$). The result is significant; this implies that availability of ICT facilities influences academic performance of students in mathematics in College of Education, Ikere-Ekiti, Ekiti State, Nigeria. This supported the submission of Knelleher (2000) who argued that although ICT cannot replace the normal classroom teaching, it can foster deeper understanding of science and mathematics concepts and provide new and authentic teaching and learning activities that could motivate the learners.

Lastly, as shown in Table 4, a Chi-Square (X^2) of independence was performed to examine the influence of utilization of ICT facilities on the academic performance of students in mathematics in College of Education, Ikere-Ekiti. Table 4 reveals that x^2 -calculated was 16.00 and x^2 - critical was 7.81 in research question four. Showing that x^2 -calculated is greater than x^2 -table value at 0.05 and $df = 3$ (i.e.. $x^2_{-Cal} > x^2_{-tab}$). The result is significant; this implies that utilization of ICT facilities influences academic performance of students in mathematics in College of Education, Ikere-Ekiti, Ekiti State, Nigeria. This supported the submission of Knelleher (2000) who argued that although ICT cannot replace the normal classroom teaching, it can foster deeper understanding of science and mathematics concepts and provide new and authentic teaching and learning activities that could motivate the learners.

Conclusion

Based on the findings of this study, it is the opinion of the researchers that significant impact existed in the use of ICT facilities on teaching and learning of mathematics. This showed that ICT as a tool plays a vital role in teaching and learning of mathematics. Also, there was significant effect of ICT facilities availability and usage on students' performance in mathematics. This also showed that ICT facilities helps students to have unlimited access to study materials and ability to relate with their counterparts in other institutions across the globe even from the comfort of their rooms and this undoubtedly helps them to improve in their academics.

It was equally revealed that there exist significant influence of ICT facilities on teaching of mathematics. This equally showed that lecturers also relied to certain extent on ICT facilities on how to improve on their skills and teaching methods. Lastly, the study revealed that significant effect of ICT facilities in improving the students' learning and knowledge in mathematics existed. This implied that ICT facilities helps greatly in expanding the knowledge and understanding of students in mathematics.

Therefore, it is uncontestable to submit that ICT facilities as a tool in teaching and learning of mathematics and science in general is a viable tool in Nigeria educational system.

Recommendations

As far as the findings of the study are concerned, it is considered pertinent to give some recommendations which are considered useful for better appraisal of the relevance of ICT in teaching and learning of Mathematics in College of Education, Ikere- Ekiti.

It is hereby recommended that;

- Lecturers should encourage the students to visit cybercafé and use internet whenever they have mathematics problems.
- Lecturers should be trained and retrained on the benefits of ICT and how it can enhance their skills and lecture methods.
- College management should make adequate supply of computers into all the departments in the institution and ensure that all students have unrestricted access to them during lectures.
- Management should also make wireless internet connection available in the institution and ensure free accessibility for both students and lecturers.
- Students must be properly orientated on the numerous benefits and opportunity that ICT offers in enhancing their academic performance in mathematics and science in general.

References

1. Adenegan, W. (2007). *Literature Review in Mobile Technologies and Learning Report U*, Future lab Series.
2. Akudolu, L.R (2003); "ICT Centred Education, a Necessity for National Development". A paper presented at 2nd National Conference held at Faculty of Education, NAU, Awka.
3. Busari, F. (2006). Mobile Wireless Technology use and Implementation: Opening a dialogue in the new Technologies in education Tech Trend: Linking Research & Practices to Improve Learning, 49(3), 54-64. Retrieved from EBSCO host.
4. Daloung, F. (2011). *Facilitating Interaction, communication and collaboration in Online course Computer and Geo mathematics*, 26, 699-7
5. David, A. (2011). *Literature review in primary Mathematics and ICT*. NESTA Future lab Series, Bristol: NESTA Future lab.
6. Fajemidagba, O. (2006). Trends in Mathematics Education in Nigeria: Issues and Problems. *ABACUS Journal of Mathematics Association of Nigeria*, 21(1), 131-153.
7. Federal Republic of Nigeria. *National Policy on Education* (3rd Edition) Lagos: NERDC, 2004.
8. Knelleher, P. (2000). A review of the recent developments in the use of communication technologies (ICT) in Science Classrooms. *Australian Science Journal*, 46(1), 33-38.
9. Obi, L.O. (2003); Science Education: A Roadmap to Economic and Technological Development. In: The Management of Tertiary Institutions for Qualitative and Functional Education in Nigeria. A Festschrift in Honour of Prof. Adeyemi Idowu. Atoyebi et al. (Ed). Ibadan, Spectrum Books Ltd. pp 567- 577.
10. Oyebisi, G. (2012); Millennium development goals for national development: Mathematical implications. *Journal of School of Science*, 1(1):71-75.
11. Shavinina, L.V. (2011). Discovering a Unique Talent: On the Nature of Individual Innovation Leadership. *Talent Development & Excellence*, 3,165-185
12. Yusuf, M. O. (2005). Information and Communication Technology and Education: Analysing the Nigeria National Policy for IT. *International Educational Journal*, 6 (3), 321.