

**COMPUTER EDUCATION FOR ALL SCIENCE AND MATHEMATICS
EDUCATION TEACHERS: A BASIC PREPARATION FOR THE YEAR
2020**

Ugbe Agioliwhu Ugbe
Cross River State College of Education
Akamkpa.

Lawrence Ahmed Ugbe
Federal College of Education Obudu
Cross River State.

And

Henry Ogbe Okpokam
Cross River State College of Education,
Akamkpa.

Abstract

The study was conducted using 200 mathematics and science Education teachers in Akamkpa Local Education Authority in Cross River State. This was to feel the pulse of teachers concerning the introduction of computer education to pre-service and in-service mathematics and science education teachers. This number was made up of 110 females and 90 males drawn from 20 senior and junior secondary schools in Akampka Local Education Authority. A survey design was used for the study. The instrument for data collection was a 20-item questionnaire, it had a reliability index of 0.92 which was done using Cronbach alpha. The opinions of the teachers were categorized as follows: (a) 25% of the teacher's believed that computer will dehumanize the classroom and replace the roles of teachers in the classroom. (b) 60% of the teachers are confused and frightened to make use of computers and would want it introduced when they are retired and out of the system. (c) 15% of the teachers believe that computer is a mark of development and would want it to be introduced now in the education system in Nigeria. These results indicate a dire need for enlightening the teachers and the public on the need to train mathematics and science education teachers in computer education and on the uses of computers in classrooms.

In a conference of nations where technological development education industry is being discussed, one will be embarrassed if all the continents are represented without Nigeria standing up for Africa. We all know that, Nigeria is currently embracing computer education which will afford her the opportunity to be among the list of developing and developed industrial nations of the world, where countries like Denmark, Poland, Japan, Switzerland and Cuba are members.

Computer education and computer technology presently needs serious emphasis in our education industry. This paper therefore addresses the possibilities of emphasizing computer education and computer technology at all levels in the Nigeria teacher's Education programme. In this discourse, the authors will address the following:

- (a) Computer in education.
- (b) Relevance of computer in teaching courses in tertiary institutions.
- (c) Report of a study on mathematics and science educators view on the introduction of computer education in Nigeria.
- (d) A proposal on preparing the mathematics and science education teachers for computer literacy in the light of Nigeria's vision for the year 2020.

Computer in Education

With the evolution of artificial intelligence, the computer now represents the culmination of man's effort at creating artificial intelligence. Today the computer is considered as the best educational technology. This is because intelligence as Chauhan (1981) observed, is the ability of the individuals to act purposefully, think rationally and deal effectively with his environment. These conditions, the computer has satisfied. The computer is now considered to be a good match to human intelligence. According to Simon (2007: pp37) from his research on artificial intelligence reported thus:

"It is not my aim to surprise or shock you..... but the simplest way I can summarize is to say that there are now in the world machines that can think, learn and create. Moreover, their ability to do these things is going to increase rapidly until in the visible future- the range of problems they can handle will be co-extensive with the range to which the human mind has been applied."

Before the emergence of the first generation computers, there existed some teaching machine with artificial intelligence such as Napier bone of 1600, pascaline 1650, Leibniz Arithmetic operation's machine of 1740, Jacquard punch card of 1800, Babbage primitive computer of 1850, Boofan machine of 1890 and Turing test machines of 1920. These teaching machines were grossly limited in their operations.

In comparing such machines and the computers, Butcher (1980) observed that computers make information available to anyone anywhere at anytime. He further pointed out that they are all based on the question – answer- reinforcement or stimulus response- reinforcement principles. He also observed that unlike the teaching machine, computer is capable of providing adaptive teaching programmes.

According to him, computers can stimulate a living dialogue between the student and the computer in which the student's reactions can determine the sequence of

presentation and the amount of explanation, assistance and practice, which he or she gets.

In computer aided instruction for instance, even wrong answers have explanations provided for them. Akinyemi (2011) emphasized that the most suitable, reliable and versatile medium for individualizing instruction is the computer, hence, the global tidal wave in the world of education industry today, in one characterized by practical objectivity, functionality and efficiency. It is one whose efficacy is capable of producing valid consequences.

With the advent of the computer in this century, human life and human activities have been drastically improved, consequently, education and economy are now technologically based initially, and some people opined that the computer was not originally designed for education or as a teaching machine. For instance Fox (1999) pointed out that the word processor which is one of the programmes in use currently for teaching language in the classroom, was primarily designed for secretaries working in offices. This is one of the reasons why it has not been easy to use computers in education, despite the many advantages of bringing computers into the classroom.

The advantages of using computers in education have been summarized as follows:

The computer

- (a) can store a large amount of information.
- (b) enable the user to select from stored information at a great speed.
- (c) can present the learner with printed and animated diagrams.
- (d) can respond to contributions typed in by the learner.
- (e) can give immediate feedback to individual learners.
- (f) can deal differently with different learners.
- (g) can be used for different activities such as intuition, stimulation and data crunching. (Rowntree, 1990).
- (h) allows the learner to update or correct existing information.
- (i) provide better presentation of data due to its use of colours and sophisticated printing techniques.
- (j) has provision/facilities for flashing characters, overlay, flexibility, animation, automated operations, classification of details and the control of machine e. g video playback.
- (k) support some active learning at a rate nearer to the speed of thought instructions that are better tailored to individual learning rates and dependent learning styles. Walker, (1993) and Harger, (1988).

Perhaps the greatest contribution of the computer to education is that it has triggered in educators some awareness and thereby serving as a catalyst that can push education into the 21st century and the year 2020.

Relevance of the Computer in Teaching Mathematics and Science Education Courses in Tertiary Institutions

Gallo and Nenno, (1989) observed that the computer can process not only mathematical calculations but can sort and retrieve scientific data.

According to Underwood (2003), the use of computer in teaching schools mathematics and science education in the United Kingdom and in the United States of America started in the 1960s. Then the basic function was to serve as a simulator and an instructional material to assist the mathematics and science education teachers drive home their points. By 1984, about 80% of the secondary schools and 56% of the primary schools in the United Kingdom and United States of America had been provided with computers. According to Jones (1989), 99% of the average students in the United Kingdom and United States of America were computer literate by 1985.

In France, Parmentier (1989), observed that not only could the computer be used as an aid in teaching simple tasks, it could also provide instruction as well as utilitarian software and can be used as an instrument for improving children's reasoning abilities.

During a "computer for teaching Mathematics and Science Education" conference held in France in 1976, certain research groups were commissioned to investigate various ways in which computer could be used in teaching mathematics and science education. In 1985, computer science became compulsory in French schools and computer literacy for mathematics and science teachers became a condition for being employed and for remaining in the teaching jobs. Parmentier (1989).

In the mid 1980s Bransford developed computer software packages for individualizing mathematics instruction in some topics in schools mathematics. In 1987, he established a company known as computer curriculum corporation (CCC). This helped to popularize the use of computers in schools. At the CCC, he used telephone lines to give computerized mathematics instruction to pupils (subscribers) in many schools at the same time.

Within this period, a team of Scientists at the University of Illinois developed a system whose aim was to make computerized lessons in mathematics and Science education available to a large group of people. The system was known as the Programme Logic Operation (PLO). From the observed efforts, it is seen that the computer plays an important role in the society and in the teaching/learning process. Therefore, the teachers and learners should be prepared to live worthwhile lives in a computer dominated society. The teachers and students should be encouraged to master the mechanism of the computer and use it to improve teaching/learning processes in mathematics in particular and science education in general.

Statement of the Problem

Computer education is currently being emphasised and also forms an integral part of the curriculum at all levels of education in Nigeria. There is still lack of mass computer literacy acquired by mathematics and science education teachers in both primary and secondary schools in Nigeria. Umoren (2006), there is deficiency in the development of computer education in Nigeria and could be traced to lack of Mass Computer Literacy and level of preparedness on the part of mathematics and Science education teachers.

The study therefore, attempts to determine the level of preparedness for mass computer literacy education for science teachers in Nigeria.

Purpose of the Study

The purpose of the study was to ascertain the opinion of science teachers on their preparedness for mass computer literacy education for pre-service and in-service mathematics and science teachers.

Research Question

The following research question was formulated to guide the study

1. What is the extent of mathematics/science teachers' preparedness for mass computer literacy education?

Research Design

A survey design was used in the study,

Sample and Sampling Technique

A total of 200 mathematics and science education teachers took part in the study. Out of a population of two hundred and fifty teachers in Akamkpa Local Education Authority in Cross River State. This was made up of 110 females and 90 males. The science teachers were randomly selected through the use of balloting from thirty junior and senior secondary schools in Akamkpa Local Education Authority.

Instrument and Validation

A researcher designed questionnaire was used for the study. A total of 20 – items were constructed based on the teachers' level of preparedness for mass computer literacy education. The instrument was faced and content validated by two science educationists in the department of science education, University of Uyo, Uyo. It also had a reliability index of 0.92 using Cronbach Alpha.

Method

The instrument consists of a questionnaire of 20 – items meant to discern the level of preparedness of science/mathematics teachers for mass computer literacy.

The questionnaire was administered to the teachers in their various schools by the researchers. After one week, the questionnaire was retrieved back. All the questionnaires distributed were collected back. This accounts for 100% returns. The items were placed besides a two point scale Agree (A) and Disagree (DA).

Data Analysis

The data collected were analyzed using simple percentage.

Results

Research Question 1

What is the extent of mathematics/science teacher’s preparedness for mass computer literacy education?

The opinion of the teachers were categorized and shown below in table 1.

Table 1

Opinion of Teachers Showing Categories of Responses

Category	Number of Responses	Percentage of Responses
A	50	25
B	120	60
C	30	15
Total	200	100

From the table above, category A represent 25% of those who opined that computer will dehumanize them.

Category B represents 60% of teachers who opined that computer should be introduced after retirement.

Category C represents 15% of the teachers who opined that computer was a mark of development.

Discussion

The result of research question 1 revealed various categories of opinions by mathematics/science teachers in Akamkpa Local Education Authority of Cross River State. Category A represents 25% of the teachers who opined that the computer will dehumanize the classroom and replace the role of teachers in the classroom, thus throwing teachers out of job.

This result tends to lend support to Jone’s (1989) assertion that introducing computer machines in mathematics classrooms will enhance students’ understanding of mathematics concept better.

Category B represents 60% of the teachers who opined that the computer should be introduced after they have retired. They were frightened and confused to make use of computers. This implies that the current in-service teachers do not want computer literacy for mathematics and Science teachers to start with them. They would rather want the training to start with the current pre-service teachers. The findings also agree with results of Simon (2007) that the level of preparedness by both pre-service and in-service teachers for mass computer literacy education is not adequate.

Category C represents 15% of the teachers who opined that the computer was a mark of development and would want it introduced now, in the Nigerian Education System.

It is also obvious that the serving teachers do not want to go through computer training for classroom uses. This implies that whatever training programme that will be planned, should be incorporated into the pre-service teacher’s programme. This

information creates a dire need for public awareness on the relevance of computer education in schools.

Proposal on Preparing Mathematics and Science Teachers for Computer Literacy in the Light of Nigeria's Vision for the Year 2020

Schools might be swept out in a tidal wave of technology come the year 2020, if no preparations are made to train mathematics and Science teachers computer wise. The following proposals are made:

- Continuous emphasis should be placed on computer education in all levels of Nigerian Education System
- The Federal Government should direct all states Government to inaugurate one or two commissions on training programme for computer development for Science and Mathematics teachers
- The Science Teachers Association of Nigeria (STAN) and Mathematical Association of Nigeria (MAN) should organize compulsory literacy training for Science and Mathematics teachers.
- There is also need to ensure the availability of good software for science and Mathematics teachers prior to the training period.

Conclusion

Science education remains the pivot for any meaningful technological development. No true Science can succeed without going through mathematical demonstrations. This development has to start properly with the training of Science and mathematics teachers. The vision 2020 is already on course but the authors are afraid that there is a missing-link.

- Computer literacy. So far 75% of Science and Mathematics teachers in Nigeria are computer illiterate and so the very people that should carry the gospel of the Vision 2020 are still groping in ignorance of the fundamental aspects of the vision 2020. Therefore, there is the need for the public, Science and Mathematics teachers to be enlightened on the importance of computer education. Invariably both pre-service and in-service Science and Mathematics teachers should be given training on Computer Education.

References

- Akinyemi, K. (2001). Programmed institution in F. Agun & 1: Imogie (eds). *Fundamentals of Educational Technology* Ibadan: Y books.
- Butcher, H. (1980). Applying programmed leaning techniques to computer Assisted institution (CAI), R. Winterburn & L. Evans (eds). *Educational Technology of the year 2000*.
- Chauhun, S.S. (1981). *Advanced educational psychology*, New Delhi: Vikas publishers.

Academic Scholarship

- Fox, J. (1984). *Can computers aid vocabulary learning* Keith Cameroun (ed) Computer assisted language learning programme structure and principles. Oxford: Intellect Limited.
- Gallo, M. & Nenno, R. (1989). *Computers and society with basic and Pascal* Boston: Prindle, Weber and Schmidt.
- Harger, D. O. (1988). *The carillion and development of educational computer technology*, Oxford. Pergamon press.
- Jone, B. (1989) *Teaching mathematics with the computer* London: Oxford Press Ltd.
- Kerlinger, F. N. (1983). *Foundation of behavioural research*. School Edition. New York Halt. Rinehart and Winston.
- Parmentic, C. (1988). *How to make the best use of limited computer resource in Primary schools education and computer science* Boston: Bedford Publishers.
- Rowtree, D. (1990). *Teaching through self-instruction: How to develop open leaning materials* London: Kogan press.
- Simon, S. E. (2007). *Computer as test beds in teaching machines*. Wales: Butterworths.
- Umoren, G. (2006). *Information and communication technology and curriculum*. A lead paper presented at the 2nd annual conference of curriculum organisation of Nigeria, (CON). Calabar. 14th – 17th Feb.
- Underwood, A. J. (2003). *Computer for basic science and mathematics teacher*. Littlewoods Pub. UK.
- Walker, M. J. (1993). *Computer assistance instruction in public schools*. New York: McGraw Books.