

EFFECTIVENESS OF THE COMPUTER AS AN ICT DEVICE FOR TEACHING AND LEARNING SCIENCE IN SCHOOLS

Obiageli Grace Ngwu

This paper considers the effectiveness of (ICT) as a tool in teaching and learning of science in our educational system. The application of information and communication technology especially computer in the teaching and learning processes in the educational sector has produced a laudable effect. The innovation of Computer Aided Instruction (CAI) and Computer Managed Instruction (CMI) into the classroom is of interest to teachers and learners. Besides CAI and CMI, the use of Internet, electronic mail, news groups and many others have provided access to information that covers a wide range of topics and interests in many disciplines or areas, such as medicine, engineering, sciences and research. As a means of facilitating teaching and learning processes in schools, computer is not just a means of transforming knowledge, but more importantly, it can be an extension of not the teacher and the chalkboard.

Introduction

We live in an information age, which is experiencing rapid use of computer in almost all areas of human endeavours. The history of the development of ICT so far shows that, no industrialized nation has been able to achieve their objective or goal without the use of computers. The need to inform and communicate more effectively with each other, send and receive information is of great importance to everyone. Computers are today being used in an extremely versatile way to aid the understanding of a wide variety of subjects, most especially the sciences and technology subjects as well as mathematics (Inyama, 2002). According to Inyama, computer can guide a user through a course of instruction through a video display unit in such a way as to facilitate understanding of the subject matter. The student's learning process is speeded up sometimes more than when a human teacher is available. This process is termed computer Aided Learning (CAL)

Also ICT is considered as an important tool in laying a solid foundation for knowledge. Anosike (2002), maintains that the Internet is advantageous in almost every sphere of life and in all aspects of human endeavour. The Internet, he said, is informative, educating and entertaining. Internet aids in researches, teaching, learning and the entire educational system.

Brewton, (2000), has this to say we use it because it's easy; all you have to do is type in your key words, press return, and then click on your favorite topics which takes you to all sorts of sites that feature good teaching ideals. Internet helps teachers to show the students many things which they cannot bring into the classroom. It helps to gain new knowledge and facts while Computer Aided Instruction (CAI) involves computer usage in teaching and learning processes in the classroom (Ngwu, 2005).

The Meaning of ICT

The term ICT is an acronym for information and communication technology. It is an advancement in computer technology. ICT can be taken as the processing and communication of information by the microcomputer or computerized devices via the interconnected Networks (information super highway). Rahman, (2002) sees ICT as a creation, processing, storage, retrieval

and transmission of data and information. Some of the computerized devices include computers, telephones, internets, e-mail, CD ROM, Video cassettes and many more. They are used in the classroom as resource materials for teaching and learning of science.

Again computer can be used to deliver instruction either partially or totally in the classroom. Anakwe, (1991), sees computer as an object of instruction and vehicle for instruction. When used as an object of instruction, it means learning about computer itself and data processing. When used as a vehicle of instruction, it means using it as a medium for transferring and impacting knowledge.

The computer educational software package which computer can use to deliver or transfer knowledge can adopt the following strategies.

- (a) Computer Aided Instruction (CAL)
- (b) Computer Managed Learning (CML)

According to Abimbade (1998), Computer Aided Instruction (CAL) involves computer usage in the teaching and learning in the classroom. It concerns programmes which are designed to provide instructional sequence on a given science topic, that is it issues a piece of information and then raises a question about that science topic discussed. Then the student. Supplies the answer and the programme moves if the answer is correct, or presents the information again and re-teaches the student, if the answer is incorrect.

Furthermore, Computer Aided Learning uses simulation to achieve its aim. It is designed to reinforce knowledge by discovery. The material is presented in such a way that the students learns by investigation.

Moreso, Computer managed learning (CML) provides prescriptive and diagnostic guidance to the learner. It is designed to assess the student and direct the students to the next appropriate set of test based on the result on the test. Here, the computer instructs the students on what to do. At the completion of each lesson assigned by the CML programme, the student's achievement and progress are recorded.

Contribution of Computer in Educational Sector

The contribution of computer at all levels of education cannot be overphasized. Its uses in increasing rapidly. Computer uses in tertiary level of education are quite varied. Recent development in computer has influenced the globalization of various aspects of man's life. This has drastically changed the objective of education in many nations. It is observed that the influence of computer on education is to enhance the ability of each learner to generate access, adopt and apply knowledge and information to solve complex problems, (Ajayi, 2001).

A medical students practiced diagnosis and prescription on a wide variety of hypothetical patients simulated by computer programmes. An engineering students uses computer assistance in solving problem of designed and calculations. Computer science students develops a programme to help his Professor of Chemistry, Biology, Physics and Mathematics evaluate the effectiveness of questions on a multiple choice quizzes. An undergraduate in general Psychology direct a computer based information system to assemble a complete bibliography on the relation between achievement, motivation and school grades, which is as current as the journals received by his Professor. A laboratory technician tests himself on newly acquired skills, using a terminal on a hospital information system.

In schools database program stores information such as students' results, student's personal data, admission and many more. Computer can organize data, update facts and figures presented to it and give report or result as and when due.

Effectiveness Of The Computer As An ICT Device For Teaching And Learning Science In Schools

The introduction of Internet into library services has greatly enhanced the effectiveness and efficiency of library services. The greatest benefits of Internet to library services is the inexpensive way to communicate with other Internet users worldwide. Computer facilities are potent for research work. Research findings are easily communicated to peers through the Internet. Exam malpractices have been eliminated through the online registration of JAMB, SSCE, GCE and other exams. This is a very glaring relief to those concerned examination bodies and this has helped to bring qualitative education to our educational system

Computer as an Effective Tool in Education

The new technology and new techniques engendered by computer now allow for the production and sourcing of new knowledge and the dissemination of data, information and knowledge among learners. Some of these facilities which have earlier been mentioned allow students and teachers to move into the role of guide and facilitators assisting students to gain the skills required to acquire and utilize knowledge available in various forms all over the world, (Ajayi, 2001).

Some of the benefits students derive from computer include:

- (a) Enhancing the quality of student's education. Since computer makes possible the sharing of information and resources. Students who are trained with the aid of computer can receive a higher quality of education than is possible without computer.
- (b) Increases the number of students turn out within a period of time, it can handle higher number of students at a time and covers widely scattered students body through electronic learning (e-learning).
- (c) Computer assisted education has the capability of providing tuition to hundreds of thousands of learners at their various location thereby making education more accessible and learning more comfortable and convenient through its distance e-learning.

Computer in Teaching and Learning of Sciences

computer is emerging as a source of learning. It is often regarded as the virtual classroom because it allows for global distance learning programme. Thousands of students at the secondary and tertiary levels of educational institutions in different parts of the world can be connected through Internet.

Furthermore teaching and learning of science subjects with computer has been noted to respond positively in terms of enhancement of learners achievement and interest many other researchers and writers went further in expressing the merits of computer in teaching and learning science. Mohammed (1997) stated that computer makes teaching of science subjects interesting and act as a very useful aid. Townsend and Wood (1978) pointed out that computer aided instruction (CAL) initiates an appreciable change in the behaviour of learners which is different from that of any other group that learn without the computer.

Moreover the constant use of CAL in teaching and learning of Mathematics and other science subjects has consistently yielded positive results in terms of achievement of earners and attitude towards learning. Anderson (2002), pinpointed that the computer based instruction as means of solving learning disability problem if properly implemented. This points to the fact that the use of computer in teaching of science subjects is very important if active learning is envisaged. Computer based learning projects promote wide ranges of ranges of learning style among the learners. Drill and practice, Tutorial and Simulations packages from majority of the computer based learning projects that enhance effective learning of science subjects.

Simulation software is particularly appropriate for scientific experiments which in real life might be costly, dangerous and impossible to be carried out. It provides the students with best education next to actual experience. Simulation software allows experiment to be carried out using a model defined by computer programme. Some of the chemistry filtration can first be simulated and the correct end point gotten through simulation software. Dangers of using hazardous chemical during chemistry experiment and practical can be eliminated through simulation software which is one of the learning style or model of computer aided instruction.

Benefits of CAL to students and teachers include:

- students progress at their own pace of learning.
- CAL is a patient tutor and does not get annoyed or tired.
- It increases motivation of the learner.
- It helps students to gain a quantitative as well as qualitative understanding of problems in subjects being studied.
- Helps the students study experimental or theoretical areas where the exercises involved are too dangerous, too expensive or too time consuming
- It shades of some workload for the teachers.
- It helps the teacher know students individual weakness.
- It helps teachers to prepare themselves very well for each lesson.

Hindrances to Computer (ICT) Utilizations in Education

Teaching and learning of sciences in our schools have long been faced with problems of unqualified teachers, lack of good teaching method, textbooks, resource materials and others. Libraries are not standard to meet the needs of teachers. Few teachers in science education have been loaded with excess load because of that they cannot have time for innovation and self updating. These affect the quality of science students we turn out. ICT has solution to all these but there are a number of obstacles hindering computer utilization in teaching and learning.

Computer Illiteracy

We live in an information age and information is the life wire of any nation's security, power, and development. In the industrialized nations their power is because of utilization of ICT in every sphere of their life. Computer literacy is important to effective use of ICT. Computer literacy is the ability to understand the computer and use it in solving problems and performing some tasks. We can only benefit from ICT when we can operate computer, use internet and other facilities of ICT to solve our problems.

Lack of Infrastructure

In our country today, we still do not have enough infrastructure to support the utilization of computer and other ICT facilities well. Electricity is one of the things that is required before we can operate our ICT equipments and it is found in cities only and even at that the supply is not steady. Computer system, telephone lines and other communication technologies are not seen in the non-urban areas and these hinder the effective utilization of computer.

Lack of Effective Internet Equipment

Internet is one of the facilities that help in effective utilization of computer in education. It requires the use of Internet Service Providers (ISP) for it to function but the ones we have here in

Effectiveness Of The Computer As An ICT Device For Teaching And Learning Science In Schools

Nigeria have no powerful servers making usage of Internet sometime boring because it takes much time before a particular program can be loaded in the system.

Unavailability of Trained Personnel

Due to the fact that Nigeria is still developing, we lack the personnel required to make use of these equipments in teaching and learning. Some of this equipment are available in some institutions but no one to operate them and any lecturer or teacher who has no knowledge of computer would find it difficult to deliver lecture online or send his students to browse and get more facts and these hinder the effectiveness of computer usage in education.

Lack of Fund

Due to the poverty level of our nation, most of our parents, students and institutions can not afford the finance needed for them to make use of these equipments and maintain them. For instance before one can browse in a business outfit you have to pay some amounts and some of us cannot make it and these deprive them of the knowledge and fact they would have gotten and these affects our educational system.

Recommendations

In order to attain effectiveness of computer in our educational system, these recommendation are hereby stated:

- continuous organization of workshops and seminars for science teachers who are going to use computer in computer in impacting knowledge to learners would help to boost that educational system since computer is dynamic and has innovation always.
- Creating Awareness: Computer usage awareness should be employed to both rural and urban teachers and students so as to involve everybody in the effectiveness of computer in education system. Religious group, peer groups, community leaders should help in creating the awareness.
- Attracting foreign investors: Foreign investors should be invited and encouraged to help us develop, expand and update some of these technologies and equipment like electricity, phone line, internet service provider, etc. so that the people in the rural areas can also benefit from CT and its facilities.
- Government funding: Government should be granting bursary awards to students and science teachers should also be encouraged by giving them allowances to motivate them for effective teaching and learning and students would be able to use internet whenever they want.
- Government should help and provide these equipments to schools and give automatic employment to graduates of computer science so as to wave off the problems of lack of personnel.

Conclusion

To acquire any desired experience requires some attentive efforts from both the learner and the teachers. The teacher can only impact qualitative knowledge to the learner when effective equipment is provided for him.

Information and Communication Technology (ICT) is providing opportunities for the use of computer system to assist in education and training of students (Modum, 2001). Instructors of all levels of education are welcoming computers, as a result of perceived benefits. Computer as an instructional tool is necessary as it plays a complimentary role to the traditional means of teaching. It

can deliver course content, monitor learner's progress, offer individualized counseling to meet the individual need of each learner. It also provides interactive learning as well as opportunity for each learner to progress at his own pace. Computer literacy is important for any education person who wants to be relevant and contribute to the labour market of his discipline.

Reference

- Abimbade, A. (1998). Information communication and technology (ITC) in learning environment. 39th annual conference proceeding of *Science teacher association of Nigeria*. Pp. 334-337.
- Ajayi, A. A. (1999). Teaching and learning perceived difficult topics in physics: the role of information technology. *Akoka journal of pure and applied science education* 2, 95-100.
- Anakwe, F. O. (1991). The role of computer in teaching and learning of mathematics. The effective teachers education curriculum studies, UNIJOS, Jos.
- Anderson-Imman L. (2002). Computer based solutions for secondary students with learning disabilities emerging issues reading and writing quarterly.
- Anosike, L. C. (2002). *Internet literacy*. Horizon publications Nigeria-Enugu, Warri Port-Harcourt, Lagos.
- Brewton, C. C. (2000). Using the internet to enrich science education. *Journal of the science teachers association of Nigeria* 35, 1& 2.
- Inyama, H. C. (2002). *Computer application and information technology*. The dynamic informer inc. Enugu, Nigeria.
- Modum, U. (2001). Electricity mediated instruction systems and computer assisted teaching and learning in Kabiru, 1 et al (eds). *Teacher education in the technology age*. Abuja: 1 (1). 52-57.
- Mohammed, I. (1997). Computer as teaching aid in integrated science. Paper presented at issa week federal college of education, Abeokuta.
- Ngwu, O. G. (2005). Improving the quality of computer education through reformed teaching methods. *The science teacher today. Journal of school of sciences*. Federal college of education, Eha-amufu.
- Rahman, L. (2002). Strengthening information technology infrastructure in Bangladesh in MAG Akale (ed) science, technology and mathematics education for sustainable development in Africa, *Science teacher association of Nigeria*
- Townsend, P. & Wood, R. O. (1978). Learning an appreciation of structural behaviour using interactive computer graphics, *computer and education* 2 (3).

