

# INFORMATION AND COMMUNICATION TECHNOLOGY (ICT): A TOOL FOR ENHANCING SCIENCE EDUCATION TEACHING AND LEARNING

*Nnaobi, Azuka F.*

## Abstract

The paper sees information and communication technology as a recent development and also as an assistance to science teacher in classroom instructions. The paper outlines the ways of using Information and Communication Technology (ICT) in classroom, benefits and pressing problems associated with ICT as an instructional strategy. It recommends that government should encourage the science teachers to attend ICT training so that the teachers would be able to use multimedia approach to impart knowledge."

## Introduction

The world is Iasi becoming u global village as a result of developments in Information and Communication Technology. The key instrument in this globalization is the use of computer. The beginning of the 21<sup>st</sup> century saw a great shift in emphasis from classroom traditional pattern of leaching science education to Information and Communication Technology. Information and Communication Technology consists of hardware, software, network and media for collection, storage, processing, transmission and presentation of information (voice, data, text and images). The use of ICT has become so important that it became the most significant indices in national and economic development (Adamn, 2001). The Nigeria's quest for change from rapid pedagogical pattern to information age and globalization was in its National Policy on Education (FME, 2004). The innovations among others include:

- (i) Introduction of Information and Communication Technology into the school system.
- (ii) Repositioning science education in the scheme of national education.

To ensure the above innovations, ICT resources should be employed. Charakpu (2002) described Information and Communication Technology as the use of computer, Internet, e-mail, satellite in the collection, analyzing, processing, manipulation, storage, retrieval, transmission and communication of data in different forms which include audio, visual and audio-visual formats. Information and Communication Technology allows for intensive interaction among learners arid instructors to take place. Rahman (2002) described Information and Communication Technology as creation, processing, storage, retrieval and transmission of data and information. This new innovation. Information and Communication Technology allows information to be transferred across distance without face-to-face contact and also in distance education or e-learning. According to Rahman, a large number of the developing countries have lagged behind in ICT due to their inability to use (lie resources. The resources include computer and multimedia projectors.

With Information and Communication Technologies at the education sector, there may be no need for every school to have big libraries, laboratories and enhanced staff strength. This is because ICTs allows for e-learning network to reach widely dispersed audience. Books could be converted to CD ROMs to solve the problem of acute shortage of textbooks. However, it has been observed that Nigeria populace lack modern skills in ICTs to compete in global economy as well as in education. Thus, the Nigeria populace needs to be educated in the use of computer to be able to communicate effectively with the rest of the world. Hence, the use of computers in teaching and learning in the education system is still at its infancy or non-existence in primary schools, secondary schools and higher institutions. Where it does exist at all are only in private primary schools, unity secondary schools and computer science department in tertiary institutions.

## Ways of Using Information and Communication Technology in Science Education Classroom

Information and Communication Technology is an aspect of technology that has great impact in all aspect of human life in a very profound manner. Information and Communication Technology allows information process to be accomplished much more efficiently, and this can be used to raise the standard of education in the country (Ezeliora, 2004). Information and Communication

Technology centered-education covers the use of computers, online self-learning packages, interactive CDs, satellites, radio, optical libber technologies, telepresences systems and all types of information

technology hardware and software.

The use of ICT in teaching and learning process can be categorized into two namely, instructional strategy and knowledge resources (Ivowi, 2002). In each of these, the computer is the object of instruction and vehicle for instruction. The use of computer to deliver instruction in the classroom could be categorized into two:

- i. **Computer Assisted Instruction (CAI).**
- ii. Computerized Managed Instruction (CMI).

In computer Assisted Instruction, the teacher uses a multimedia approach (T - media). The CAI enabled the learners to interact with the computer directly. The multimedia approach (T - media) examines how the teachers incorporate the use of ICT resources such as projection technology/ interactive whiteboards to enhance learning. In CAI, the teacher uses the T- media approach to free himself/herself from the routines classroom teaching task while he/she explains some salient points. In Computerized Managed Instruction (CMI), (he teacher has already packaged the concept in C'D ROMs.. Students' interests are sustained and ideas concretized using different resource at a pace that appeal to each student. Individual differences of students are accommodated such that slow and fast learner benefits from the instructional approach (Ozcliora, 2004).

Other ways of Information and Communication Technology in science education as the sources of knowledge includes:

- i. **International Network (Internet):** Internet allows data to be transferred from one computer to another. The Internet consists of millions of computers around the world that are connected to one another through communication lines, each computer on the Internet offers various informations, which can be accessed by anybody with the right equipment.
- ii. **Electronic Mail (E-Mail):** **The e-mail enables meaningful interaction between the teacher and the learner. The teacher can post useful educational information to his/her e-mail. With this kind of educational environment, the learners will be able to access the learning materials and system anywhere, provided the necessary authorization has been given.**

Ivowi (2002), mentioned that, the consequences of Internet and the characteristics of the information age is the propensity for many sources of information. With the ICT tools, the students no longer put their hopes on the teacher for source of knowledge as they have equal access to knowledge. In ICT, both teachers and students have access to current textbooks, reference books and using of Internet. Information and Communication Technology enhances knowledge sharing, quality of knowledge, authentic and unique knowledge. The useful application of ICT in the teaching and learning of science education is enormous, interesting and exciting (Ezeliora, 2001). There are some benefits and problems limiting the application of ICT in Nigeria education sectors.

#### Needs and Benefits of ICT Skills Development in Nigeria Schools

The awareness of computer education in Nigerian schools was launched in 1988, by the Federal Government to offer the following objectives (Abimbade, 1999). The objectives, include:

- i. A basic appreciation of how computer works;
- ii. Understanding of basic principles of operating a computer; and
- iii. Hand-on experiences using pre-programmed packages, which are relevant to the interest of the students.

In his keynote address to the 44<sup>th</sup> Annual Science Teachers Association of Nigeria Conference, held in Jos, in August 2005, the then Nigeria Honourable Minister of Science and Technology, Professor Turner T. Isonn outlined several benefits of ICT as follows:

1. Increased employment and educational opportunity for young people.
  - Opportunity for life-long learning.
  - Learning while working.
  - Open distance education.
  - Skill for employment.
2. Promote unity in diversity.
  - ❖ People are linked together in a “network of networks” irrespective of location to communicate and exchange information and share resources.

- ❖ People are better informed through e-government leading to stronger democracy.
  - ❖ Gives the Nigeria youth opportunity to compete on level playing ground with other youths in the global village.
3. ICT can be employed to transform 'brain drain to brain gain'.

However, since the information age is driven by knowledge of computer, the development of skills and infrastructures for ICT should be encouraged.

#### Problems of Information and Communication Technology

The problems of teaching and learning science education have been characterized as:

- i. Lack of teaching textbooks.
- ii. Shortage of qualified teachers.
- iii. Lack of resource materials.

The ICT would have been a way out of these handicaps to teaching and learning in our schools if not for the following obstacles.

1. **Power and Energy:** Power and energy supply is the most disturbing factors to the application of ICT. Many parts of the country have not been connected to electricity supply. The towns that have electricity, the power supply is very unreliable and inadequate.
2. **Computer Illiteracy:** To live in an information age, there is the challenge of the populace to be computer compliant.
3. **Lack of Manpower/Computer Experts in the Schools:** The available computer experts preferred to work in oil companies instead of teaching in schools.
4. **Lack of Government Policy:** The existing government policies on ICT are not properly implemented in schools due to nonchalant attitudes towards government policies.
5. **Lack of Infrastructures:** The ICT infrastructures in most schools are not on ground to cope with the envisaged automated curriculum and e-learning activities.

#### Recommendations

1. Science teachers should be encouraged to use ICT in their classroom.
2. Training programmes should be encouraged on a regular basis on the use of ICT in teaching and learning sciences.
3. Government should provide adequate ICT infrastructures in schools for effective instruction and learning.

#### Conclusion

It has been seen that Information and Communication Technology has an important role to play in teaching and learning of sciences. The potential of learning computer in science curriculum should be encouraged to achieve the government policy on ICT capabilities. The government and private sector should enhance the teaching and learning of computers in schools by providing laptops and desktops to teachers and schools.

#### References

- Abimbade, A. (1999). *Principle and practice of educational technology*. London: International Pub Ltd.
- Adamu, U.A. (2001). *Teaching and learning using computer assisted instruction (CAI) in science class*. Paper Presented at the Training-the-Trainer Workshop for Revitalization of Science Education Organized by NC'CE in Collaboration with UNESCO.
- Charakpu, R. (2002). ICT in fusion in tertiary education in Botswana from experiment to sustainable development. *43<sup>rd</sup> Annual Proceedings of STAN*. Pp. 543-545.
- Ezeliora, B. (2004). Problems affecting effective use of information technology in the teaching and learning of chemistry in schools in Nigeria. *Women Journal of Science and Technology (WJOST)*, Enugu, Women Scientists (3) 15 - 22.
- Federal Ministry of Education (2004). *National policy on education*, Lagos.
- Ivowi, Umo (2002). Educational challenges for the information age. *Interdisciplinary Education Journal*

(INTEJ) 4( 1)3-17.

Rahman, L. (2002). Strengthening information technology infrastructure in Bangladesh. *43<sup>rd</sup> Annual Proceedings of STAN*. 551-554. Port Harcourt.

Isoun, T.T. (2003). Keynote address presented at 44<sup>th</sup> annual proceedings of STAN. 3-5. Held in Jos