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## **PROVISION AND UTILIZATION OF ICT AND INTERNET SERVICES IN SCIENCE, TECHNOLOGY AND MATHEMATICS EDUCATION**

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### **Abstract**

*The current revolution in information communication technology (ICT) has contributed immensely to better practice in education programme delivery worldwide. It has linked several geographical areas in the world for better interaction. In this paper effort has been made to discuss basic concepts of ICT, Science, and technology. Also, the need for the provision and use of ICT in Science teaching was discussed. The challenges of effective use of ICT were highlighted. Finally recommendations were made among others, that there should be regular supply of power for effective ICT use in schools. The government, NGO'S, and alumna of various schools should provide computers and internet facilities to schools in Nigeria and developing Nations.*

### **Introduction**

The ever-present need to continuously improve on the methods of teaching, learning and research in order to keep up high standards and as well offer the best to the learners cannot be effectively achieved without the provision and use of ICT (Babbie, 2001). The advent and the revolution in Information and Communication Technologies (ICT) have been of tremendous blessing to the practice in education worldwide. In fact, technologies, from print to instructional television and to the current interactive technologies, have played prominent roles in instructional delivery in education programmes. This is why the United States office of Technology Assessment (Meteethan, 2001) defined 'ICT' in Education/learning" as the linking of a teacher and students in several geographic locations via technology that allows for interaction (Wegner, 2001). The internet has increasingly become an invaluable tool in education research, teaching and learning. The role of the internet in information access, dissemination, handling, packaging, storing and retrieval is at the root of any meaningful academic enterprise all over the world, particularly in developed nations. (Tuckman,2003). Internet connectivity is a solid means of academic empowerment and development which has been acknowledged by Mohammed and Ekpunobi (2003)

and Cohen, Manion and Morrison, (2000). Cohen, Manion and Morrison (2000) also maintained that the internet is an instrument for research and communication. This has opened up numerous possibilities for resources such as the use of ICT in teaching and learning, keeping data, data analysis, transfer of technology, Joomla, Skype, Moodle, Maharah and so on for teaching and learning at local, national, regional and global levels.

### **What is ICT?**

ICT is the application of electronic media to education in all areas; higher education, continuing education corporate training, military and government training, telemediate and the pursuit of lifelong learning (McCoamick and Scrimshaw,2001;Fleknoe,2002). ICT is also a principal driver of Educational development and social change, worldwide. In many countries, the need for education and social development is used to justify investments in ICT education reform and social changes. The connection between national development goal and ICT-based education reform is often more rhetorical than pragmatic in approach (Rajasekar, 2010).

### **Access and Use of ICT in Education**

In the developed countries such as United States of America, Canada and so on the internet has transformed the conduct of research and teaching in academic institutions by giving lecturers a wide range of assess and opportunities for getting accurate and timely information as well as providing a medium of communication with other research findings to a wide audience. Collaborating research efforts has also been made easier through the internet (Wagner,2001).

### **Need for Adequate Provision of ICT**

The need for ICT cannot be over emphasize. Tuckman (2003) opined that the functions of internet has always been to provide a way for academic staff to have better access to each other and as a tool to facilitate research. The internet is the most efficient means of communication when compared to other sources of communication in the world. Babie (2001) reported that the internet is a powerful and efficient tool for search, retrieving and dissemination of information and

ideology. Nwachukwu, (2006) noted that academic staff, professional skills, attitude, and values may be improved through proper utilization of internet for academic work. This is probably the reason why Cohen, Manion and Morrison, (2000) maintained that academic institutions in developing countries especially in Africa must not ignore the potentials of the internet in Africa to produce scholars that would make an appreciable impact in this information age. It has also given academics the opportunities of contacting experts' individuals from all over the world on topics of their interest. Lecturers in Nigerian institutions of higher learning therefore cannot afford to lag, behind if they hope to remain relevant in the global quest for advancement in technology. The world is witnessing an era of Globalization which has made it clear that ICT should manifest in all aspects of people's lives, be it in health, education etc. ICT is a pathway to achieving the MDG goals which are consistent with Nigeria's, Needs program as instituted in 2004. Most public services in advanced countries are ICT oriented. Most offices, even homes are equipped with computers, which are expensive in terms of cost of materials; installation and maintenance. For example, with the Internet, students can access information far beyond the scope of their traditional textbooks. School Curricula can be individualized and adapted to students' specific learning styles. ICT has the power to enhance the overall knowledge accumulation, instead of just focusing on content mastery. There is need to define and explain some basic concepts, terms and ideologies that will assist in giving a clear and better understanding of the need to provide and use ICT in STM education in Nigerian.

### **What is science?**

Science is a (Latin word coined from scienta, from scire, "to know"). Science as a term used in its broadest sense denotes systematized knowledge in any field, but usually applied to the organization of objectively verifiable series of experience. Science is a way of knowing, a systematic method of learning about nature, based on observation and testing leading to the formulation of hypothesis, facts, laws, and theories (John, 2009).

The pursuit of knowledge in this context is pure science, distinguished from applied science, means the search for practical use of scientific knowledge and from technology through which applications are realized. The working

definition of science that really stresses, appraised rather than content was provided by UNESCO in 1971. UNESCO (1971) defines “science as the approach in which concept and principles of nature are presented so as to express the fundamental unit of thought, to avoid premature or undue stress on the distinction between the various natures”. This definition is perhaps the most significant distinguishing feature of science in education (Kocakaya & Gonen, 2010).

**Technology** is a Greek word for “a bag of tools”. It means a way, manner, method or techniques of doing things and as such, it predates science. The techniques of doing-something can be learnt informally through apprenticeship or by on the job training or formally in a training institution. This is where technology education comes in. It is learnt in an institution (Adebayo, 2008).

The National Policy on Education (FRC,2004) described technical education as the aspect of education, which leads to acquisition of practical and applied skills as well as basic scientific knowledge of how to do things.

**Education** is referred to as the process of training and instruction which is designed to give knowledge and develop skills in the learner (Flecknoe, 2002). Education is also the art of imparting knowledge and skills to the learner. (Olorukooba, 2007).

**Mathematics** is called the queen of the sciences. It is a branch of science which deals with the study of manipulation of numbers. Mathematics has been considered as the back bone of all science courses because with the full knowledge of addition, subtraction, multiplication, division, solving day to day problems and activities is easy. (Salau, 2000).

#### **Access and Use of ICT in Education.**

The need for the use of the internet in Africans academic institutions especially in Nigeria has been imposed by dwindling budgetary allocation particularly in education sector for the past three decades. As a result, purchase of library books and journals as well as other relevant information sources needed for research and teaching appear to be deemphasized in the priority list of these

institutions. Therefore, it stands to reason that the provision access and use of ICT in teaching, learning and research be seriously considered in all institutions at all levels.

Access and the use of the internet will provide information for teaching, and research in technology such as the use of Flash Micro media and JoomlaLMS. The impartial role the internet places in academic institution as clearly presented by Wegner (2001) is that tertiary institutions practically may not do very well without the internet, in this era of the superhighway networking. Internet connectivity is a solid means of academic empowerment and development which has been acknowledged by all (Attama, 2005). Olakire and Okwuanaso (2006) also maintained that the internet is an instrument for research and communication. This has opened up numerous possibilities for resources sharing at local, national, regional and global levels. For example, Information on latest journals, books and transaction can be exchanged through the internet.

### **Challenges of Effective Use of ICT for STM Teaching in Higher Institution**

In Nigeria's Higher Institutions of Learning (HIL), the use of ICTs to promote teaching and learning is fast gaining momentum (Flecknoe, 2002). This development could partly be traced to the realization and acceptance by lecturers, instructors and other managers of Higher Institutions of Learning of the significant roles ICTs are capable of playing in the education sector (Flecknoe, 2002). In these HIL, the environment has remained almost stagnant due to the slow pace of capacity building mechanisms, poor funding. Inadequate infrastructural provision and development, and until very recently, low wages (Flecknoe, 2002). However, the numbers of both enrolled and aspiring students has been on the increase because of the obvious flood of academic information globally. It has been observed that Information and Communication Technologies (ICTs) are capable of, and are playing a number of significant functions in education programme delivery (Flecknoe, 2002; McCormick and Scrimshaw, 2007). Some of these functions include ICT being employed as catalysts for rethinking and repositioning of learning and teaching practices (Flecknoe, 2002; McCormick and Scrimshaw, 2001). Tuckman (2003) opined that ICT is important in developing the kind of graduates and citizens required in an

internet in the universities followed by, faculty of science, faculty of Arts came third while, faculty of pharmacy, education and Agriculture faculties occupied the last three positions.

In the same vein, Elikamenor (2003) investigated the use of internet resources by scientists in ten universities in Nigeria, he discovered that 64.6% of the respondents had access to computers and about half of them had access to the internet.

In addition, Mabaworiki and Okwilagwe (2004) in their study on the use of ICT in Nigerian library and Information schools discovered that 28.8% of the respondents had internet access in their office while 64.4% admitted that they had access to internet from other locations such as cybercafés, while 37% claimed that they access to internet through their university libraries. However, Ojedokun (2009) revealed that over one third of individual with internet access users used browsing and E-mail which he said were used by more than half of those with internet access.

Awolabi and Agboola (2010) also found out that academic staff of various institutions is aware of the internet and used the facilities for research and learning. Their findings agree with Onyekweli (1998) that the main obstacle facing the use of internet in Nigeria is inadequate power supply. Iliyasu and Isiyaku (2010) also found out that lecturers have access to ICT within the institution at least 26.50% of the time while less than 25% of the time outside the institution. The frequency of use of ICT within and outside the institution is equally less than 25% of the time and their proficiencies in the administration and management of ICT during usage being the same. Gana, C.S &Gana, H.S (2012) conducted a simple survey on Internet usage among university lecturers in Federal University of Technology Minna and discovered that School of ICT and Statistics staff were the fore most users of the internet in the universities followed by, School of Engineering and School of environmental , School of science and School of Agriculture came third while, School of Entrepreneurship occupied the last three positions.

From the available data and discussion above it is clear that the use of internet for research, teaching and learning by the academic staff has contributed immensely in solving the problems of lack of relevant and current information

and resources in many institutions. The cost of globalization in ICT knowledge has immensely overtaken most teaching and learning methods. Computer literacy that is at the core of most types of training and had positively influenced many forms of training at basic and advanced education levels. To help learners in developing countries, meet the challenge of the changing world there should therefore be positive policies in ICT curriculum development and education in general.

### **Conclusion**

The youth are the primary users of ICT in Nigeria, for the university Matriculation Examination (UME), scratch cards are used. They were easily identifiable as most students had their uniform on, when they go to cyber café to access their particulars on line. While some educators believe the use of interactive, computer-based technology is crucial to improving classroom learning and that ICTs use will fundamentally change the learning process and structure, others believe that it is merely a tool that has minimal impact on the quality of learning. It is the position of the writers of this paper that ICTs has the potential to significantly expand the length, the breadth and depth of the education curriculum. Also, ICTs could significantly affect the role of teachers, as well as the structure of schools and classrooms. The use of ICTs will change the teacher's role from expert to facilitator of knowledge or coach. Instructions will no longer be limited to the school building or classroom. Students can also take courses from a global satellite or on the Internet. Learning can take place at home, at work, or anywhere else that has the capacity for a television, phone, or computer.

The above potentials of ICT in learning science technology and mathematics programmes form the basis for the recommendations which follow.

### **Recommendations**

1. There should be an ICT Policy for all Institutions of Higher Learning in Nigeria. Each type of the IHL (i.e. Universities, Polytechnics, and Colleges of Education) should have their own Policy tailored to meet their need specifications.
2. Enough ICT tools should be provided in all IHL (Becta,2003).

3. ICT capacity building mechanisms should be put in place to empower Lecturers and Instructors in their usage of ICT to continuously improve their ICT knowledge on their jobs.
4. More studies on different aspects of ICT usage in all segments of the education sector such as the use of Moodle, JoomlaLMS, and Blackboard should be encouraged(Becta, (2005).
5. There is need for the university management to provide internet connectivity in all areas of the university particularly in all the offices of academic and non academic staff.
6. Government should improve the funding of universities to enable then acquire more ICT facilities.
7. Power supply should be improved in the country to ensure constant power supply in IHL for ICT use and for other services.
8. Finally, all academic staff should be acquiring personal computer facilities with full internet connection in their offices and classrooms through cooperative societies and the ETF intervention. The assistance of ETF could be sought in this regard.

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