

## An Evaluation of the Impact of ICT Diffusion in Nigeria's Higher Educational Institutions

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### Abstract

*Higher education is approaching the point at which Science and Technology particularly Information and Communication Technology (ICT), plays a vital role in nearly all phases of the educational process. The Internet has emerged as a major driving force of this dynamic development of Information and Communication Technologies (ICTs) which has impacted positively in virtually every sector of the Nigerian economy. In the education sector, tertiary institutions use computers in their academic programs in order to produce good quality of research output and learning. This paper focuses on how ICT diffusion has impacted the higher educational sector positively in Nigeria. The research also exposes the effect of ICT diffusion on undergraduate and postgraduate students of Nigeria's tertiary institutions. A combination of observation, interview and document materials for data gathering was employed as methodology for carrying out this research. The result of the research suggests that ICT is becoming a driving force for educational reforms and that ICTs have become an integrative part of national education policies and plans in Nigerian tertiary institutions.*

**Keywords:** Internet, Higher Education, Tertiary Institutions, Nigeria.

### Introduction

Communication is the livelihood of today's business. Electronic data communication is becoming the industry standard of transaction media and widely used in such areas as education, payment of bills, video conferencing, and group work collaboration, etc. Through tele-education and tele-medicine, as already practiced in many developed countries such as South Africa, India and China, education and health can be brought to the door step of the rural and deprived urban cities in all countries in Africa. For example, the United Nations Committee on Peaceful Uses of Outer Space (COPOUS), at the 46<sup>th</sup> Session of the Scientific and technical Subcommittee recognized the broad application of tele-medicine in epidemiology, tele-surgery, offsite radiology services, cardiac monitoring, medical consultations and specialist referrals, as well as tele-education in medicine and therapeutics education and Open University System. The world is moving at an unimaginable speed in the area of information use and dissemination. The most vibrant sector of the national economy is the information technology industry as well as the educational sector.

Though, every nation has a price to pay for technological development. Science and Technology is the bedrock of this development. The Science & Technology sector in general and Information and Communication Technology (ICT), in particular, represent areas that must be addressed for sustainable technological growth. Three technological waves driving global economic development are; (i) Information Technology (ii) Material Science and (iii) Biotechnology

Technology is changing at an unprecedented rate and, without the proper machinery in place; one stands the risk of being left behind. Through the use of Information technology, knowledge and information can be transferred and cross-fertilized in real time. Hence, the need to pay attention to the way information technology has revolutionized the educational sector through ICT principally the Internet.

### **An Appraisal of the National Policy for Information Technology and Education in Nigeria**

Information and Communication Technology (ICT) policy, as noted by Rowland (1996) and cited in Hafkin (2002), can be categorized into vertical, infrastructural, and horizontal policies. Vertical ICT policy addresses sectorized needs, such as education, health and tourism. The infrastructural aspect deals with the development of national infrastructure and this is closely linked with telecommunication. The horizontal aspect deals with the impact on broader aspects of society such as freedom of information, tariff and pricing, privacy and security. These three aspects are adequately addressed in the Nigerian IT policy. It is now important to examine the document as it affects education.

In carrying out this analysis, the following four key questions were taken into consideration:

1. What does the Nigerian national policy for information technology tells us about education?
2. How adequate is the policy for the integration of ICT in the Nigerian education system?
3. What implications are there for the Nigerian education system?
4. What agenda is needed to redefine the national policy to cater for the country's education system?

Answers to these questions are intended to provide a basis for redefining and re-development of the Nigerian national policy on information technology (Federal Republic of Nigeria, 2001). First, the document mission statement recognized the need 'To Use IT for Education' (p. iii). In addition, the general objectives in three (xv, xvi and xxiv) of the 31 stated objectives stressed that information technology must be used to:

- a. Empower the youth with IT skills and prepare them for global competitiveness.
- b. Integrate IT into the mainstream of education and training.
- c. Establish new multifaceted IT institutions as centers of excellence to ensure Nigeria's competitiveness in international markets (pp. iv – v).

In order to achieve these objectives, 20 strategies were outlined. The fifth strategy was stated in this way: "Restructuring the education system at all levels to respond effectively to the challenges and imagined impact of the information age and in particular, the allocation of a special IT development fund to education at all levels" (p. vi). It should be underscored that although as the

mission, general objectives, and strategies recognized the importance of ICT in education, the document has no sectoral (vertical) application to education (Yusuf, 2005). Issues relating to education are subsumed under sectoral application for human resources development. Under this sectoral application, objectives 1 to 4 relate to education as follows:

- a. To develop a pool of IT engineers, scientists, technicians, and software developers; in order to increase the availability of trained personnel;
- b. To provide attractive career opportunities; and
- c. To develop requisite skills in various aspects of IT.

To achieve the objectives for human resources development, nine major strategies are outlined. These strategies are targeted at the building of knowledge and skills in information technology. These include (a) making the use of ICT mandatory at all levels of educational institutions; (b) development of ICT curricular for primary, secondary, and tertiary institutions; (c) use of ICT in distance education; (d) ICT companies investment in education; (e) study grant and scholarship on ICT; (f) training the trainer scheme for National Youth Service Corp members (g) ICT capacity development at zonal, state, and local levels; (h) growth of private and public sector dedicated ICT primary, secondary, and tertiary educational institutions; and (i) working with international and domestic initiatives for transfer of ICT knowledge.

In spite of these objectives and strategies that are focused on education, the document is inadequate to cater for the needs of the country's education system. Some of the deficiencies noted in the document are enumerated as follows (Yusuf, 2005).

First, the policy has no specific special application to education. While there are sectoral applications for health, agriculture, art, culture, tourism; and governance, education is subsumed under human resource development. An ADF (1999) recommendation explicitly notes the need for sectoral allocation dedicated just to education.

Second, the objectives and strategies related to education as reflected in the sectoral application for human resource development are market driven. Students are only being prepared to acquire knowledge and skills for future jobs. The focus is only on learning about ICT, which is regarded as 'Topicality', whereas for primary and secondary schools the focus is regarded as the early stage of ICT use in education (Clope & Sharif, 2001). This philosophy limits the potential of ICT in education to a central force in economic competitiveness. Its potentials as a tool for addressing challenges in teaching and learning and as change agent are thus neglected (Culp, et al. 2003). Students need not learn about computers only; ICT should be integrated for the development and management of teaching and learning in Nigerian schools.

Third, teachers are indispensable for successful learning about ICT, and learning and teaching through ICT. Computer education introduced into the Nigerian secondary school since 1988 has largely been unsuccessful as a result of teachers' incompetence (Yusuf, 1998). Empirical studies have established that teachers' ability and willingness to use ICT and integrate it into their teaching is largely dependent on the professional development they receive (Davis, 2003; Pearson, 2003; Selinger & Austin, 2003; Watson, 2001). The Nigerian national IT policy is silent on teacher education and teachers' ICT professional development as envisaged by the review of Culp, et al. (2003).

Learning through ICT entails the development of nationally relevant context software for school use. The national policy does not recognize the need to create quality software. A review of 28 key policy documents over 20 years in the United States (Culp, et al., 2003) put forward seven key recommendations. The second emphasizes the creation of more high quality content and software. The available software in Nigerian schools is imported with no local content. The policy document does not address this issue.

A further recommendation by Culp, et al. (2003) also includes an increase in research, evaluation, and assessment. None of the issues relevant to ICT application in the Nigerian education system address the issue of research, evaluation, and assessment, all of which are critical to ensure success. Research, evaluation, and assessment should address access, professional development, use and competence, attitude, and so on.

### How ICT Can Improve Qualitative Education

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training (Wadi & Sonia, 2002).

ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment. The following are some of ways in which ICT have enhance quality education:

1. **Motivating to learn:** ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process and tele-collaboration. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.
2. **Facilitating the acquisition of basic skills:** The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs such as “*Who Want to be a Millionaire*”; Nigeria’s biggest thought provoking program, enlightens people because of the questions that are required to be answered before the cash price is awarded. Questions are drawn from all works of life ranging from religious, cultural, educational to contemporary issues, thereby facilitating the acquisition of basic skills amongst populace.
3. **Enhancing teacher training:** ICTs have also been used to improve access to and the quality of teacher training. For example, institutions like the Cyber Teacher Training Center (CTTC) in South Korea are taking advantage of the Internet to provide better

teacher professional development opportunities to in-service teachers. The government-funded CTTC, established in 1997, offers self-directed, self-paced Web-based courses for primary and secondary school teachers. Courses include "Computers in the Information Society," "Education Reform," and "Future Society and Education." Online tutorials are also offered, with some courses requiring occasional face-to-face meetings (Jung, 2002).

In Nigeria, The National Open University of Nigeria, satellite-based video and audio conferencing was founded in 2000 by the then Nigerian President, Olusegun Obasanjo, supplemented by print-materials and recorded video, to train teachers who have not obtained the requisite degree for their current job placement from any geographical distance. The teachers interacted with remote lecturers by telephone and fax.

### **Research Methodology**

In this study, we used a combination of observation, interview and document materials (textbooks, articles and reports) for data gathering, which we believe are valuable sources of data about educational research. Some observations were made of the physical settings of some institutions and the quality of the ICT skills of those working in them based on their qualification and length of experience to be able to describe what was going on in the institutions.

The categories of documents used in the study include both primary and secondary sources. Documents provided us with good insight into what has been written concerning the topic under study. These theoretical sources were used extensively in the course of our analysis of this study. To be able to make full use of the document materials that we located and accessed, the researchers needed to assess their validity and value. (Pole & Lampard, 2002).

Scott (1990) puts four overlapping validity criteria: authenticity, credibility, representativeness and meaning, which served as a framework to us. In all, it must therefore be recognized that we were able to systematically select documents in a fashion, which looks like a randomized sampling procedure, which helped us put more ideas, color and rigor into this work.

Interviewees were selected across the different academic disciplines, from different departments and from both sexes within 6 south-western universities in Nigeria to ensure coverage of all these relevant demographic and academic indicators. The universities are:

- a. Obafemi Awolowo University, Ile-Ife.
- b. University of Ibadan, Ibadan.
- c. Lead City University, Ibadan.
- d. Osun State University, Oshogbo.
- e. Bowen University, Iwo.
- f. National Open University of Nigeria, Ibadan Study Campus.

During the structured interview sessions, open-ended, close-ended and probing questions were asked from our interviewees in order to obtain the current status of ICT diffusion in the various institutions. After each interview session, a report is produced. However, both quantitative and qualitative data were analyzed concurrently.

Our acceptance or otherwise of the retrieved information were dependent on our selection of information from the review and the interpretation put on it. It is hoped nonetheless that the representation pinched here is relatively balanced and logically precise.

### Empirical Analysis

The Impacts of ICT diffusion in Nigeria's Tertiary Education are summarized as follows:

- a. **Access to remote learning resources:** Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many institutions in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons, mentors, experts, researchers, professionals, business leaders, and peers all over the world. Lecturers are able to break away from professional isolation. With ICTs, they can easily connect with lecturers from other countries and with sources of teaching materials. Therefore, with information more readily available, learners are not dependent on lecturers and librarians for information. Learners are helping redefine the role of lecturers and librarians so learners can focus on analyzing information and sharpening their critical thinking skills. This is the current trend in the higher institutions visited for this study.
- b. **ICT have broken the barrier of distance in knowledge acquisition:** With the advent of ICT and its subsequent diffusion in higher institutions in Nigeria, interactive electronic communication between two or more people from different geographical location is now used in teaching and exchange of ideas either inform of a conference, symposium, seminar or lecture. This technology known as **video conferencing** is already implemented in Obafemi Awolowo University (OAU) Ile-Ife as well as the National Open University of Nigeria (NOUN), which has various campuses situated across the country. This technology has become a driving force for educational reform, making it possible for teachers and learners (and related support professionals) to connect better to information, ideas and each other via effective combinations of pedagogy and old and new technologies. ICTs for teaching and learning undergo at least three phases: a **substitution phase** where traditional teaching occurs with the use of new technologies; a **transition phase** where new teaching and learning practices begin to appear as established practices start to be questioned; and a **transformation phase** where the new technologies enable new practices. Nigeria's tertiary institutions are now undergoing the transformative phase of this digital drive.
- c. **ICTs are altering the functions of libraries and changing the role of librarians:** With a wealth of learning resources on the Internet, some of which are freely available, librarians are becoming information managers or cybrarians. These cybrarians will be computer experts and information brokers who will be involved in structuring and will be engaged in publishing as well as in teaching. To this end, researchers are no longer faced

with a lack of information but a glut of information. Data sharing, peer review and developing a network of contacts are no longer constrained by distance as access to email, web based file and data sharing and web logs become more ubiquitous.

- d. **There is an increasing prominence for ICT inclined institutions:** Obafemi Awolowo University (OAU) Ile-Ife was recently branded Nigeria's foremost ICT University because in 1998, it became the first university to establish an independent satellite link to the Internet. (Idowu, et al. 2004). Presently, it is only OAU that has fully installed Internet facilities available to both staff and student mainly for academic or research purposes within the confines of the large campus. This has earned a lot of integrity and prominence for the university as far as Nigeria is concerned. Furthermore, universities are entering into partnerships with the private sector (for example, Lead City University, Ibadan) in order to stay current as well as to get help on maintaining operation and financial viability of ICT based education programs.
- e. **ICT Diffusion has lead to the efficient Institution of Distance Learning:** University of Ibadan, Obafemi Awolowo University and the National Open University of Nigeria now operate distance learning centers, where a combination of print, live and recorded broadcast as well as the Internet is used to deliver courses or lectures to students. At the Obafemi Awolowo University, course materials are still predominantly print-based but online tutorials are becoming a convenient alternative to face-to-face tutorials especially for students unwilling or unable to go to OAU's various physical learning centers. The Internet, and associated ICTs, is making it possible for various forms of cross border education, including trade in education. The relevance of traditional quality assurance mechanisms is being questioned and new mechanisms for ensuring quality in transnational education are being proposed.

### **Challenges Facing ICT Utilization or Diffusion in Nigerian Tertiary Institutions**

This can be broadly grouped into four categories; namely:

- a. Inadequate Infrastructure,
- b. Inadequate Skilled Manpower,
- c. Resistance to Change and
- d. Inadequate Funding.

#### **Inadequate Infrastructure**

Tertiary institutions in Nigeria lack adequate ICT infrastructure to effectively tap into the opportunities offered by the cyberspace. Personal Computers (PCs) are available in most Nigerian tertiary institutions, but they are not readily accessible to students because of the low computer (PC): student ratio which is averagely put at about 1 to 40. In most cases, the basic software needed for practical works are not available and where they are available, they are not accessible because of the low ratio. There is also the lack of Computer Aided Interaction and other specialized software to support some areas of teaching learning and research. Internet connectivity is available in most tertiary institutions in Nigeria, but in most cases the bandwidth subscribed to (which determine speed of access) is too small to support any meaningful academic

activity during peak period. Some institutions have subscribed to Virtual Library sites whereby members can access electronic academic materials such as journals. Also some institutions have CD-Rom collections on specialized fields, but the currency of the information on the CDs cannot be guaranteed as no effort is made to update them Whereas ICT infrastructures like multimedia projectors are available in Nigerian tertiary institutions to support teaching, learning and research, other infrastructures like Interactive White Boards and mobile devices are lacking.

### **Inadequate Skilled Manpower**

Inadequate ICT technical personnel are a major problem in Nigerian tertiary institutions. The reason for this can be ascribed to the lucrative job opportunities available to ICT professionals outside the academics. The situation has made institutions rely on commercial private ventures to provide support for the few ICT facilities available. The support offered is in most cases are commercial and lack academic content. As a way out of this challenge, some universities like Obafemi Awolowo University Ile-Ife, Lead City University Ibadan, Bowen University Iwo and National Open University of Nigeria are in partnership with private and international organizations for ICT technical manpower development.

### **Resistance to Change**

There is the concern of faculty members not willing to take the “soft” approach to teaching and learning. Rather, they stick to the traditional hard “approach”. Report from OECD (2005) gave reasons while faculties resist e-learning for example. These include:

- i. That e-learning development, with its standardization aspects, might conflict to some extent with the professional culture of academic, based on autonomy and reward system often based on research.
- ii. Concern about intellectual property rights and shared rights between faculty, institutions and technologies.

### **Funding**

This is the major challenge confronting the acquisition and utilization of ICT in Nigerian tertiary education. Most institutions solely rely on their proprietor for funding and the bulk of such fund goes to servicing the overhead cost. Since no clear sustainable business model has yet emerged for commercial provision of e-learning, and failures have been more numerous than success, (OECD, 2005), institutions are not willing to invest the little fund available to them on e-learning project.

### **Conclusion**

All over the world, the use of Information and communication Technology is changing the face of teaching, learning and research. Nigerian educational system cannot afford to take the back seat. Nigerian tertiary education need to fully utilize ICT resources to make education widely available and accessible at reduced cost, hence this study.

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