Necessary Framework for Implementation of ICT in Nigerian Tertiary Institutions for Curriculum Delivery

Adetona, Z. A., Okeke, B. and Igbabini, W. O.

Abstract

The term ICT is fast becoming a household word in many aspects of human endeavor. It is affecting everything man does. In many developing lands and all over the world, changes are being effected to academic curriculum to adequately pave way for ICT implementation. In Nigeria, in spite of all benefits ICT offers in education, the adoption of ICT in education to curriculum development and delivery is slow to take effect. Only few institutions of learning have geared their curriculum delivery towards the implementation of ICT. Many reasons to this effect are identified. Some of these reasons are a lack of adequate training, infrastructures, and availability of funds. To implement ICT in curriculum delivery, necessary infrastructures, training and budgeting need to be put in place. Stable power supply is also identified as a necessary prerequisite to the implementation of ICT in curriculum delivery and ways of providing same proffered. When all necessary prerequisites are put in place, implementation of ICT in education and curriculum delivery process will improve tremendously. Students and educators shall appreciate the process in the long run.

Key words: ICT, curriculum delivery, educators, ICT infrastructure, educational institutions, e-learning, the Internet.

1.0 Introduction

The modern society in all parts of the world has realized the need to have a break from norm. New methods are being employed in virtually all aspects of employment and training. Consider the following two examples. First, to send a piece of letter in times past required writing an essay and taking the pains to post it through the post office. The recipient of the letter also would have to wait for weeks (or months depending on distance involved). Second, to get a copy of certain best books in the world a lecturer needed to spend huge sums of money and wait for many weeks (or months) for the book to be delivered by a vendor from Europe or America. Thanks to the advent of modern information and communications technology (ICT), much of the bottlenecks to accessing information have been resolved.

ICT has been defined as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" (Blurton, 2010). Such technologies include computers, the Internet, broadcasting technologies (radio and television), telephony, hand-held devices such as palmtops, telephone handsets etc. Tinio, 2010 maintained that "in recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings". Aminu (2003) posited that "Information and Communication Technology (ICT) have become the key tools and had a revolutionary impact on how we see the world and how we live". No doubt, the phenomenon has given birth to the contemporary e-commerce, e-pension, e-medicine and e-education" (Sheyin, 2009) -a mode of knowledge sharing and transmission, which may not necessarily involve physical contact between teacher and student.

Owing to the rapid growth of ICT in all facets of human endeavor and its attendant benefits and promises, its adoption in education has become a challenge. More than that, recent developments across the world have moved much beyond the vision of using ICT as a teaching and learning aid, but of reshaping the delivery of instruction and bringing about changes in education – transforming education in the industrial society to education in the information society (Law et al 1999).

For developing countries, ICT has the potential for increasing access to and improving the relevance and quality of education (Tinio, 2009). It can "greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor" (World Bank, 1998).

As good as ICT promises are in education, many developing lands still find it difficult to employ. The reasons are attributable to the various challenges involved in its implementation, ranging from incompetency and the tardiness or unwillingness to adopt changes on the part of individuals, to financial inadequacies of stakeholders in the educational sector of many developing lands.

For ICT to gain wide appeal in Nigerian educational sector, a holistic approach has to be employed. ICT implementation needs to be examined as part of the multifaceted school reforms rather than in isolation (Bober, 2002). Such reforms will adopt new and qualitative changes in the teaching and learning process (Twining, 2002). Ultimately, the curriculum and its method(s) and processes of delivery will change. (Plomp and Brummelhuis, 1999; Squires and McDougall, 1994).

In Nigeria, many tertiary and secondary institutions have been implementing ICT at various levels in their curriculum delivery. The Ministry of Education created its ICT department in February 2007. However, there is no specific policy for ICT in education (Agyeman, 2002). Notwithstanding, the government has put in place policies that could serve as a basis for ICT policy. One of such is the policy on telecommunication with the following objectives (ITU, 2006):

• Deregulating, liberalizing, and privatizing the telecommunications industry
• Providing incentives to telecom investors and operators to facilitate their entry into the Nigerian telecom market by waiving tax and import duties
• Promoting and providing access to telecommunications facilities and services at reduced cost while increasing penetration

Another is the introduction of converged licensing for ISPs for the benefit of the disadvantaged communities and rural populations. This made the purchase of bandwidth at a rate of N100 per hour possible for individual users.

2.0 Applications of ICT in Education

In itself, ICT, which contains neither pedagogical philosophy nor content basis, is found wanting (Means, 1994). Therefore, to get the best out of the implementation of ICT in education, the usage has to be embedded in a larger process of school change (Honey et al, 2000). The essence of adopting ICT in education is to simplify or make easier, the way curriculum is being delivered. In view of this, several aspects of curriculum delivery and related exercises in
learning should be affected. We shall now look at some of these aspects.

2.1 e-Registrations

The first step in education is to apply or register for a course of study. Every prospective student must apply for a course to study in a university, polytechnic or college of education. In times past, students in rural areas had to travel great distances in order to register for certain examinations. The registration process includes payment of fees to the bank, checking of names on admission lists, filling of forms for admission, etc. Also, after gaining admission, many students are subjected to endless queues at the admission, course lecturer's and course adviser's offices under the scotching sun or other unfavourable conditions. Some students would miss out on valuable class lectures while trying to get registered for a semester's course.

The implementation of ICT can totally eradicate such stress inflicted on students. With the application of ICT, a student can register at his/her convenience even before a semester begins. It is noteworthy that many Nigerian tertiary institutions have begun using this method of registration but others are still found wanting. A survey of the web presence of 70 higher institutions in Nigeria, carried out in January 2009, showed that 46 of the Nigerian universities have a web presence online, and 24 are not online (Iloanus and Osuagwu, 2010). Implementation of ICT in curriculum development requires among other things, that all tertiary institutions have a web presence.

2.2 e-Learning

According to Tinio (2009), "e-learning encompasses learning at all levels, both formal and non-formal, that uses an information network—the Internet, an intranet (LAN) or extranet (WAN)—whether wholly or in part, for course delivery, interaction and/or facilitation". E-learning involves a Virtual Learning Environment (VLE) and online testing to improve the quality of teaching and reduce stress on over-burdened teachers.

For illustration, there are certain courses taken by all first-year students in some tertiary institutions. More often than not, different faculties or college students are assigned to one or more lecturers and a lecturer often teach the same part of the allocated course more than once to different students. Application of ICT may greatly reduce such burden of repeating classes and arrest similar situations. E-learning also involves web-based learning which is a subset of e-learning and refers to learning using an Internet browser.

A recent development in ICT is the Web 2.0 technology. With this technology, every Internet user can have a voice and a worldwide audience. That is, a user can link people from around the world in an unforeseen way. This can be employed to inter-connect many campuses together while certain lectures are delivered to students. Babalobi, 2010 posited that "this is a pertinent and serious challenge that needs to be taken up by developing countries, including Nigeria".

Simple video conferencing method or a wide area network (WAN) can be employed to link students from several lecture halls on the same or nearby campuses together with an educator so that he can deliver his lecture at once while the students from different halls interact with him in the course of delivery of the lecture.

(Sheyin, 2009). The implementation of e-learning in any institution is costly; however, it is cost-effective to the students and staff when implemented, and of great benefit to

the institution in the long run (Iloanus and Osuagwu, 2010).

2.3 Blended e-learning

A flexible e-learning approach called blended learning is currently being advanced. It involves a mix between traditional classroom practice and e-learning solutions. Students can be assigned both online and offline assignments. If online assignments are involved, the students can interact with the lecturer through a chat room and are subscribed to a class email list. The lecturer can also deliver the class note through email to the students. On limited occasions, the students learn face to face in the traditional way.

With the adoption of e-learning, students can have access to the best of the libraries so that institutions are transformed and they are made internet-ready and ICT driven. Staff will also be trained in the use of ICT infrastructures for curriculum development and scoring and assessment will be abreast of latest development in the world.

2.4 Information Sourcing and Research

One major component of ICT is the Internet, otherwise called information superhighway. The internet has dramatically transformed the way people communicate from one part of the world to another. It has also made distance learning fully ICT-driven.

Distance learning is a form learning that provides learning opportunities while the teacher and learner are separated in time or place, or both time and place. The use of ICT which provides two-way communications has made this form of learning very easy to deliver. Lectures can be recorded (audio or video) by an instructor and uploaded for students to download listen to or watch. Class work, assignments and assessment can easily be carried out online.

Also, students have unprecedented access to information on the Internet. The best books on any subject can be made available to any student in a matter of hours-albeit in electronic format. Research work also requires information sourcing, literature review and consultations with knowledgeable individuals on a particular subject. The Internet makes all this tremendously easy. The solution to any assignment for a diligent student seems to be a click of the mouse away.

Also related to this is the virtual library project in Nigeria. Virtual library objectives include (Sheyin, 2009):

1. improving the quality of teaching and research institutions through the provision of current books, journal and other library resources;
2. enhancing access to academic libraries to global library and information resources;
3. enhancing scholarship and lifelong learning through the establishment of permanent access to shared digital archival collections;
4. provision of guidance to academic libraries on ways of applying appropriate technologies for the production of digital library resources;
5. to advance the use and usability of globally distributed networks library resources

There are three virtual library initiatives in Nigeria namely:

1. The National Virtual (Digital) Library Project of the Ministry of Education supervised by the National Universities Commission.
2. The National Virtual Library Project of the Ministry of Science and

Technology supervised by the National IT Development Agency.
3. An ongoing effort by UNESCO to develop a virtual Library for all Nigeria Higher Education Institutions in Nigeria

Anyone sourcing for information can make good use of any of the three virtual libraries.

The National Open University of Nigeria (NOUN) sets the pace in the use of electronic library. NOUN e-library provides Reference, Information Literacy, Circulation, Current Awareness Services among others and Internet access through local area networks and wireless connectivity is running 24/7. The Library's collection is expected to grow to 20,000 volumes of books and 100,000 volumes of electronic resources by December 2007 (NOUN, 2010).

3.0 ICT Equipment and Infrastructures Needed for Educational Development

Certain infrastructures need to be put in place for ICT to be employed in the educational system. Such infrastructure and equipment include the availability of stable power supply, computers, networking equipment, etc. Some of these shall now be discussed.

3.1 Provision of Stable Power Supply

One of the most important prerequisite to the implementation of ICT in education is the availability of stable power supply. Since ICT equipment is electric power-driven, any attempt not to provide stable power supply before the commencement of implementation will result in efforts in futility.

As we are all aware, power supply problem in Nigeria is affecting many aspects of the economy. Agyeman (2007) noted that "about 40% of Nigerians enjoy electricity from the national grid while power supply remains sporadic, and several communities in urban areas lack electric power". He further mentioned that "to date, 57 of the 774 local government headquarters are yet to be connected to the national grid". In view of this, institutions of learning can find ways to provide alternative power supply or back-up for their ICT equipment in order not to rely on the epileptic power from supply authority.

Such alternative means include the use of sizeable electric generators, installation of gas turbines or solar power supplies. Fossil fuel-powered electric generators are the most common approach because the initial cost is minimal but it's more expensive in the long run because of high cost of fuel. Gas turbine and solar power generators have considerably high initial cost relative to fuel-powered generators. However, they are more cost-effective in the long run because of their low maintenance and running cost. Further, mini hydro-power projects can be embarked on in communities with availability of water to provide necessary power supply Both the educational institution and people in the community can benefit from a mini power project funded by a government or an academic institution.

3.2 Provision of Computers and Internet Facility

Every educational community where ICT is to be employed must provide buildings, computers (desktops and laptops), routers, switches, VSAT, campus-wide intranet, etc. and a decentralized wireless/wired Internet service with sufficient bandwidth for the users. Desktop computers should be available for students' use and personal laptops for the lecturers. Furthermore, there should be provision of smart boards for teaching, slide projectors and other related teaching equipment. Printers should be available in strategic locations around the community where materials obtained in electronic format can be turned into hard-copy.

When such are provided, they should be available to the users (staff and students) nearly 24 hours in a day. Providing ICT services for one or two hours in a day to members of staff and students defeats the purpose of ICT in education. In this respect, staff strength of an institution shall increase to take care of the necessary areas of ICT use.

4.0 ICT and Curriculum Delivery Process

Having provided the necessary infrastructures that are prerequisite to the adoption of ICT, an institution of learning can start the process of implementation of curriculum delivery using ICT.

The task of curriculum design, development and revision rests largely on older teacher educators (Jegede, 2009). And older educators do not show significance difference from younger educators in the use of ICT. But youths are in the fore front of ICT use in Nigeria. Nigerian youths, apparently worried that the potentials of ICT in the effective delivery of educational services are not being maximally harnessed, held a Student Leaders Conference in Port-Harcourt to identify and harness possible complimentary roles that they can play in the effective delivery of ICT for education initiatives of various government agencies and in the creation of sustainable and affordable access to ICT infrastructure within their institutions (Sheyin, 2009). The student leaders gave the following recommendations:

- ICT related courses in the school curriculum at all
- Development of ICT infrastructure at institutional level
- Participation of young leaders in IT policy making
- Utilization of virtual teaching and learning opportunities/environments
- Prioritization of access to ICT infrastructure at the institutional level

In view of the foregoing, the readiness of young ones to participate in the implementation of ICT in education is easily observed. Younger educators are mostly more knowledgeable in ICT than their older counterparts. Professional certifications in ICT are mostly obtained by young people. To introduce changes in the curriculum then, the job of curriculum development in ICT should not be the sole responsibility of older educators. Young ones must be invited to contribute their knowledge that may be lacking in older ones, to ICT curriculum development and implementation.

Since there is no government policy on ICT curriculum implementation yet, institutions can start introducing ICT-related courses in their curriculum starting from the first year. They can also implement a blended e-learning approach. An institution may instruct its educators to deliver their course notes and receive assignments through students personal email address.

If e-learning or blended e-learning is adopted by an institution, then, naturally, it is expected that the mode of assessment also should be tailored toward e-assessment. That is, some, if not all examinations, should be e-examination. This will also make it easier for educators to mark and grade their students. As a matter of fact, the students must have been used to such e-examination during the course of delivery of the curriculum. They could have been given materials such as CD-ROM that have similar methods of assessment that they must have used to study for the courses in the semester.

It is noteworthy that the new National Board for Technical Education (NBTE) has reflected an ICT-driven approach especially in the ICT-related courses of study notably Computer Science, Computer Engineering and Electrical Electronic Engineering. But

certain courses should be made compulsory for all learners to help them appreciate the use of ICT.

Of importance is the effect the implementation of ICT would have on the curriculum. ICT should not impact negatively on the curriculum or its delivery process. It should enhance the curriculum and complement all necessary areas that will help the learners grasp knowledge better. Basically, it involves changes in the curriculum content, the instructional process, and the teacher-student relationships (Plomp and Brummelhuis, 1999). If use of ICT is to support the curriculum, the instructional process becomes more efficient but the content remains unchanged. If use of ICT is to extend the curriculum, the content changes and/or the instructional process changes but they could have been achieved without the use of ICT noted Twining, 2002.

5.0 Training the Trainers

Before any of the e-learning methods can be employed, the major stakeholders in an academic environment-the educators-must be very conversant with the proposed method. In order words, the implementation of ICT in curriculum delivery to a large extent depends on academic staff. If the academic staff is not knowledgeable in the use of ICT in teaching, it is of no use introducing it in curriculum development and delivery. So it has become imperative to train the trainers as well.

Such training for educators has been ongoing. For example, two of such are an MOU that Microsoft Corporation signed with the Educational Trust Fund (ETF) under the Microsoft Partners in Learning Programmes (PiL) to develop the ICT skills of teachers and a Partnership with CISCO to provide the necessary services to telecom operators to grow their voice and data services (Agyeman, 2007).

To implement its partnership, CISCO has established 22 CISCO training academies all across Nigeria, with the intention of expanding further training facilities and academies in the country to increase access to education. The government on its part also, through National Information Technology Development Agency (NITDA) is offering free training on Microsoft products to ICT staff in government and public enterprises. The government has also acquired Microsoft products for free distribution to these enterprises (Agyeman, 2007). Educators can be made to benefit from such training and similar ones. The cost, if any, of the training, shall be borne by the institutions concerned. This does not, however, rule out personal development on the part of individual educators.

If there are members of staff already having wealth of experience, then training seminars can be organized for others. Such seminars will be best held in small teams of brilliant but humble people of differing personalities. The leader must be first amongst equals. Team members should be very creative, highly competent people driven by passion and a desire to make a difference with what they do. The team must be a balanced combination of specialists and generalists and people who understand and believe in continuous learning and improvement. More importantly, these fellows must be rounded geeks-yes the ICT gurus with lots of experience and competence.

6.0 Conclusions

With the foregoing discussions, it is necessary and appropriate for government to put in place a policy on ICT in education to serve as a framework for the adoption of ICT in curriculum development. As observed by Wong et al, (2008) the implementation of ICT should be at the forefront of education

reforms locally, regionally, nationally and internationally. Educational institutions should also be ready to make a dramatic change. The change, for educators, involves among other things, becoming a student once again to acquire necessary knowledge of ICT and its process of delivering curriculum. The trainers must, for once again, become trainees.

ICT implementation in education is cost-intensive. Every institution of learning proposing to implement curriculum delivery using ICT must set up committee(s) on the implementation. Such committee will look into the infrastructural needs of the institution, staff training necessary, budgeting, etc. Also, it is necessary to set-up ICT department that will carry out and oversee all the necessary work in the implementation and continuous maintenance. This department will be the first point of call on a campus on ICT related matters. Some institutions might evolve their ICT department from existing departments such as management information systems (MIS), computer science, electrical and electronic engineering etc.

Government and institutions of learning should be ready to set aside funds for the implementation of ICT in education generally. The implementation of ICT in curriculum development should follow a step-wise approach. This will ensure that the whole process is learner-centered. In the long run, both learners and educators shall reap the benefits of ICT implementation in curriculum development in Nigeria. Students will have a more flexible way to learn and study. They will have more access to information related to their academic work and ultimately their academic performance shall improve. Educators will have more flexible ways to deliver the content of course curricula. It will be easier for them to conduct tests and examinations and carry out grading and assessment. Thus their job will be simplified.

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Authors' Profiles

Adetona Zacchaeus A. is a lecturer at the Electrical Engineering Department, Federal Polytechnic, P.M.B.50, Ilaro.
Email address:
zacchaeus.adetona@federalpolyilaro.edu.ng
Phone number: +2348157562049

Okeke, Benjamin is a lecturer at the Department of Information Management Technology, Federal University of Technology, Owerri.
Email:benokeke2001@yahoo.com
Phone: +2348037277357

Igbabini, Wilson Omokhagbo lectures computer and electrical engineering courses at the Computer Engineering Department of Lagos
City Polytechnic, Ikeja.
Email:igbabiniwilson@yahoo.com
Phone number: +2348067296399