Information Communications Technology (ICT): A Reform Strategy to Enhance Curriculum Instruction at the Secondary and Tertiary Levels of Education in Nigeria

By

DR. COMFORT EBERE MBACHU
Department of Curriculum & Instruction,
Faculty of Education,
Niger Delta University,
Bayelsa State.

Abstract
Most developed nations of the world today have shifted their development tool from industrialization to Information and Communication Technology (ICT) where computer serves as the major vehicle for the conveyance of its information. ICT hinges on progress in computers and telecommunications technology to achieve inter-connectivity known as INTERNET (International Network of Computers). (The 21st century is experiencing a significant development and innovation in the applications of world-wide web (www) in education due to the versatility of computer, and the ease with which ICT has lent itself to the improvement of all sectors of economy.) This paper therefore gives in-depth knowledge on the need for curriculum reform in secondary and tertiary institutions. It delves into the strategies for incorporating ICT into instructional procedures at these two levels of education. It equally looks at the relevance/ the need for ICT to enhance Curriculum instruction in secondary and tertiary institutions. It discuses on the problems that may affect the integration of ICT into our institutions of learning. The paper concludes with suggestions and recommendations to enhance quality curricular instruction at secondary and tertiary levels with the use of ICT.

Introduction

Information and Communication are integral to human society. In African societies that existed before colonial rule, people communicated using various instruments and codes such as, drums, flutes, gongs, town crier and village square meetings. The use of writing and the invention of printing transformed the type and content of recorded history. Communications on a universal scale became possible through the use of books, news papers, magazines and radio.

More recent technological innovations increased further the reach and speed of communications, culminating, for now, in digital technology. Onyejekwe (2006) attested that the world today has been transformed into a global village. Unlike in the past, whatever happens in one part of the globe today, can quickly be transmitted to any other part of the world. This revolution ... obal communication has become possible as a result of the combined effect of three major technologies (the Computer,

Telecommunications and Electronics). These three constitute what we today refer to as Information and Communication Technology (ICT) Awe (2007), supported by saying that the advancement in technology has created so many ICT tools that are necessary and useful in the development process. These new technologies have become central to contemporary societies. Nicol (2003) classified these modern technologies into three, namely:

- Information Technology that uses computers, which have become indispensable in modern societies to process data and save time.
- Tele Communication Technologies which include telephones-mobile, fixed (with fax), and broad casting of radio and television, often through satellites.
- Networking technologies, of which the best known is Internet, but which has extended to mobile phone technology.

All these have come to dominate the modern society and become the basis for the survival of the modern man.

The presence and need for such modern technologies have led to the introduction of computer education in secondary and tertiary institutions in Nigeria. Computer education in Nigeria as Awe (2007) puts it, has come a long way since the foundation of IBM African Education Training centre at the university of Ibadan in 1963 for the training of computer personnel to operate, program, to a limited extent, and service IBM 1461/1620 machines. Today, there are fully fledged computer science departments in Nigeria Universities and other tertiary institutions teaching a range of subjects including computer science, software, hardware, programming languages, numerical computations and system analysis. Computer education and training is also provided by private institutions, Polytechnics and mostly private secondary schools.

Kalu, Asim and Ani (2003) agreed that the world is fast becoming a global village, as a result of developments in Information and Communication Technology (ICT). The key instrument in this globalization is the Computer. ICT have changed how people live, work and play. Most of the developed countries have exploited the potentials of ICT to transform their educational landscape at the tertiary, secondary and even primary school levels, particularly the instructional process. Nigeria Educational system therefore, should not be left out of this global reformation.

The Need for Curriculum Reform in Secondary and Tertiary Schools.

Curriculum is said to be the most flexible educational instrument. It is changed or modified as and when necessary to address contemporary problems and issues. Education is said to be similar to culture which is dynamic. It cannot afford to be static, globally, and the curriculum in various nations of the world has undergone several radical changes to address various issues. New ideas in the education process were introduced to render existing system obsolete and new goals have been set to address the knowledge explosion.

Some of the reasons as put by Obanya (1997) why radical meaningful reforms are necessary include:

- **Rapid change in the modern world** –Many nations of the world today are striving to achieve health for all, science for all, wealth for all, and education

for all. But as nations pour in colossal sums of money to achieve these, more impediments compelling deplorable situations emerge. Therefore, the nations need a widespread education through functional Curricular to enlighten their citizenry in it's strive to achieve "milk and honey" for all.

- **The knowledge explosion in our culture**. The current electronic/Computer Technology has introduced over whelming increase in knowledge in our culture. It is inconceivable that consumers could utilize the products of modern technology fully without the requisite education needed to understand the technology. New curricular content should therefore be developed to utilize the technological capacities of devices which can store and retrieve information. Such a technology, with the proper curricular, will enable students to define problems, gather data, suggest hypothesis, generalize intelligently, propose new solutions and reach meaningful scientific conclusions, based on the learner's own research. Dike (1999), agreeing with Gbamanja (1997), on knowledge explosion, stated that knowledge explosion is a major factor that is influencing new trends in the teaching/learning process. New facts are being discovered every day as a result of research and development activities. It is a common knowledge that new facts are emerging at a rate at which it is impossible for a single individual, no matter how versatile, to keep pace with. Different theories are abound about the way individuals learn and about how to motivate and manage a classroom for effective instruction, so much so that it is impossible for even the best generalist to keep abreast with recent advances in his field.

- **The need for process-oriented curricular.** -The present Curricular in many countries, especially in the developing countries are still moribund with stereotyped teaching methods which emphasize information learning rather than discovery, problem solving, data analysis, and related scientific activities. Text book learning, teacher telling, and factual achievement tests with emphasis placed on the mastery of information, are still the practices found in many classrooms. The complex nature of today's world does not demand for such, but it needs to develop understandings, motor skills, process (mental skills) and affective traits together with necessary attitudes, interests and appreciation to utilize the growing technology.

Need to relate in-school education to out-of-school realities.- Some school leavers remain unemployed today because what they learnt in school in many cases, does not relate to life outside school or industry. The learner may be required to define or learn about certain information, but not necessarily understanding the concepts of what is learnt. The inability to transfer is not uncommon. The content of any curricular must therefore consider the realities of the environment. There are so many problems that have bedeviled so many countries, problems such as crime, drug abuse, HIV/AIDS and other environmental problems. The curriculum should integrate such problems so that the learner gains an awareness to enable him play his part in solving such societal problems.

There are other factors in our educational system that point to the fact that curriculum reforms are needed. Obanya (2003), pointed out that there are some significant changes that characterized our time and noted that, since the days of the Curriculum ferment of the 1970s and 1980s, Nigeria has moved from being a nation ready for socio-economic take–off to being a highly indebted, low income country. There is so much dissatisfaction with the educational system, and "descolarisation" is today noticeable in many forms: Boys opting out of school work, generalized poverty, making education unfavorable. Students leaving school today without the acquisition of the pre-requisites of life and work can lead to generalized unemployment creating feeling of helplessness in young people and their families. Obanya observed that one way dissatisfaction and "descoloarisation" is noticeable in our educational system today is strong lack of interest in school work among the students. Adesina (1984), supported and said that teaching at any level requires that the student be exposed to some form of stimulation. Learning cannot take place in a sensory vacuum. As a minimum physical requirement, the instructor must be able to produce stimuli having enough strength and definition to get through to the student……, the student must notice something. In a large classroom or auditorium, students in the back must be able to hear and if there is something to see, they must be able to see it. By the use of modern technology, we can control the size of the visual image and the amplitude of the sound.

Achuonye (2007), in her contribution on the need for Curriculum reform said that the emergence of new technologies is fast sending the traditional role of the teachers into oblivion. New science, new concept, new worlds' teaching trend have created a profession and confusion of symbols and meanings that seem to defy easy analysis and assimilation. The rapid population explosion leading to high enrolment figures in limited facilities hinder effective interaction and learning. Gap between theory and practice, gap between the skills needed in school and those needed in the work place are getting wider. There is an implication that the teacher –student contact time is diminishing, making it even more imperative for students to develop independent learning skills to improve them selves. This places additional responsibility on teachers changing roles to ensure that appropriate strategies are employed to meet the changing needs of students.

Strategies for Incorporating ICT into Instructional Procedures.

There are many strategies that can be adopted to help put instructional strategies in the new world order of ICT. In the application of the modern ICT instructional procedures, Computer stands out as the base. Ofeofuna (2005) grouped the computer roles and their applications in instruction in the following ways:

- Web delivery –This is one of the recent innovations in ICT adopted into the instructional process. Okafor (2003) saw web delivery as the provision of courses online via the internet. This has been made possible by the use of programming tools.

- Virtual teaching –The term "virtual teachings" refer to teacher/learner situation in which teachers and learners interactive video conference technology is used to

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facilitate the learning. This learning seat level of interaction is extremely similar to that present during face-to-face learning sessions.

- Multi treaded –this appears to be a very effective and efficient way of handling a course. Okafor (2003) citing Akele, pointed out that it is a feature of web that connects the different parts of a course materials in any order that makes sense to their learning style. The use of cross indexing and forward and backward has proven to enhance students' engagement with the materials and can be used to deliver science education course materials in the web with multi headed feature.

- Internet –Different Computers are able to talk to one another when they are both running programmes that use the same communication standard called an Internet Protocol. The Internet consists of all networks that co-operate to form one seamless grid for collective users. Oloruntoba (1997), pointed out that the Internet therefore can be regarded as the linking of millions of Computers with each other through the telephone systems, like spider's web, to achieve instant global communication, Through this, large amount of educational information can be assessed.

- Instructional slides and tutorial (Audio) –This technique appears to hold the ace to our much needed Curriculum innovations in secondary and high institutions. Okafor (2003), stated that instructional slides are teaching and learning aids made and written into compact disk with graphic and text. This is made possible by the use of an applications package or software such as power point. On the other hand, tutorials which is a component of this are mainly learning aids recommended for self-paced learning. This means that this tool itself has taken recognition of the slow and fast learners. She pointed out that using technology effectively in the classroom, means transforming the classroom, making it possible for the classroom to be students - centered, with teachers as coaches and guides.

- Computer Assistant Instruction (CAI), Ofoefuna (2005), stated that based on current experimental progamme, a typical CAI installation consists of individual learning booths or wet carrels each with a console and a television screen for displaying information. This information could take the form of video tape recording, motion picture sequences, slides, films strips or other visual displays generated by the computer. The student may questions the computer and feed answers into it by means of a keyboard. The Computer responds by printing out comments, answers and questions. Or the student may write directly on the light sensitive display screen with a light pen or gun. The Computer scans these markings and notifies the student of the correctness of his response. Audio system for listening and responding are also present to enhance learning.

Relevance of ICT to Improve Curriculum at the Secondary and Tertiary Levels.

The importance of Information and Communication system in education cannot be over emphasized. It is the heart beat of every instructional process. Invariably, the hall mark of this heart beat is the Computer. A Computer Assisted Instruction (C.A.I) package is a dynamic resource for teaching which helps the students in a number of ways, which include the following:

➢ CAI packages as explained by Onyejekwe (2006), allow the students to progress at their own learning rates. In other words, CAI programmes promote the individualization of instruction.

➢ CAI package are effective in increasing the motivation for learning. This it achieves through careful structuring of its items and stimulus- response chain of activities which enhance interest and urge students to strive to reach set goals. Even where the learners fail a number of times they are is still encouraged and motivated to continue in their efforts to accomplish set tasks.

➢ Through CAI packages, students are enabled to gain both quantitative and quantitative understanding of problems in the various subjects and topics under study

➢ CAI packages help to ease the difficulty associated with experimental and or theoretical studies and money. This it achieves through simulation process in which what would ordinarily be impossible to bring into the classroom, is presented for study.

➢ CAI programmes are usually carefully prepared by experts. Such experts usually take into consideration their audience and so select, for use the most appropriate methods and media.

➢ Computer Technology is an important aid to learning wide variety of subjects ranging from basis reading, spelling, arithmetic to biology, chemistry and physics for students of diversified abilities, of all ages and culture.

➢ Shy students who may not be able to make oral contributions, can freely interact with the Computer which is not a human teacher.

(1) **Internet:** The Internet has been described as ' the mother of all networks' Onyejekwe described it as a network of networks. Through it, Computers all over the world can exchange and share data thereby, providing an incredible array of information that people all over the world can access through the internet both teachers & their students.

➢ Through the Internet, both the teachers and their students can easily access necessary information that are not available in their textbooks and other reading materials.

➢ Through the Internet, the teachers and the students can access experts professionals in different subject areas and subject matters. Such resource persons add important and necessary ingredients to effective teaching and learning.

➢ Through the Internet, students and teachers can access ' breaking news' – information and knowledge that are not yet published in books and other print

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Computer conferencing and the Electronic mail (e-mail)

These facilities have greatly reduced the distance between scholars across the world by making direct, quick and effective contact possible. Through these facilities, the students can get answers to questions about academic subjects, research topics, or just get another person's perceptions on any topical academic issue. Views of students are greatly broadened on a variety of academic issues due to such contacts with other students and teachers elsewhere that people all over the world can access through the internet both the teachers & their students.

➢ The World Wide Web (www), a sub- system of the Internet; through the www, a user. Can move across the world in search of information and knowledge using links from one document to another. Through it, images and all sorts of multi-media could be viewed and accessed. Complex data-bases such as financial database could be assessed.

➢ Conferencing and on-line charts could be effected via the Internet, and scholars and scientists across the globe can share ideas, opinions, findings, access necessary data for scientific studies and publish research finding via the Internet.

As regards registration, West African Examination Council (WAEC) NECO JAMB Exams /courses are now registered online and all activities of teaching and learning are now gradually moving towards a globally accepted Curriculum and ways of running educational system.

➢ The use of ICT has helped to develop Curriculum that has improved the educational system as well as transform the inputs of the educational system into quality outputs/ graduates.

It is believed that an ICT driven Curriculum will ensure that the products of our educational institutions especially the University are competent and will rank among the best in the world.

In recognition of the relevance of ICT in this information age, the Federal Government has stated that A Network of Educational Services Centers in Nigeria (NESCN) shall be set up to provide a forum for exchange of ideas on the development and use of innovative materials for improvement of education. All states, Teachers Resource Centers, University Institutions of Education and other professional bodies shall belong to the network of Information and Communication Technology (ICT). Government shall provide facilities and necessary infrastructure for the promotion of Information and Communication Technology (ICT) at all levels of education. (NPE 2004:54).

In the light of the above policy statement, ICT is making in-roads into Nigeria education system. It has greatly and will continue to enhance and improve our instructional objectives and instructional content. It is no longer uncommon these days to see students and teachers browsing in the internet for materials to aid their project/research work and assignments. Business centers are every where along the streets and campuses for all manner of typing and printing jobs, Computer Courses today are compulsory areas of study at all levels of education system. External examinations are registered on-line. Results of examinations such as JAMB, WAEC, NECO etc are also checked on-line. Distance learning and Open Universities are

resuscitated and their registrations are done on-line. ICT centers are constructed in all most all tertiary institutions.

Problems Affecting the Integration of ICT into our Secondary and Tertiary Institutions.

There are some factors militating against the application of ICT in our institutional process. Some of the factors as Ofoefuna (2005) puts it include:

•**Inertia** –This is one of the greatest problems confronting the application of ICT in our instructional procedures. Many teachers especially those of the old brigade are very unwilling to change. They still feel satisfied with the long old age methods of instruction.

• **Time scheduling** –In spite of all efforts to de-emphasize examination at all levels of education, many conscientious teachers are still too examination conscious. What is always upper most in their minds is how to cover the term's syllabus. Any thing that will divest their energies from the goal will not be easily accommodated. The traditional time-table in our schools does not make room for such reform/innovative strategy.

• **Irregular power supply** –Most of the tools for ICT, because of their encoding property need constant electricity as the source of power. Any power failure when a whole class is being instructed through CAI or any such instructional mode could be very disorganizing.

• **Inadequate funding** –This is the bane of our educational development. It is so disheartening to observe that a country as rich as Nigeria cannot fund its educational sector adequately. It is no doubt that without adequate funding, such exciting curriculum reform strategy will be a mirage. Achuonye (2007), supported by said that ICT is yet to have a significant impact on instructional process in Nigeria because most teachers are yet to learn the skills, and to fully integrate ICT into the institutional process. Nigeria class-rooms are still laden with old media such as books, boards, charts etc.

Conclusion.

Nigeria needs authentic development. A type of development that is only possible through dynamic functional and reliable education. Ofoefuna (2005) declared that "the schools should be seen as part and parcel of the society" therefore, the technological life of the society should be reflected in the techniques and reform strategies to enhance and improve curriculum instruction in our secondary and tertiary levels of education.

Suggestions and Recommendations.

Having highlighted the importance of ICT in the modern world, it become very necessary to adopt it especially at the secondary and tertiary levels of education, and its effective adoption, will require the joint and co-operate efforts of Nigeria

Universities, Federal and State Ministries of Education, Nigerian Communication Commission (NCC), private sectors and Non-Governmental Organizations (NGOs). Having said this, Federal and State government should:

(1)   Provide more funds to purchase good computer systems.
(2)   Provide related infrastructure –regular electricity, buildings, chairs and tables.
(3)   Provide strong support system to monitor and control the progress.
(4)   Teachers should acquire the necessary skills to enable them tap the vast resources of ICT.
(5)   They should integrate ICT facilities fully into the day-to-day instructional process.
(6)   They should produce their coursewares which are indigenous to Nigerian curriculum contents.
(7)   They should be receptive to changes in ICT no matter how cumbersome it may be.

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