Integration of Information and Communications Technology into Teaching and Learning Activities: A Panacea for Nigeria's Educational System for 21st Century Challenges

Gabriel C. Job
School of Education
National Open University of Nigeria
14/16 Ahmadu Bello Way, P.M.B. 80067
Victoria Island, Lagos
job.gabriel@yahoo.com

Abstract

This paper centred on the pervasiveness of information and communications technology (ICT) which has virtually taken over the way things are done in all spheres of human endeavour. It also reviewed the state of Nigerian education system from the perspective of low academic performances of the products of the various available institutions at different levels. It posited that in the absence of the identified challenges, effective integration of ICT into the teaching and learning activities will launch the nation into the apex of comity of nations that have attained the Millennium Development Goal in education.

Keywords: integration, information, communication and technology

Introduction

The incursion of information and communications technology into ways of doing things in all spheres of life, be it industry, science, politics, economy or education has brought a new dimension of achieving result and has turned the entire world into a global village. ICT with its new inventions is rapidly sweeping away the traditional ways of handling things. Through innovations and modifications, it has taken centre stage in turning around modes and methods of education in the developed countries of the world. This is an intent which developing world must launch into in order to be a key player in developmental issues in all ramifications. Computer and internet have contributed a lot to teaching and learning activities such as enriched

multimedia presentations, virtual libraries, individualised learning, programmed instructions, problem-based learning, mediated learning and online communities.

Information and communications technology has been variously defined. Butcher (2003) states that it is electronic technologies for collecting, storing, processing and communicating information. Onyejekwe (2006) defines it as a broad-based electronic technology that is used for collecting, storing, processing and transmitting information in various forms. Job (2011) defines ICT as the acquisition, processing, retrieval and dissemination of information through electronic machines. Generally, ICT is a euro-centric invention, which has its root and bases in the Western world, while Nigeria and indeed all other African nations are merely struggling slowly to evolve national information and communication technology policies.

The use of ICT in teaching and learning ought to enhance academic performance if properly applied. Olaniyi (2006) states that the use of ICT could enhance the transfer of knowledge which could be cross-fertilised in real time. It is important therefore to give adequate attention to how ICT could change education through internet. Zheng and Ferris (2008) assert that as ICT keeps growing, an increase in the amount of learning activities will be expected through interactivity within the academic and e-teaching and e- leading materials. ICT when properly integrated into teaching and learning will amongst other things reduce and/or eliminate the cost for instructor fees and materials to a reasonable level. It will also reduce time of learning and the time employees are absent from their duty posts. ICT in the classroom increases retention and enhances hands-on application. The use of ICT could be cost-effective and enhance responsiveness to positive change, consistency, timely content, flexible accessibility and providing customer value (Olomo, 2001). Unfortunately, Nigeria as a developing country is still backward in ICT application and use (Aduwa-Ogiegbean and Iyamu, 2008).

In Nigeria, the government approved the National Policy for Information Technology (IT) in 2001 (Ajayi, 2002), this was followed with the establishment of the National Information Technology Agency (NITDA), with the responsibility of implementing the policy. The general objectives of this IT use in education according to Yusuf (2005) were to:
a)   empower the youth with IT skills and prepare them for global

competitiveness

b)   integrate IT into the mainstream of education and training excellence to ensure Nigeria's competitiveness in international market.

The strategy for these objectives emphasised "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." This way, the education sector, particularly at the tertiary level will witness unprecedented surge in the utilisation of information and communications technology, which will definitely imbue flexibility and accessibility in our educational system.

Statement of the Problem

The pervasiveness of ICT is obvious in all spheres of human endeavour. It has altered the entire mode of the people's activities, including the way they think. It is also infusing flexibility into the educational sector all over the world. Meanwhile, the education industry in Nigeria has been on the down slope in terms of academic performance (Okworo, 2008; Job, 2010). This assertion is gleaned from the poor academic performances in all tiers of the Nigerian institutions as documented by researchers. The fear has been expressed by educational administrators and indeed all concerned with education in Nigeria if the situation will not deteriorate by the 21st century. UNESCO (2002), states that higher education institutions, especially those in the West, have adopted ICT as a means to impact on students the knowledge and skills demanded by 21st century education. Hence, this paper examines the potentials of this unprecedented, pervasive element that has altered positively every area it has been applied, and wonders if same could be achieved in re-positioning the Nigerian education system in this 21[sl] century, in terms of high academic performance, when effectively infused into teaching-learning in all tiers of our educational sector.

State of ICT Utilisation in Nigeria

There could be the possibility that pedagogical researches have now recognised the value of ICT enhanced teaching and learning as critical in the mix of diverse strategies. Iloanusi and Osuagwu (2009) aver that when the

meaning of ICT and its unlimited potentials in the educational arena are understood, then the rapidly changing technologies will not be seen as overwhelming, but as enablers of greater critical thinking and problem solving in education. In the same vein, Commonwealth of Learning (2001) opines that "another serious challenge facing higher education in Nigeria is the need for integration of new ICT literacy knowledge into academic courses and programmes". This assertion may seem too generalised as there may be isolated cases of ICT utilisation in higher institutions of learning in Nigeria. This position is supported by a 2009 survey of Online presence of 70 higher education institutions, which found that 46 Nigerian Universities have Online presence, whereas, 24 are not, (UNESCO, 2002). This report at least is an indication of progress been made in terms of improving ICT penetration in university education in Nigeria.

Meanwhile, Lawai, Ahmadu and Dogara (2003) studied the use of ICT in teaching and learning Science, Technology, and Mathematics (STM) in six selected secondary schools in Kano Metropolis. The study aimed at determining whether teachers made use of ICT in teaching STM, whether ICT materials were available, and whether their use enhanced teaching and learning STM. Data was collected using two sets of questionnaires, which was administered on STM teachers and students. The findings among other things revealed that about half of the STM teachers were IT literate but very few used ICT in teaching STM. It was also discovered that ICT materials were available but inadequate and inaccessible to STM teachers and students. The study recommended among other things, that, government and private school proprietors should provide enough funds for the purchase of ICT materials and to support the use of ICT in teaching and learning.

Busari (2003) investigated the training status and ICT of teacher trainers in institutions of higher learning in Lagos state. All the colleges of education, universities and polytechnics in Lagos State formed the population of the study. The results indicated that most teacher trainers had little ICT support from their employers and that majority of them rarely applied ICT in instructional delivery. The study recommended that personal computers and ICT training should be provided for student teachers.

Iji (2000) studied the level of accessibility, effectiveness and attitude of Mathematics teachers towards computer utilisation in the teaching of

Mathematics generally. The finding revealed amongst others, that the computer is a good instructional tool for the teaching of three dimensional problems. The study recommended that computers should be utilised for teaching other difficult concepts in Mathematics and that teachers should be further exposed to the capabilities of computers through short term courses, seminars workshops, as well as conferences as the case may be.

These various studies have shown that ICT integration into teaching and learning in Nigeria has not taken the expected centre stage. These research reports have also revealed that ICT actually enhances academic performance. The reliance on the traditional mode of teaching and learning may be responsible for the deteriorating academic performance as reported by some educationists. For instance, Job (2010) posited that the general academic achievement of students at senior secondary school level in the external examinations has been deteriorating. Ekpo (1992) predicted that the trend has been for the failure rate to keep increasing yearly, resulting in untold hardship to the parents and frustration to the unsuccessful candidates. Buhari (2014) presented a table of performance rate in three core science subjects of Mathematics, Physics and Chemistry for five years.

Table 1: West African School Certificate Examination Report for 2007 - 2011

YEA	CHEMISTRY				MATHEMATICS				PHYSICS			
	NO SAT	NO PASS	% PAS	% FAI	NO SAT	NO PASS	% PAS	% FAI	NO SAT	NO PASS	% PAS	% FAI
2007	4226	1942	45.9	54.1	12490	5840	46.8	53.2	4185	1807	43.2	56.8
2008	4184	1859	44.4	55.6	12682	7263	57.2	42.8	4151	2003	48.3	51.7
2009	4685	2047	43.7	56.3	13485	6343	47.0	53.0	4656	2227	47.8	52.2
2010	4656	2360	50.7	49.3	13065	5480	41.9	58.1	4637	2377	51.3	48.7
2011	5656	2802	49.5	50.5	15089	6088	40.3	59.7	5631	3600	63.1	36.1

Table 1 depicts a low academic performance within the period presented. It is the opinion of researchers that an effective integration of ICT into teaching and learning will upturn the situation for better.

State of ICT Integration in the Nigerian Education System

Education revolves around teaching and learning with a guided curriculum in

the case of formal education. It is proven that learners do better in their learning activities when support is provided for them, which may include a teacher, peer or technology, such as the applications of computers. This premise is subsumed under the learning theories such as constructionist. Hence, the Nigerian government policy on information technology theoretically provides for IT use in education. The objectives in the sectoral application -1-4, which outlined nine major strategies as stated by Ajayi (2002) are:

a) making the use of ICT mandatory at all levels of educational institutions
b) development of ICT curriculum for primary, secondary and tertian institution
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 Corps members
g) ICT capacity development at zonal, state and local levels
h) growth of private and public sector dedicated ICT priman secondary and tertiary educational institutions
i) working with international and domestic initiatives for transfer o: ICT knowledge.

It is noteworthy that these objectives and strategies are mere theoretic J frameworks that ought to integrate effectively ICT use in the educational institutions at all levels.

Unfortunately, these theoretical frameworks are bedeviled by some fundamental flaws. ICT is not purposefully integrated into the educational system for the development and management of teaching and learning in the tertiary institutions (Ajayi, 2002). Hence, Yusuf (2005) stated that the potentials of ICT in education as a tool for addressing challenges teaching/leaning, particularly in the methodology of teaching is l realised. The assertion deduced here is that ICT education is market- dm and the central force being economic competitiveness. This way. students are merely prepared to acquire knowledge and skills for future jobs-

- since the only emphasis is on the learning about ICT, and not using ICT to arouse learning in the classrooms.

In the same vein, the direction on the teachers' ability and willingness to use ICT and integrate it into their teaching is not feasible. Yusuf (1998) asserted that computer education introduced into the Nigerian secondary schools since 1988 has largely been unsuccessful as a result of teachers' incompetence. It is glaring also that the Nigerian national IT policy is silent on teacher's education and teachers' ICT professional development.

Effective Integration of ICT that is Advocated (Application to Education)

The paper advocates for effective integration of ICT into teaching/leaming, beyond the mere skill acquisition. By effective integration is meant the totality of usage of the ICT possibilities in arousing learning. Alade (2006) opined that the quality and availability of and access to information and communications technology are indications of the successful application and adoption of ICT by education system and society. Horton (2005) opined that ICTs create experiences that educate human beings. And that it increases access to post-secondary instruction, improving the availability of educational resources, and facilitating meaningful interaction among learners. The effective integration of ICT into teaching/leaming, therefore, will include:

a)   Using ICTs in the Classroom

The use of ICTs in the classroom will transcend the mere acquisition of ICT skills, and involve the use of the various ICT packages to access knowledge. This will call for ICT competences on both the teachers and students, who should have access to computers in their classroom, which are equipped with projectors and interactive boards. In this situation, the teachers' lessons should be delivered via any of the ICT devices and accessible to the students in the same method. Achieving this idea will delete completely, the problem of overcrowding of students in the classroom. It will also increase the number of students that could be attended to by a teacher, since the teacher assumes the role of a facilitator. The overall advantage is that the number of intake in terms of admission will increase, consequently reducing the

number of those languishing to secure a space in the institutions.

b)   Using ICTs for Continuous Assessment

In the new ICT integrated education, the teachers should give students their take home assignment through their e-mail addresses. Of course, the students and their teachers should have e-mail addresses provided by the school through the individual students' matriculation numbers and possibly the teachers' identity card numbers. This way, the school authority can easily pass information to students and teachers individually and severally. In the same vein, the students will submit their complete assignment to their teachers or communicate with the management of the school. The major gain here is reduction in cost of management managing a large crowd with convenience in terms of total control of activities with higher productivity.

c)   Using ICTs as a Tool of Learning Resources

Teachers and their students ought to acquire the ICT competencies that would enable them manage ICT devices as learning resources within their environment. These competencies will function in their ability to carry out basic operations with computers, having knowledge of some software and using same in a range of other activities. This way, both the teachers and their students would belong to the ICT community and definitely share from the benefits accruing thereof. These benefits will include access to interne: for a variety of online materials, virtual libraries, open education resources (OERs) and so forth.

In the envisaged ICT era, the national educational institutions shall accommodate more students at all levels. The admission into the institute r will rise, with remarkable improvement in the literacy level. In the same vein, distance education would have been adopted by all the tertiary institutions, and more single-mode distance educational institutions established instead of the National Open University of Nigeria, which is the only one currently. This development will also cushion the illiteracy lex d since many drop outs and those who lost their first chance in getting education will now receive it. The evil of examination malpractice would have been eradicated as most of the examinations shall be electronical.

7 controlled. The management of the schools in terms of administration should have been enhanced with greater efficiency. This will result in overall turn around in educational system, leading to the achievement of the Millennium Development Goals for education.

Challenges to Overcome

In the effective integration of the new system, the following challenges must be envisaged and controlled for the attainment of our desired height.

Effective funding: The integration of ICT into the mainstream of education that this paper advocates is one that presents all the classrooms, conference halls and lecturers' offices with computers and adequate interconnectivity Therefore, the financial allocation to the educational sector as provided in the government budget should be adequate to sustain and maintain the huge expenses that will be required to run the system. In the same vein, the government should ensure that appropriate measure is taken to forestall misappropriation of the available fund.

Training/Retraining of Teachers; The effective integration of ICT will transform the system if the human element in the school system is upgraded. In this circumstance, the training and retraining of the teaching force in terms of compliance to technology becomes inevitable. To achieve this, both teachers and students should be encouraged to own personal computers.

Improved Maintenance Culture: The maintenance culture of Nigerians, particularly when it concerns public equipment has always been disheartening. In the new era, proper measures must be adopted to oversee the maintenance of all the ICT facilities, such that there must be immediate replacement of obsolete ones. In the same vein, the electricity/power supply should be efficiently improved to help the school community effectively utilise the ICT gadgets. Alternative power supply should be provided, preferably the solar energy in the absence of power supply by the Power Holding Company of Nigeria (PHCN).

Updating of the Curriculum: Every school curriculum ought to be updated at least once in ten years. And in the event of the pervasive ICT, the curriculum should be up-graded to accommodate the changes in methodology.

On the other hand, adequate measures should be taken to check the misuse of the ICT possibilities, so that the students will not lean more on the negative side of ICT such as Internet pornography. The internet places large quantities of pornographic materials on the web. The management of institutions should device means to discourage students who may, if not checked browse the internet for sexual excitement.

Another evil of internet that ought to be checked is - internet crackers and hackers. These are people that secretly get into other peoples' computers with the sole aim of stealing information such as credit card numbers, transfer of funds from banks, erase files etc. These could be the act of most students who ordinarily should be engaged meaningfully with internet.

Conclusion and Recommendations

This paper has looked at the pervasiveness of ICT that has eroded other ways of doing things in all spheres of human endeavour. It also commented on the pitiable level of the Nigerian educational system, gleaned from the low academic performances of the product of the institutions at various levels. It, therefore, opined that effective integration of ICT into the teaching/leaning environment if checked by the challenges envisaged will launch the nation at the apex of comity of nations that have attained the Millennium Development Goals for education. It is recommended that:

1.   that the educational sector should be given high budgetary provisions
2.   the curriculum of education at various levels should be up graded to accommodate the innovations occasioned by the perfect infusion of ICT.
3.   there should be uninterrupted power supply in the various institutions. The government should provide alternative and effective power supply in the absence of Power Holding Company of Nigeria
4.   there should be technical unit for regular servicing and general maintenance of ICT gadgets
5.   the teaching force should be retrained particularly in the ICT knowledge and be made to own their computers
6.   there should be adequate and proper censorship of the internet

7.   materials by the school authorities, to prevent the proliferation of pornographic materials and other crimes of internet.

References

Aduwa-Ogiegbean, S. E. & Iyamu, E. O. S. (2008). Using Information and Communications Technology in Secondary School in Nigeria. *Educational Technology' & Society,* 8(1), 104-112.

Alade, A. (2006). *Principles and Practice of Educational Technology.* Accra, Ghana: Well Publishing Service.

Ajayi, G. O. (2002). African Response to the Information Communication Technology Revolution. *AIPS Special Paper.* NO 8. Retrieved June 2007 from http://www.atpsnet.org/does/Ajayi.pdf.

Banim, B. A. (2004). Instructional Strategies for the Teaching of Integrated Science in Tertiary Institutions. *Journal of Research and Development in Education (JORDC).* 11(1): 240-256.

Busari, S. (2014). Effects of Skype Computer Application on the Academic Performance of SSI 1 Physics Students in Kosofe LGA, Lagos. Thesis submitted to SOE, NOUN for Award of PGDE.

Iloanusi, N. O. & Osuagwa, C. C. (2009). ICT in Education: Achievements so far in Nigeria. In: A. Mendez-Villas, A. Solano Martin & J. Mesa Gonzalez (Eds). *Research, Reflections and Innovations in integrating ICT in Education.* Badajoz: Formatex. pp. 1331 — 1335.

Job, G. C. (2011). Influence of Emerging ICTs on Academic staffs Attitude in Nigeria South - South Tertiary Educational Institutions. *Journal of Education; Ignatius Ajuru University of Education,* Port-Harcourt.

Lawai, F. K., Ahmadu, H. O., & Dogara, M. M. (2003). The Status of ICT in Teaching STM in Selected Secondary Schools in Kano

Metropolis. *44lh Annual Conference of the Science Teachers Association of Nigeria (STAN),* pp. 119 - 123.

Olaniyi, S. S. (2006). E -learning Technology: The Nigerian Experiences. *A Paper Presented at the Shape the Charge xxl 11 FIG Congress.* Munich, Germany.

Olomo. R. O. (2001). Mapping and the Internet; Challenges and Opportunities in Nigeria.

Okworo, G. S. (2008). Effects of Teaching Strategies in Secondary School Students Achievement and Retention in Christian Religion Knowledge, using Instructional Television. A Ph..D. Thesis, University of Uyo.

UNESCO (2002). Information and Communication Technology in Education. *A Curriculum for Schools and Programme for Teacher Development.* Division of Higher Education.

Yusuf, M. O. (2005). Information Communications Technology and Technology in Tertiary Institution. In: E. A. Ogunsakin. (Ed.). *Teaching in Tertiary Institutions* (pp. 67 - 76). Ilorin.