A REVIEW OF INTRODUCTION OF ICT INTO THE EDUCATIONAL SYSTEM IN NIGERIA

Ogunyinka, T. K[1], Oni, O. O[1], Ibikunle, O[2], Ojuawo, O. O [3]

[1*] Department of Computer Science, Gateway Polytechnic, Saapade

[2*] Department of General Studies, Gateway Polytechnic, Saapade

[3*] Department of Computer Science, Federal Polytechnic, Ilaro

Abstract

The change towards an Information Society rather than a manual driven Society implies that teaching and learning must be accomplished through Information and Communication Technology (ICT) rather than the traditional methods. ICT now plays salient roles in the Society such as work places, business, education, entertainment and all facets of human endeavour. Moreover, society has now recognized ICT as a catalyst for change, change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research and in accessing of information. This paper reviews the roles of ICT in educational system vis-à-vis. Primary, Secondary and Tertiary education in Nigeria, the prospects, limitations and the key challenges of integration to educational system. The paper attempts to proffer solutions to the following questions;(a) What are the benefits of ICT in educational system in Nigeria?(b) What are the existing promises of ICT use in educational system in Nigeria?(c) What are the limitations and key challenges of ICT's integration to educational system? The paper concludes that regardless of all the limitations characterizing it, ICT has benefited educational system in Nigeria which is a contemporary paradigm shift from the traditional methods of learning.

Keywords: Information Society, Information and Communication Technology, Educational System.

Introduction

Information and Communication Technology (ICT) plays an important role in the society when we take into account the social, cultural and economic role of computers and the internet. The Organization For Economic Co-operation and Development (OECD) also accepted beyond any rhetoric that society is changing from an industrial/ traditional to an information or knowledge society in which citizens need to be able to manage huge amount of information that can be

disclosed and processed with the help of ICT. According to the European Commission, for instance, all citizens of the European Union should have the possibility to acquire the so-called key skills, which include digital literacy and higher order skills such as team work, problem solving and project management (European commission, 2002). Key skills are often referred to as life-long learning competencies. According to the education ministers of OECD countries (OECD, 2004), the concept of life-long learning covers all purposeful learning activity in a person's life. A major feature of the concept of life-long learning is developing the capacity of "learning to learn". The life-long learning approach anticipates a coping with the increased pace of globalization and technological change (OECD, 2004).

Many students that are about to start their school career eventually will look for a job that does not yet exist. It is therefore often argued that nowadays young children need to develop lifelong learning competencies.

Society-through formal and informal schooling – needs to create opportunities for their citizens to develop lifelong learning competencies. Voogt (2003) distinguishes a number of educational elements that are considered important in learning environments that foster the developments of these competencies. Table 1 shows how these elements are organized in such a way that they show the characteristics of a pedagogical approach that is expected to be more dominant in an information society versus one that suits an industrial or traditional society. By using the words less and more, the table also indicates that education nowadays is searching for a new balance for pedagogical approaches in educational system.

Table 1: Overview of pedagogy in the industrial/traditional versus the information society (adapted from Voogt and Odenthal, 1977; Wijnen, Zuylen, Mulders, and Delhoofen 2000)

	ASPECT	**LESS** Pedagogy in a Traditional society	**MORE** Pedagogy in an information society
1.	Active Learning	*Activities prescribed by teacher *Whole class instruction	*Activities determined by learners *Small Groups

		*Little variation in activities *Pace determined by the program	*Many different activities *Pace determined by learners
2.	Collaborative Learning	*Individual *Homogeneous groups *Everyone for Himself/herself	*Working in teams *Heterogeneous groups *Supporting each other
3.	Creative Learning	*Reproductive learning *Apply known solutions to problems	*Productive learning *Find new solution to problems
4.	Integrative Learning	*No link between theory and practice *Separate subjects * Discipline-based *Individual teachers	*Integrating theory and practice *Relations between subjects *Thematic *Team of teachers
5.	Evaluative Learning	*Teacher-directed * Summative	* Student-directed *Diagnostic

Traditional methods of learning connotes a classroom setting where face-to-face instructions are given by teachers to students and it usually involves a lecture/note. On the other hand computer based learning commonly referred to as online instruction/education generally refers to the fact that the student is separated from the teacher and connected through the use of a computer and the internet. On-line education is a primary method of distance education. According to Waits and Lewis (2003), distance education has grown fast in recent years.

Recent research has indicated that online education has positively influenced many aspects of education both directly and indirectly (CEO forum, 2000; Phipps & Merisotis, 1999).

Previously there have been related debates in this area. Clark (1983, 1994) maintained that media do not influence learning in any condition. But Kozma (1994) debated that educational technologies will influence learning by interacting with an individual's cognitive and social processes in constructing knowledge. These earlier debates are still relevant since newly emerging technologies allow users to use them more efficiently. Most recent research studies in this area have been conducted around these debates.

According to Phipps and Merisotis (1999 and Russell (1999), there have been two lines of research in relation to the effect of on-line Vs traditional instructions on student's end-of – semester grades or learning outcomes between online and traditional sections in various subjects. The first line of research supported the "significant phenomenon", citing on-line learners' significant increases in learning outcomes over their traditional counterparts.

The most widely cited literature along this line is McCollum's (1997) report. McCollum cited a Sociology Professor who divided his Statistics class into two groups: one in on-line format and one in face-to-face (FtF) format. According to McCollum, online students had more online collaboration, and their performance out scared their traditional counterparts by an average of 20 percent. Later other studies also supported the "significant Phenomenon" (Al-jarf and Sado, 2002; Day, Raven and Newman, 1998; Liu, 2005; Nester, Hanner, Merlburg, and McGowan, 2001).

However, the second line of research in this area supported the "no significant Phenomenon", citing no differences in learning outcomes between online and traditional groups. Navarro and shoemakers (1999) found that about 90% online learners in graduate MBA class believed that they learned as much as or more than they would have in a traditional classroom. Later other studies also supported the no "significant phenomenon" (Gage and Shepherd, 2001; Jones, 1999; 2002: Johnson, Aragon, Shaik and Plama-Rivas, 2000; Ryan, Johnson, Aragon, Shaik and Palma-Rivas, 2000; Ryan 2000; Schulman and Sims, 1999).

Need To Integrate ICT to Educational Policies of a Country

The need to integrate ICT to educational policies require recognition. To reflect the importance of technologies, educational policies should focus in the following major points (UNDP, 2004);

(a). Education Policies have to reflect alternate and new teaching paradigms that ICT can offer in terms of providing a more effective relevant, and flexible mode of learning for the under priviledge and the general masses.

(b). Policies must take into account the retraining of teachers incorporating use of ICTs in education. Teachers should skillfully redesign learning environments so that students can transfer their newly gained ICT skills to other applications to use in an ICT rich environment.

(c). Most educational policies reflect the need for ICT infrastructure but they left out the need for local educational content. The development of instructional content-ware remains a neglected area, affecting investments in hardware and resulting in a heavy economic and educational loss.

(d). The focus of developing countries should be on how they use ICTs to compensate for the factors that are lacking in education, namely, well-trained teachers and the resources to pay for expensive equipment. The task is to concentrate on technological alternatives that at low cost, bring to students the imagination and creativity of a few excellent teachers

Educational System in Nigeria

The National Policy on Education came into existence as result of the conviction that education is an instrument "per excellence" for effecting national development. Government of Nigeria set out the educational goals that would be relevant to the needs of every individual in the nation.

Introduction of ICT into the education system among others is one of the key policies made in 1977 to enhance qualitative teaching and learning. The Open University is now in operation which needs ICT to operate because learners are located in different locations and therefore would need internet access since they do not have contact with their lecturers.

Primary and Secondary Education

In recognition of the prominent role of ICT in advancing knowledge and skills necessary for effective functioning in an Information Society, the National Policy on education specifically stated that ICT must be integrated into the curricula of these sectors in order to enhance learning by pupils in order to acquire relevant training early in life. Kofi Anan the former United nations secretary general pointed out that in order to attain the goal of universal Primary education by the year 2015, all and sundry must ensure that ICT unlocks the door of education system. This indicates the growing demand and increasingly important place the ICT could receive in education. Since ICT provides greater opportunity for students and teachers to adjust learning and teaching to individual needs.

Tertiary Education

Tertiary institutions all over the world are complex organizations that replicate and integrate much of the activities in the larger society. They have the capacity to carry out teaching, training and research; and this mandate is enshrined in a complex process with numerous activities which include teaching, training, administration, examination and evaluation.

Data and information generated by human race have risen to a proportion that manual manipulation cannot give accurate result. Delivery of educational services, proper record keeping, administrative and managerial services can no longer survive the traditional methods. The problems of information explosion, increase in school enrolment at all levels, shortage of competent and qualified personnel, storage and retrieval of data, high price or resource materials have compelled all institutions, especially tertiary institutions, to evolve means of tackling the problems (Egbowon and Nwaboku, 2009)

The last two decades witnessed the advent of Information and Communication Technologies (ICT) and this has offered the tertiary institutions the opportunity of achieving better co-ordination which has resulted in reduction of administrative stress and expansion of the scope of attention for teaching, learning and training.

Many writers have elicited the implicit advantages of the new technologies and how they could be harnessed for optimal application and integration. (Ajayi, 2000, Nwaboku, 2006, HMIE,2007) In the same vein, some International Organizations like UNESCO, ILO, have identified ICTs as

a means of bridging educational and economic gaps between the north and south as evidenced in the pace of developments in South East Asia and the Pacific (ADB, 1990, UNESCO-PROAP, 1991).

Application of ICT in Tertiary Education

Tertiary Institutions hold the ace in terms of setting the pace in educational development of a nation. Most of the policies formulated for education come from the workshops which involved the cream of experts and professionals from the Tertiary Institutions. It has been established that Information and Communication Technologies offer a wide scale of tools which lead to the change of teaching process from one closed and rigid, oriented on teacher, to an inciting and interactive process centred on learners (Dumitresue, Oleteanu, Gorphni and Gorghni, 2006). Recently tertiary institutions in Nigeria deploy ICT for:

i. Teaching and Research work: via lecture delivery to students by lecturers to students on Cd, obtaining materials for research work on the internet

ii. Capacity building of in-house software or procured for upgrading the skills of both academics and non-academic staff to meet the required level of competence

iii. Harnessing Funds: use of e-payment for school fees, thereby blocking financial leakages.

iv. Institution's websites: this has helped in the area of students registration, purchases of form, on-line job applications etc

Benefits of ICT in Education

The uses of ICT is making major difference in the learning of students and teaching approaches. Schools in the Western world invested a lot for ICT infrastructures over the last two decades, and students use computers more often and for a much large range of applications (Volma, 2005). Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use. (Kulik's 1994). In Nigeria the Joint admission and matriculation Board (JAMB) is now shifting attention to computer-based test (CBT) rather than a Pencil- to-paper test (PPT) to conduct examination for prospective students seeking admission to various tertiary institutions of learning. This shows that there is a significant rise in the level of competence in the use of ICT among secondary school students in the country.

(2) The use of ICTs in education also shifts the learning approaches. As put by (Bransford, brown, and cooking, 1999) cited in Volman (2005), there is a common belief that the use of ICT's in education contributes to a more constructivist learning and on increase in activity and greater responsibility of students. This limits the role of the teacher to supporting, advising, and coaching students rather than merely transmitting knowledge. The gradual progress in using computers changes from learning about computers, to learning computers, and finally to learning with computers (Volman, 2005)

(3). ICTs are exerting impacts on pedagogical approaches in the classrooms. Their contributions to changes in teaching practices, school innovation, and community services is considerable. A research review by Kozma 92005) suggests three significant concerns of consideration regarding ICTs impact on education. Firstly, student's output such as higher scores in school subjects on the learning of entirely new skills needed for a developing economy. Secondly, consideration should be given to teacher and classroom output such as development of teachers' technology skills and knowledge of new pedagogic approaches as well as improved attitudes toward teaching. Finally, consideration should be given to other output such as increased innovativeness in schools and access of community members to adult education and literacy.

Limitations of ICT use in Education

ICT as a modern technology that simplifies and facilitates human activities is not only advantageous in many respects, but also has many limitations. Many people from inside and outside the education system, think of ICT as "Panacea" or the most important solution to school problems and improvements. However, many conditions can be considered as limitations of ICT use in education. The limitations can be categorized as teacher related, student related, and technology related. All of them potentially limit the benefits of ICT to education. Teachers' attitude plays an important role in the teaching-learning process that utilizes computers and internet connections. Although teachers' attitude towards use of these technologies is vital, many observations reveal that teachers do not have clarity about how far technology can be beneficial for the facilitation and enhancement of learning. Of course, some
teachers may have positive attitudes to the technology, but refrain from using it in teaching due to low self-efficacy, tendency to consider themselves not qualified to teach with technology. In

this respect, Bandura (1986) describes self-efficacy as "individual's opinion of capabilities to organize and perform courses of actions to achieve particular types of performances." Moreover, as identified by Brosnan (2001), attitude, motivation, computer anxiety, and
computer self-efficacy are factors affecting teachers' use of computers in their lessons. Teacher resistance and lack of enthusiasm to use ICT in education may also be another limitation. Furthermore, many teachers may not have
the required IT skills and feel uncomfortable, nor do they have trainings needed to use the technology in their
teaching. Unless teachers develop some basic skills and willingness to experiment with students, ICT use in education is in a disadvantage (Brosnan, 2001).

On the other hand, the limitation of ICT use in education is related to student behaviour. Appropriate use of computer and the internet by students have significant positive effects on students' attitude and their achievement.

Nonetheless, it is very common to observe limitations related to student behaviour. Students tend to misuse the technology for leisure time activities and have less time to learn and study. Yousef and Dahmani (2008) described online gaming, use of face book, chat rooms, and other communication channels as perceived drawbacks of ICT use in education, because, students easily switch to these sites at the expense of their study. Internet access at home, for instance, may be a distraction because of chat rooms and online games, reducing the time spent in doing assignments and learning (Kulik, 1994). Therefore, the impact of availability of ICT on student learning strongly depends on its specific uses. If ICT is not properly used, the disadvantage will overweight the advantage. For example, while students use the internet, it may confuse them by the multiplicity of information to choose from.

As a result, the teacher spends much time to control students from websites unrelated to the learning content. Then, for caution, it is important to identify the major limitations of ICT use in education as related to student behaviour. The various literature in the area, identify the following limitations of ICT use in education as related to student behaviour.

. Computers limit students' imaginations, Over-reliance on ICT limits students critical thinking and analytical skills, Students often have only a superficial understanding of the information they download, Computer-based learning has negative physical side-effects such as vision

problem, Students may be easily distracted from their learning and may visit unwanted sites, Students tend to neglect learning resources other than the computer and internet, Students tend to focus on superficial presentations and copying from the internet, Students may have less opportunity to use oral skills and hand writing, Use of ICT may be difficult for weaker students, because they may have problems with working independently and may need more support from the teacher.

The Key Challenges of ICTs Integration in Education

The integration of ICTs in education systems may face various challenges with respect to policy, planning, infrastructure, learning content and language, capacity building and financing. ICT-enhanced education requires clearly stated objectives, mobilization of resources and political commitment of the concerned bodies. Tinio (2002) discusses issues such as analysis of current practices and arrangements, identification of potential drives and barriers, curriculum and pedagogy, infrastructure and capacity building to be considered in the formulation of policy and planning. In addition, it is wise to specify educational goals at different education and training levels as well as the different modalities of ICT use that can facilitate in the pursuit of the goals. Policy makers then, need to know the potentials of ICTs in applying different contexts for different purposes. Other challenging points at the level of policy and planning are identification of stakeholders and harmonization of efforts across different interest groups, the piloting of the chosen ICT-based model, and specification of existing sources of financing and the development of strategies for generating financial resources to support ICT use over the long term.

The infrastructure challenges that may exist are absence of appropriate buildings and rooms to house the technology, shortage of electric supply and telephone lines, and lack of the different types of ICTs. Because of this, one need to deal with infrastructure related challenges before the planning of ICTs integration to education systems. With respect to challenges of capacity building, we have to develop competencies of teachers and school administrators for the successful integration of ICT in the education system. In fact, one impeding factor of ICTs integration in education systems is the skill gap of people implementing it (Tinio, 2002).

For instance, teachers need professional development to gain skills with particular applications of ICT, integration into existing curricula, curricular changes related to its use, changes in teacher role, and on underpinning educational theories such as constructivism/or student-centred

learning. Because of this, any attempt of ICT integration in education should parallel with teachers professional development.

The school leadership also plays a key role in the integration of ICT in education. Lack of support from the school administration is also a big challenge. Thus, for the effectiveness of ICT integration, administrators must be competent and have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education. Furthermore, learning content and language also challenge the integration of ICT in education. Content development is a critical area that educators overlook. In integrating ICT in education, we have to care for the relevance of the learning content to the target groups. With respect to language, English is the dominant language in many of educational software, while English language proficiency is not high in many of the developing countries, and this is one barrier in the integration of ICT to education. Another great challenge is the financing. ICTs in education programs require large capital investment and developing countries need to predict thebenefit of ICT use to balance the cost relative to the existing alternatives. Potential sources of money and resources for ICT use programs suggested are grants, public subsidies, fund-raising events, in kind support from volunteers, community support, revenues earned from core business, and revenues earned from ancillary activities (Tinio, 2002). Overcoming the mentioned challenges may help education systems benefit the most from this technology.

Summary, Conclusion and Recommendation

This review attempts to proffer solution the following questions on the impotance and the roles of ICT in educational system in Nigeria taking cognizance of the following salient issues the existing promises, limitations and the challenges of its integration in Nigeria's educational system. Information and communication Technology is playing major roles in all straits of life not excluding educational system. ICT is encouraging changes in working conditions, handling and exchanging of information, teaching/learning approaches and so on. One major area in which the impact of ICT is felt in education is the encouragement and significant changes in teaching approaches by teachers and the ways students are learning. ICT based learning encourages active, collaborative, creative, integrative and evaluative learning which is an advantage of all traditional methods of learning. In other words, ICT is becoming more

appropriate in the realization and implementation of the emerging pedagogy of constructivism that gives greater responsibility of learning to students. On the other hand, this paper discuss the major limitations of ICT use in educational system in Nigeria as teacher related, student and technology related. Furthermore, the major challenges of integration of ICT into the educational system in Nigeria hinge policy making, planning, infrastructure, learning content and language, capacity building and financing.

The way forward is that since the consign opinion of all stake holder is that the development of any country depends upon the quality of educational programs offered to citizens. ICT despite its known limitations, is believed to be immensely beneficial in this regard. The computer and the internet are especially useful to enhance student engagement in learning and positively impact student performance and achievement.

In concluding, it is highly recommended that utilization of ICT, particularly the computer and the internet must be integrated into the educational system at all levels, because it encourages and promotes curriculum implementation and enhanced learning by students. Therefore, policy makers in educational sector, educators and all concerned should evaluate and recognize the role of ICT in education in order to work for the effective functioning of this technology in educational system in Nigeria.

References

Al-Jarf, A. & Sado, R. (2002). Effect of online learning on struggling ESL college writers. San Antonio, TX: National Educational Computing Conference Proceedings. (ERIC Document Reproduction Service No. ED 475 920).

Bandura, A. (1986). *Social foundations of thought and action: A Social-Cognitive View.* Englewood cliffs, NJ: Prentice-Hall

Brosnan, T. (2001). *Teaching Using ICT*. University of London: Institute of Education.

Carnoy, M. (2002). ICT in Education: Possibilities and Challenges. (Downloaded from: http://www. uoc.edu, 04 March 2011).

CEO Forum (2000). The CEO forum: School technology and readiness report [Online]. DC: CEO Forum. Available: http://www.ceoforum.org.

Clark, R.E. (1983). Reconsidering research on learning from media. Review of Educational Research, 53, 445-459.

Clark, R. E. (1994). Media will never influence learning. Educational Technology, Research and Development, 42(2), 21-29.

Day, T., Raven, M. R. & Newman, M. E. (1998). The effects of world wide web instruction and traditional instruction and learning styles on achievement and changes in student attitudes in a technical writing in an agricommunication course. Journal of Agricultural Education, 39(4), 65-75.

Dick, W., Carey, L., & Carey, J. O. (2001). The systematic design of instruction (5th Edition). New York: Addison-Wesley Educational Publishers, Inc.

European Commission. (2002). *eEurope 2005: An information society for all*. Brussels, Belgium: European Commission.

Hare, H. (2007). Survey of ICT and Education in Africa: Ethiopia Country Report (ICT in Education in Ethiopia). www.infodev.org downloaded February 28 Jonassen,

D.H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and development*, 39(3), 5-14

Kok, A. (2007). *ICT Integration into Classrooms:* Unpublished literature review

Kozma, R. B. (1994). Will media influence learning? Reframing the debate. Educational Technology Research and Development, 42, 7-19.

Kozma, R.B, (2005).National policies that connect ICT-based education reform to economic and social development. *An interdisciplinary journal of humans in ICT environment 1(2) 117-156*

Kulik, J.A. (1994).Meta-analytic studies of findings on computer-based instruction. In J.E.L.Baker &H.F.O'Neil (Ed.), *Technology Assessment in Education and Training.* Hillsdale, NJ: Lawrence Erlbaum

McCollum, K. (1997). A professor divides his class in two to test value of online instruction. Chronicle of Higher Education, 43, 23.

Mills, S. C. (1999). Integrating computer technology in classrooms: teacher concerns when implementing an integrated learning system. KS, US. (ERIC Document Reproduction Service No. ED 432 289).

Navarro, P., & Shoemaker, J. (1999). The power of cyberlearning: An empirical test. Journal of Computing in Higher Education, 11(1), 33.

Nesler, M. S., Hanner, M. B., Melburg, V., & McGowan, S. (2001*). Professional socialization of baccalaureate nursing students: Can students in distance nursing programs become socialized*? Journal of Nursing Education, 40(7), 293-302.

OECD. (2002). ICT: Policy Challenges for Education. Planning Meeting, Agenda and Issue Paper. (Retrieved from https://www.oecd.org/LongAbstract on December 2009)

Olson, J. (2000). Trojan horse or Teacher's Pet? Computer and the Culture of the School. Journal of Curriculum Studies, 32 (1), 1-8.