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**Information and Communication Technology Use  
in Education: Emphasis on the Impact of  
Asynchronous Media**

**Oduma, C. A., Ph.D.**

Department of Business Education

Faculty of Education

Ebonyi State University, Abakaliki

**Abstract**

*Information and Communication Technology (ICT) use in education is an innovation in the system to foster efficiency in teaching and learning. ICTs and their utilization is one of the most pertinent issues in the education industry today. This paper thus focused on ICT use in education with emphasis on the impact of asynchronous media in education system. Asynchronous ICT media is perceived here to include those teaching and learning electronic gadgets that allow participants in the learning process to be at different times and different places. Asynchronous learning resources are therefore used to facilitate information sharing among a network of people. The paper pointed out specific impact of asynchronous ICT media in distance education. This piece equally reviewed the various types of*

*ICT driven learning, the roles and weaknesses of ICT in education as well as the barriers to the application of ICT in education. The paper concluded that the challenge of the knowledge society through ICT is a significant area that is propelling the use of ICT in education. The paper finally noted that the struggle to be part of the digital world is obvious in the knowledge society, therefore, government and in fact, education authorities should endeavour to provide ICT in Nigeria school system.*

### **Introduction**

ICT literacy rate have become key tools that has revolutionary impact of how we see the world and how we live in it. ICT literacy is the capacity (knowledge, skill and aptitude) of a person to identify, search effectively and present specific information in order to build knowledge and develop critical and creative thinking pertinent to a field of study (Hernes, 2012). This phenomenon has given birth to the contemporary and advances in our ways of life. ICTs are having a revolutionary impact on education methodology both at conventional and distance education levels. However, this revolution is not widespread and needs to be strengthened to reach a large percentage of the population. In a complex society like Nigeria, many factors effect distance education (Ololube, Ubogo and Ossai, 2008).

Sife, Lwoga and Sanga (2009) clearly noted that ICT originally is applied to serve as a means of improving efficiency in the education process. Furthermore, it has been shown that the use of ICT in education can help improve students' memory retention, increase their motivation and generally deepen their understanding (Butes, 2011). ICT in education can also be used to promote collaborative learning, including role playing and group problem solving activities. Generally, ICT is promoting new approaches to working and learning, and new ways of interacting among teachers and students at different geographical arena. Many academics especially those in the computing discipline for instance, are major catalysts to promoting the necessary changes and to equip students with the skills they are expected to have upon graduation (Barnet and Coat, 2005).

In tertiary institutions, for example, there has been gradual attention as well as continuous emphasis and shift towards learning about information and communication technology. Thus, ICT and its utilization especially in distance education, is one of the most concerns of educational issues in our education system today. In many tertiary institutions, there are significant evidences in the training, development, procurement and utilization of ICT equipment. It is essential therefore, that the pedagogy of ICT becomes one of the main focus of study in education as well as staff and students development in tertiary institutions in Nigeria. This may be achieved through a gradual process of study; and this will have to be built upon in a constructive manner in order to allow institutions to achieve the full benefit of using ICT in both instruction and in their daily tasks (Haris, 2011). Teaching and learning refers to both the contents (skills, understanding and values) and the process of bringing about changes in the learners' behavior. Thus, decision on teaching and learning activities in tertiary education can be done in various levels including academic member departments and faculties. ICT in education is one of the most concerns of educational authorities around the world and for a number of years, there has been evidences that a training and development area which may be labeled information literacy is gradually being formed (Haris, 2011). Thus, if ICT tools are to improve institutional effectiveness and efficiency, it is obvious that their application in support of teaching and learning be seriously considered. However, investment in this area should always be carefully balanced against other ways in which teaching and learning in education and every other discipline may be implemented and strengthened.

### **ICT and Distance Education**

Distance education also called open or distance learning is a form of education in which there is normally a physical separation between teachers and learners. Distance education equally involves the provision of whatever educational opportunities that are needed by anyone, anywhere, and at any time to those who otherwise would have

been denied such educational opportunities (Ololube, Ubogu and Ossai, 2008). The authors further noted that promoting the development of a knowledge society through open and distance learning education is one of the approaches increasingly adopted in recent times by government around the world who want to encourage economic development at all local, state and national levels. Thus, distance education are growing in importance as centers for the development of knowledge society , and this has led several countries like Nigeria to encourage this effort aimed at providing people who do not have the opportunities to attend conventional education institutions (Ololube, Ubogu and Ossai, 2008).

In Nigeria for instance, where access to the net as well as the provision of basic facilities for life are still very low, delivering educational knowledge through ICT or distance learning presents a significant challenge to educators. In a nation where the concern of most people is meeting their basic needs for food, clothing and health, access to information and communication technologies (ICT), especially the most modern ones, is very low on their list of priorities – and often times not considered a priority at all (Rao, 2011). Nonetheless, ICT has had a major impact on open and distance learning (ODL) in Nigeria. Ideally, issues such as geographical location, lack of knowledge and skills to use ICT, and financial constraints are major consideration in deciding what ICT to use and in what combination. In deed, the use of a particular ICT must not only address certain pedagogical concern in distance learning, it must aim to bridge the digital divide and then make access to education less strenuous (Rao, 2011).

In this direction, the academic landmark in Nigeria includes the teaching and learning process, along with the educational programme and courses and the pedagogy or methodology of teaching, the research process, including dissemination and publication; libraries and information services, higher education administration and management, and distance education programme. The Federal

Republic of Nigeria (2004) through its national policy on education detailed that the goals of distance education should be to:

- a. Provide access to excellent education and equity in educational opportunities for those who otherwise would have been denied.
- b. Meet special needs of employers by mounting special certificate courses for their employees at their work place.
- c. Encourage internationalization especially of tertiary institutions/education curricular.
- d. Restructure the effect of internal and external brain drain in tertiary institutions by utilizing Nigerian experts as teachers regardless of their location or place of work (FRN, 2004).

Thus, the Federal Government of Nigeria is convinced that for education and in fact for distance learning to make any meaningful contribution to national development, ICTs are essential ingredient to foster its implementation. Unfortunately in Nigeria, the relationship between the development of ICTs penetration and use in distance education programme and its diffusion into the programme in higher education and distance education in general has often been faced with both financial constraints and inadequate educational provisions.

### **Asynchronous ICT Media in Education**

We can study ICT in terms of the technologies. That is, the delivery system or in terms of their content. Based upon their delivery system (characteristics) ICT media technologies could be grouped into two categories, namely; synchronous and asynchronous ICT media. Asynchronous ICT media in education allows for participants in the learning process to be at different times and different places (Rao, 2011). Asynchronous learning therefore, is a student centered teaching and learning approach which includes self study and peer to peer learning. In asynchronous learning, the resources are used to facilitate information sharing among a network of people. Asynchronous

classes are just the direct opposite of synchronous. Thus, in asynchronous classes, instructors provide materials, lectures, tests and assignment that can be accessed at any time or within a stipulated time frame by the learners (Merisotis, 2010). Thus, some students believe that asynchronous courses provide a better way to learn. Many students need more time to form their thoughts or consider all the sides of an issue before offering an opinion (Haddad and Drexler, 2002). The major or notable asynchronous class elements to be discussed here include:

1. *Virtual libraries/Repositories of documents, presentations, graphics, Audio files and video:* Your online course (class) will provide you with instructional materials or documental or notes. This could consist of articles often in portable document format (Pdf) that you can download from a virtual library (Merisotis, 2010). Virtual library is an electronic library through which documents, information or data could be gained or received or made to appear to exist by the use of computer software, for example; on the internet (Haddad and Drexler, 2002). Thus, new technology has enabled development of an online virtual library. Through this means you may also be asked to download presentations, slides and illustrative graphics. In addition, students may have instructional documents that consist of video snippets, audio files, and even full length movies such as documentaries (Taghiouf, 2009). In this case, you will often have the option to stream the content rather than having to download an enormous file.
2. *E-mail:* E-mail is a foundational item in all online courses. It's a great tool for asking questions, keeping in touch, and receiving materials, updates, reminders, and even assessments. Some online courses use e-mail as the main way to interact with your instructor and peer (Bosch, 2001).

3. *Discussion Board*: The discussion board is another pillar in the online leaning structure. It's a great way to respond to questions and to share documents and links. It's also a good place to ask questions and to clear up ambiguities (Perraton and Creed, 2011).
4. *Social Networking*: Many online courses now incorporate social networking in order to enhance collaboration and learner interaction. In many learning management systems, social networking is built into units via embedded hypertext markup language (html) scripts. Social networking programs that are often incorporated include blogs, wikis, Facebook, Orkut, Bebo, Twitter, Flickr, Youtube, Youstream, and more (Perraton and Creed, 2011).
5. *Wikis and Collaborative Documents*: Collaborative documents allow students to edit each other's work and to collaborate. You will enjoy seeing how people contribute, and you will feel excited about logging in and adding your thoughts and ideas. A "wiki" is a place that allows you to build a definition or series of explanations – much in the way that Wikipedia works. You can add text as well as graphics (Rao, 2011).
6. *E-portfolios*: Some online courses utilize special software (such as Mahara) that makes it easy for you to create an online portfolio. E-portfolio demonstrate your skills and you knowledge of a special topic. They are often assigned as a capstone project in which students combine text, images, presentations, video, audio, links, and a discussion space.
7. *DVD/CD-ROM*: Some courses provide textbooks that come bundled with DVDs for video and media content. These can be real life-savers where there is slow, limited, or expensive internet connectivity. They are great ways to let students review the materials offline, and then budget their online time effectively (Bosch, 2001).

## **Specific Impact of Asynchronous ICT Media in Distance Education**

There are specific but vital impacts of information and communication technologies on education. Such specific impacts of ICT on education may be discussed on the following sub-heads:

- a. *Impact on orientation of New and Incoming Students:* It is very possible that ICT could be used in distance education for instance, to give orientation to new students. Students' orientation is an important scenario for students' induction in tertiary education and its process. For instance, orientation activities are required to inform students especially new ones, about courses prerequisites, course outlines, procedures for adding and withdrawing from classes, grading criteria, tips on where to access study materials, and so forth (Iwamaga, 2008). The fact that many students live far away from main and satellite campuses, however, makes it very impractical if not impossible – to gather them physically all in one location for orientation. The creative use of low-cost, readily available technologies like *Yahoo Messenger* for instance, will help distance education providers overcome obstacles of time and space.
- b. *Impact on Human Resources Development:* Educational providers use both hardware and software ICT components that are reliable to support the provision of knowledge as well as learning activities in education (school). Just as important, these ICT hardware components must be supported by highly skilled individuals, armed with the knowledge and skills they need to ensure that the hard and software runs smoothly. To accomplish the human aspect of ICT, institutions must offer training to various user groups (i.e, students, teachers, administrators, etc.). Offering such training helps to ensure the efficient and effective use of ICT for all stages of the teaching and learning process, from accessing online classrooms, to course registration, to managing digital library



materials, to manipulating databases, to get the information one needs to do their work or complete an assignment, etc (Dirrh, 2010).

- c. *Impact on instruction content and design:* The technology used to deliver instructional content has influenced instructional design and methods used. While the pedagogy has always been the central consideration, the delivery characteristics of the technology used is also on the minds of instructional designers charged with designing pedagogically sound learning materials. The “chunking of lessons”, for instance, and the level at which learners should interact with the course contents are major design considerations – considerations which must fit both the content and the attributes of the technology. Depending on the technology used, the interaction by which to engage learners will vary. Loveless and Elli (2001), for example, advised that “it is not enough to use technology to do the same types of activities; educators must also consider the new ways of thinking that the technology affords.” This means educators must think about pedagogy and ICT from within a system perspective-not as discrete variables independent from one another.
- d. *Impact on Organizational Structure:* ICT use in education especially in learning is also re-shaping educational institutions’ entire organizational structures. Westbrook (2001), for example, observed that the introduction of ICTs in education has resulted in four distinct changes thus: (1) curriculum; (2) role of teacher and students; (3) organizational structure and (4) learning environment. Through ICT, a growing number of transactions can now take place online at a distance. ICT use in education can enhance appropriately automated systems for records, and so forth; this must be supported by holistic policies and procedures that take into account all academic-related activities

- e. *Impact on Blended Learning:* Librero (2006) observed that conventional universities are now using ICTs to achieve blended learning environment, which blend traditional face-to-face classroom delivery with distance delivery. This blended approach has increased the sources of learning materials that learners must access under blended learning strategies. Thus, through blended learning, the conventional teaching approach could be supported by ICT use to provide learning materials (information knowledge) online to learners.
- f. *Impact on University Image:* Librero (2006) again noted the changing image of universities, as a result incorporating ICT into its educational offerings, a term he calls “corporatization”. Universities are starting to think and operate like businesses; they are ever seeking to take advantage of emerging opportunities to earn lots of money via online learning. Almost every university is today striving to achieve online transactions with students. Examination bodies like JAMB, NECO, WAEC, etc are fast transforming their mode of transactions to be ICT based. All these have much evidence to the image of the organization.
- g. *Impact on University Culture:* Use of ICT is also re-shaping university cultures. A school’s culture is defined by its pattern of relationships and of management of resources. These patterns of relationships and methods of management are in turn, shaped by its overarching educational philosophy, expectations from the community it serves, its moral culture, political skills of its leadership, and curriculum (Azinian, 2001). In recent years, the culture of teaching has shifted from that of being the “sage on center stage,” to that of being a learned facilitator, a dynamic called “learner-centered” pedagogy. Iwamaga (2008) for example, observed that online tutors have greater responsibility to ensure that all voices are recognized and respected and must consider all opinion when integrating messages or making concluding statements. Rao

(2011) further notes that with ICT use in education, teachers must aim to be literate in the new technologies and retrain themselves in pedagogy for them to understand how to make technology support conceptual formation and changes in students.

- h. *Impact on Students Culture of Learning:* Clearly, ICT use in education can influence the culture of learning, thus shifting from the culture of students passively listening in a classroom where attendance matters, to the culture of proactive reading, encoding and decoding anything, anywhere. Leach, Ahmed and Power (2005) also observed that online discussion has had a democratizing effect on the learning process, a dynamic referred to as an egalitarian environment (Brown, 1997, as cited in Richmond, 2002). In an online learning environment, adult learners must take greater responsibility over their own learning paths by sharing their vast array of experiences and knowledge with others in their class.

### **Types of ICT Driven Learning**

ICT supported education can promote the acquisition of the knowledge and skills that will empower students for lifelong learning. When used appropriately. ICTs especially computers and internet technologies can facilitate new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way (Perraton and Creed, 2002). These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from teacher centered pedagogy to one that is learner centered (Stevenson, 1997). Varied types of learning activities have been prompted by the use of ICT in education. These varied learning types include:

- a. *Active Learning:* ICT enhanced learning mobilizes tools for examination, calculation and analysis of information, thus providing a platform for students' inquiry, analysis and construction of new information (Richmond, 2002). Learners

therefore learn as they do and whenever appropriate, work on real-life problems in-depth, making learning less abstract and more relevant to the learners' life situation. In this way, and in contrast to teacher centered memorization or rote learning, ICT enhanced active learning promotes increased learner engagement.

- b. *Collaborative Learning*: ICT supported learning encourages interaction and corporation among students, teachers and experts regardless of where they are. Apart from modeling real-word interactions, ICT supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance teaming and communicative skills as well as their global awareness (Kings, 2001). It models learning done throughout the learner's life time by expanding the learning space to include not just peers but also mentors and experts from different fields.
- c. *Creative Learning*: ICT supported learning promotes the manipulation of existing information and the creation of real-world products rather than the regurgitation of received information.
- d. *Integrative Learning*: ICT enhanced learning promotes a thematic, integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice that characterizes the traditional classroom (Hawkins, 2002).
- e. *Evaluative Learning*: ICT enhanced learning is student-centered and diagnostic. Unlike static, text or print based educational technologies, ICT enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember.

### **The Role of ICT in Learning**

ICTs use in education is often perceived as divers set of technological tools and resources used to communicate, and to create, disseminate, store and manage information. These technologies include computers, the internet, broadcasting technologies (Radio and Television) and telephone. The role of ICT equipments in students learning may be summarized thus:

- a. It helps to motivate students to learn: ICTs such as videos, television and multimedia computer software that combine text, sound and colourful, moving images can be used to provide challenging and authentic content that will engage the students in the learning process (Richmond, 2002). Interactive radio like-wise makes use of sound effects, songs, dramatizations, comic skits and other performance conventions to compel the students to listen and become involved in the lesson being delivered (Kings, 2001). More so, than any other type of ICT, networked computers with internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.
- b. Facilitate the acquisition of basic knowledge skills: The transmission of basic work skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programmes such as “children teach yourself alphabets, numbers, colours, shapes”, and other basic concepts are good examples here. Most computer based learning focus on mastery of skills and content through repetition and reinforcement.
- c. Facilitates students Inquiry: Students can use computers (ICTs) to find out information and to gain new knowledge in several ways. They may find information on the internet or by using an ICT based encyclopedia such as Microsoft Encarta

(Ifinedo, 2006). They may find information by extracting it from a document prepared by the teacher and made available to them via ICT, such as document created using Microsoft word or a Microsoft power point slideshow. They may find out information by communicating with people elsewhere using e-mail, such as students in a different school or even in a different country.

- d. It facilitates the processing of knowledge: Students can use the ICTs as part of a creative process where they have to consider more carefully the information which they have about a given subject. They may need to carry out calculations (eg. By using Microsoft excel) or to check grammar and spellings in a piece of writing (perhaps using Microsoft word), or they may need to re-sequence a series of events (for example by re-ordering a series of Microsoft power point slides).
- e. Facilitates the sharing of knowledge: Students can use ICT to present their work in a highly professional format. They can create documents and slideshows to demonstrate what they have learned, and then share this with other students, with their teacher, and even through e-mail with people all around the world.

### **Weaknesses of ICT in Education**

ICT in education is an innovation that is cherished all over the world. ICT has helped to transform activities, teaching and learning in the education sector. Technology also is penetrating all other fields of study, as well as other facet of human endeavour – health, military, engineering, etc. but ICT also have weaknesses which we must understand. Reddid (2009) noted that these weaknesses include:

- a. *High Infrastructure and Start-up Cost:* It is costly to procure, build and maintain ICT gadgets in an educational institution. This is one of the most pronounced handicaps in the use of ICT in education.

- b. *Problem of Access:* It is clear that not every one has equal access to ICT. This is often due to poor infrastructure such as road, electricity, etc. the lack of these essential infrastructure deny people (users) the access to ICT.
- c. *Hard to assess Impact:* Learning from ICT delivery content is difficult to assess since such learning is of a multidimensional and long term kind, rather than from immediate learning assessment as in a classroom test.
- d. *ICT tends to widen social class:* It is gradually becoming clear that those who have gained sound knowledge in ICT education can easily source education research grants and make money. Not only that they create wealth, they also create new knowledge through the system thus, widening the gap between new and old knowledge as well as the gap between the educated rich and the educated poor.
- e. *ICT is essentially a delivery system:* A medium is different from the content; and often we forget that we can deliver any content, because ICTs are essentially meant only to deliver content, not to change attitudes or bring about behavior change.
- f. *ICT is not Location and Problem Sensitive:* ICTs address problems in a general way, but cannot without special effort solve local and culturally sensitive problems.
- g. *ICT Promotes Rigidity in Content:* ICT tends to reach large numbers of people in a very wide geographical base but does not vary content or strategies or mode of delivery as group (recipients) change. Thus, the larger the number, the lower the cost. This means that ICT tries to reach larger number of people so making content common, not taking into account individual differences within the group.
- h. *Education Personnel Need Constant Training:* Just as learners learn to use ICTs, educational personnel including the

teachers who use the ICTs gadget to discharge their education functions, also require constant training in order to be able to cope with the current trends and advances in ICTs. Often, education personnel resent in participating in such constant training.

- i. *Constant Call for Change:* ICTs are different media and have a different way of teaching from what we are accustomed to, therefore, they need different ways of understanding what teaching and learning is all about almost at a constant pace. ICTs are mixed bag, thus it is important that we recognize their weaknesses, before planning to use them in our education system. This is imperative because such recognition will enable to sharpen our focus, understanding and thinking. Often, we may presume that a particular set of ICT is ideal one, but not recognizing its limitations, we are likely to fail in out effort and then to believe that all ICTs are useless and inadequate in education.

### **Barriers to Application of ICT in Education (Teaching and Learning)**

1. Inadequate familiarity of academia with computers hardware and the supplementary equipment.
2. The lack of orientation/training programme on computer literacy or low rate of academic participation in computer literacy training.
3. The teachers/lecturers increasing average of age and their reluctance to use computers in education.
4. Unfamiliarity of academia with software which can be used in their teaching.
5. Unfamiliarity of academics with World Wide Web environment and the way of using it.



6. Inadequate access of faculty members to personal computers (PC) in their homes or offices.
7. Inadequate access of academics to enough budgets.
8. The common belief among academics that new ICTs possibilities have no effect on improving the quality of higher education.
9. Missing of a proper working place and labs or equipped classes with PCs, digital projectors and other equipments.
10. The absence of moods, cooperative motivations and enough coordination in faculties of education staff for entering into new atmosphere.
11. The absence of digitalized copy equipments like compact disc (CD) copier in departments and faculties.
12. The budgets weakness and lack of financial possibility for students.
13. The absence of students' access to personal computers (PCs).
14. The students illiteracy in computer knowledge

### **Conclusion**

ICT use in education is challenging. To belong to the knowledge society and overcome the problems of the digital divide institutions of learning (especially tertiary institution) around the world are struggling to be connected and to be knowledgeable in ICT. The challenge of the knowledge society is also another significant area that is propelling the use of ICT in education. Interest is given to asynchronous ICT gadgets here because it does appear that the best magic of the system technologies is in the use of asynchronous ICT media. Again, the challenges of internationalization are also one of the innovations that developing countries want to achieve in their education system. To realize this, the education system needs to be

adequately filled with ICTs. Education personnel including students too need to be ICT literate for the system to effectively function.

### **Recommendations**

The struggle to be part of the digital world is obvious in the knowledge society. The challenges of collaborative learning as well as blended learning are all the offshoot of ICTs in the education system. These innovations demands that;

- a. Government and infact education authorities should endeavor to provide ICTs in schools.
- b. ICT skills should be made a priority in secondary schools.
- c. ICT resources centers should be established in all local education authorities.
- d. ICT resources should be properly funded in all institutions.
- e. There should be clear government legislation/policy for ICT use in education.

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