TRANSFORMATION OF ICT USAGE FOR EFFECTIVE HIGHER EDUCATION

By

Saviour Donatus
Department of Computer Science,
College of Education,
Afaha Nsit.

And

Doris Asuquo
Department of Computer Science,
College of Education,
Afaha Nsit.

Abstract

Information and Communication Technology (ICT) are increasingly becoming a crucial part of the education system. This paper is considering the rapid spread that ICT applications have brought about markedly drastic technological, social and economic transformations. The sustainability of a nation in this era of knowledge economy depends on the effective educational system. Productivity is an economic concept where productivity is considered as the comparative analysis of inputs and outputs. The proper integration of ICT with teaching/learning environment increases education and increased productivity. The growing use of ICT will change many of the strategies employed by both Teachers and Students in the learning process. ICT has enabled educators to monitor and evaluate what is learned, how it is learned and when and where learning took place. ICT also work for non-traditional students by providing internet based education to them anytime and anywhere and these internet technologies enable innovative ways of teaching.

Key words: ICTs, ICT-based / virtual education, Distance education, Higher education.

Education is the backbone of a nation. The Education system plays a major role in the development of modern economies. Understanding how the education system

works and how it evolves over time, has been one of the most important research agendas in recent years.

The education system of any country performs the following main tasks: first, it handles the basic and higher education; secondly, it provides better opportunities of income; thirdly, it enhances the living standard and helps in social development.

Information, Knowledge, and Communication Technology play vital roles in imparting education in the modern scenario. At the height of the Internet boom of the 1990s, a fashionable saying was that "the Internet changes everything." The ICT changed the way of imparting education in modern era. Higher education in India has seen the massive growth in post-independence era. At the time of independence 17 universities and about 400 colleges were there in India and today 520 universities, nearly 22,000 colleges and over 10 million students, 0.45 million teachers and one of the largest higher education system in the world. Their education system focuses on the creation of high quality and well trained human resources to satisfy the need of ever growing Indian economy, but on the other hand it faced challenges at its operational level. Educational governing bodies like University Grant Commission (UGC), All India Combined Entrance Test (AICET), India Council of Medical Research (ICMR), India Council of Agricultural Research (ICAR), all posse difficulties in maintaining proper coordination, administration, monitoring and evaluation for improving the quality of education and also imparting the educational knowledge (Altbach,1991).

The role of Information and Communication Technology (ICT) plays a great role in strengthening the three traditional branches that make up the mission of higher education i.e teaching, research and service to the society (Guruz, 2011). ICT changed the style of functioning of the educational system and its governance with the help of digital data, its storage, retrieval, manipulation and transmission. ICT works in three ways, viz (i) communication and decision implementation, (ii) automating tedious task, and (iii) supporting new and existing tasks and processes.

ICTs can process information, create knowledgebase and make them available wherever and whenever necessary. Information and Communication Technologies (ICTs) in most cases have tremendous success in providing services at reduced costs to the people's door steps. ICTs have the same to do for making the higher education available to all classes of people throughout the country at a lower cost. As a result, on one hand, people will have the access right to higher education and on the other hand will gain the necessary knowledge, skills, and experiences to serve the nation and prosper accordingly.

In this 21st century, one can hardly find a country where higher education through distance mode is not available. In fact, it has been practiced since 1840 in London pioneered by Sir Isaac Pitman (AIP). But at present, with the revolution in ICTs,

the higher education through distance mode, has been more practical and well accepted by all people around the globe. It is now being called Virtual learning. In developed countries, people are getting more interested in learning through Virtual Campus than that of a Brick-and-Mortar Campus. Virtual Campus is nothing but ICT enabled campus, where students are attending their classes, discussing with teachers, accessing learning resources, seating exams, joining forums/clubs, submitting assignments etc. virtually having the facility of real-time interactions between teacher and students.

ICT is defined as new information-processing and information-transmitting technologies that include computer-related commodities and technologies such as broadcasting and wireless mobile telecommunications etc. Personal computer (PC) that connects Internet has become a vital tool for communication during the past few decades since its proliferation among the masses. It is observed that penetration of ICT is faster in developed nations rather than developing nations. The penetration of ICT can be linked to socio-economic conditions of a nation such as education, freedom of information exchange, promotion of basic telecommunications infrastructure and market.

Definition of Terms:

ICTs stand for Information and Communication Technologies.

According to Blurton (1990), ICT is defined as "diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information". Technologies included in ICTs are: Radio and Television (broadcasting technology), Telephony, Computers, and the Internet.

E-Learning: The delivery of learning, teaching or education program by electronic means. It involves the use of computer or electronic devices in some way to provide training, educational or learning material. (Derek, 2003).

Open and distance learning: The general term for the use of telecommunication to provide or enhance learning. It can also be defined as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance (Derek, 2003).

ICT has extended the scope of offering educational programmes at a distance. The off-campus delivery was an option for students who were unable to attend the classes regularly. Today, many students are able to make this choice through technology facilitated learning settings. This make available the education everywhere. It is time and cost saving also. The major benefit of ICT implementation in education is in extending courses of choice to students of different backgrounds, cultures, perspectives. Learners are free to participate in learning activities at their convenience through online technologies.

Teleconferencing refers to "interactive electronic communication among people located at two or more different places." There are four types of teleconferencing based on the nature and extent of interactivity and the sophistication of the technology. They are 1) audio conferencing; 2) audio-graphic conferencing, 3) videoconferencing; and 4) Web-based conferencing.

Audio conferencing involves the live (real-time) exchange of voice messages over a telephone network. When low-bandwidth text and still images such as graphs, diagrams or pictures can also be exchanged along with voice messages, then this type of conferencing is called audio-graphic. Non-moving visuals are added using a computer keyboard or by drawing/writing on a graphics tablet or whiteboard. Videoconferencing allows the exchange not just of voice and graphics but also of moving images. Videoconferencing technology does not use telephone lines but either a satellite link or television network (broadcast/cable).

Web-based conferencing: as the name implies, involves the transmission of text and graphic, audio and visual media via the Internet. It requires the use of a computer with a browser and communication can be both synchronous and asynchronous.

The Objectives of this paper are:

i) To look at ICT-based higher education by the use of different technologies.
ii) To investigate the current status of ICT-based higher education and its useful implementation in imparting the education.
iii) To suggest means of transforming ICT usage for effective learning/teaching.

Methodology

The study is descriptive in nature and therefore the information presented is based on secondary data. Secondary information has been collected from various documents such as books, newsletters, reports, magazines, journals, daily newspaper, WWW, to understand the uses of ICTs for offering various levels of higher education in the countries.

Literature Review

ICT consists of IT as well as telephony, broadcast media, and all types of audio and video processing and transmission. The expression was first used in 1997 in a report by Dennis Stevenson to the UK government and promoted by the new National Curriculum documents for the UK in 2000.

Sometimes used with technologies in the plural. Originally, only information and communications technology (with communications in the plural) was considered correct since ICT refers to communications (in the sense of a method, technology, or system of sending and receiving information, specifically telephone lines, computers, and networks), not communication (the act of sending or receiving information by

speaking, writing, phoning, emailing, etc. or a message containing such information), and the older form (information and communications technology) is still the only one recorded in professionally edited reference works (e.g. Oxford Dictionaries Online, Computer

Desktop Encyclopedia, Webopedia, and Encarta® World English Dictionary) and preferred by many style guides (e.g. Editorial Style Guide of the Republic of South Africa. Nevertheless, the form "information and communication technology" is becoming increasingly common and is now used in about half the books that can be searched using

Google Books and is for example also used by the International Telecommunication Union.

The quality and quantity of the skilled manpower determine the competency of economic leadership of any world society in the global market. Education is necessary for any nation for its social and economic growth. There are a number of regulating agencies for higher education in India, which leads to duplication of procedures causing immense loss of time and resources. In concern with funding process in educational institutions takes lots of time due to manual verification. So here ICT have played a vital role by providing an option like online payment. (Wikipedia)

The use of the term **Technology** has changed significantly over the last 200 years. Before the 20th century, the term was uncommon in English, and usually referred to the description or study of the useful arts. The term was often connected to technical education, as in the Massachusetts Institute of Technology (chartered in 1861).

"Technology" rose to prominence in the 20th century in connection with the second industrial revolution. The meanings of technology changed in the early 20th century when American social scientists, beginning with Thorstein Veblen, translated ideas from the German concept of Technik into "technology". In German and other European languages, a distinction exists between Technik and Technologies that is absent in English, as both terms are usually translated as "technology." By the 1930s, "technology" referred not to the study of the industrial arts, but to the industrial arts themselves.

ICTs are used as productivity tools or enrichment resources; this generally means that they support the traditional teacher-led mode of instruction in subject areas such as math, language, social studies, or science. Transformative applications of ICTs refer to non-traditional emerging uses where exposure to and distribution of ICTs fundamentally changed the way education is conceived and delivered to students. ICTs are enablers that optimize student-centered instructive methods. They are used to develop broad, generic skills such as problem solving, independent and collaborative

learning, and communication. They lead to more individualized instruction, less educational delivery, and an emphasis on problem-solving and cooperative learning situations.

Teachers assume the role of facilitators and skills developers. They help the students achieve a greater understanding of information by making use of new technologies. In the past educational institutions have provided little choice for students in terms of the method and manner in which programs have been delivered. Students have typically been forced to accept what has been delivered and institutions have tended to be quite staid and traditional in terms of the delivery of their programs. The use of ICTs provides many options and choices and many institutions are now creating competitive edges for themselves through the choices they are offering students.

Description of ICT separately:

Information, in its most restricted technical sense, is an ordered sequence of symbols. As a concept, however, information has many meanings. Moreover, the concept of information is closely related to notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception, and representation.

Communication is a process whereby information is enclosed in a package and is channelled and imparted by a sender to a receiver via some medium. The receiver then decodes the message and gives the sender a feedback. All forms of communication require a sender, a message, and an intended recipient; however the receiver need not be present or aware of the sender's intent to communicate at the time of communication in order for the act of communication to occur. Communication requires that all parties have an area of communicative commonality. There are verbal means using language and there are nonverbal means, such as body language, sign language, paralanguage, haptic communication, chronemics, and eye contact, through media, i.e., pictures, graphics and sound, and writing.

In 1937, the American sociologist Read Bain wrote that '**Technology** includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them". Bain's definition remains common among scholars today, especially social scientists. But equally prominent is the definition of technology as applied science, especially among scientists and engineers, although most social scientists who study technology reject this definition.

More recently, scholars have borrowed from European philosophers of "technique" to extend the meaning of technology to various forms of instrumental reason.

Integration and application of these three techniques in education for enhancement of productivity of education is termed as effective educational technology and methodology of teaching. ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse 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 telephony. In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings.

But ICTs are more than just these technologies; older technologies such as the telephone, radio and television, although now given less attention, have a longer and richer history as instructional tools. For instance, radio and television have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries. The use of computers and the Internet is still in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access. Moreover, different technologies are typically used in combination rather than as the sole delivery mechanism.

ICT in Teacher Education

Globalization and technological change - processes that have accelerated in tandem over the past fifteen years - have created a new global economy "powered by technology, fuelled by information and driven by knowledge." The emergence of this new global economy has serious implications for the nature and purpose of educational institutions.

As the half-life of information continues to shrink and access to information continues to grow exponentially, schools cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, schools must promote "learning to learn," i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime. "The illiterate of the 21st century," according to futurist Alvin Toffler," will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn." Concerns over educational relevance and quality coexist with the imperative of expanding educational opportunities to those made most vulnerable by globalization—developing countries in general; low income groups, girls and women, and low-skilled workers in particular. Global changes also put pressure on all groups to constantly acquire and apply new skills.

The International Labour Organization defines the requirements for education and training in the new global economy simply as "Basic Education for All", "Core

Work Skills for All" and "Lifelong Learning for All". Information and communication technologies (ICTs) - which include radio and television, as well as newer digital technologies such as computers and the Internet - have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life. However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past several decades suggests that the full realization of the potential educational benefits of ICTs is not automatic. The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology - indeed, given enough initial capital, getting the technology is the easiest part! - but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others.

ICT-Based Higher Education / Online Education

In recent times factors have emerged which have strengthened and encouraged moves to adapt ICTs into classrooms and learning settings. There are a good number of western universities/institutions offering ICT-based higher education successfully with quality for decades. ICT is now changing the way of education in India and abroad, with the help of internet one can access anywhere anytime. Now in India and also in western countries the higher education is becoming more advanced than before. The recent example is the commencement of online test for common admission test for management students. Other tests like GMAT, GRE also held online as they are the higher level quality exams.

In Asia, the 44 radio and TV universities in China (including the China Central Radio and Television University), University Terbuka in Indonesia, and Indira Gandhi National Open University in India have made extensive use of radio and television, both for direct class teaching and for school broadcasting, to reach more of their respective large populations. Japan's University of the Air was broadcasting 160 television and 160 radio courses in 2000. Each course consists of 15-45-minute lecture broadcasts nationwide once a week for 15 weeks. Courses are aired over University-owned stations from 6 am to 12 noon. Students are also given supplemental print materials, face-to-face instruction, and online tutorials.

Findings

ICT-based higher education is popular for those who want flexibility in the learning process so that one can do both study and work together The study reveals that respondents find ICT-based higher education in terms of technical support as quite adequate. Quality of higher education can be maintained through ICTs means in comparison with face to face conventional learning.

The outcome of each technology varies according to how it is used. Delivery of instruction and its reception by learners, online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based education can be offered regardless of time and space. ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, each of the different ICTs - print, audio/video cassettes, radio and TV broadcasts, computers or the Internet.

Educational programming consists of a broad range of programme types - news programs, documentary programs, quiz shows, educational cartoons, etc. - that afford non-formal educational opportunities for all types of learners. In a sense, any radio or TV programming with informational and educational value can be considered under this type.

Some notable examples that have a global reach are the United States-based television show Sesame Street, the all-information television channels National Geographic and Discovery, and the radio program Voice of America.

Importance of Teacher with ICT:

The most obvious advantage of using information technology in teaching and learning is the flexibility for learners to get access to computers. Now that computers have become common, learners can get access to the Internet and engage in study at any time, any place and at their own pace. This is the reason why distance learning has become so common nowadays. Another advantage of information technology is its versatility. Other than just sounds, computers can produce colourful graphics, which will greatly enhance the learning outcome as learners will retain the majority of what is taught through sights rather than sounds. Besides, compared with humans, computers have absolute superiority in generating attractive graphics. In a nutshell, a picture is worth more than a thousand words. Besides, computers can provide instant feedback to learners when they are doing exercises or practicing.

In addition, it is difficult for a teacher to monitor the performance or progress of students during the lesson. Supervising more than forty students' activities through a central monitoring system is not as easy as it seems. There are always some naughty students in class who will not follow the instructions of teachers. In the end, teachers may have to be forced to walk around the classroom to supervise students. Next is the problem of interactions. Teaching and learning involve a lot of human interactions. This is especially so in language teaching and learning. One can hardly imagine learners can pick up a language entirely through the interactions with some cold machines like computers.

Human interactions do not rely solely on the uttering of sounds. Other factors include subtle variations in facial expressions, gestures, postures, eye contacts, the number and type of people involved, the setting and so on. A machine can never cope

with all these, whereas an experienced teacher can do so with ease. There is no doubt computers can provide instant feedback to learners. However, the type of feedback is limited to simple answers and pre-set comments. They are useful only for low-level questions. Questions that ask for more complex skills from students like note-taking, summarizing, giving comments and so on can never be handled by computers. To sum up, information technology can aid teachers in producing desirable learning outcomes.

Means of Transforming ICT Usage in Higher Education

Laudon and Laudon (2010) state that the most important drive behind globalization has been the explosion in Information and Communication Technologies (ICT) sectors. For effective learning/teaching, ICT usage can be enhanced in the following ways;

- **Mobile Learning:** New advances in hardware and software are making mobile "smart phones" indispensable tools.

- **Cloud computing:** The implications of this trend for education systems are huge; they will make cheaper information appliances available which do not require the processing power or size of the PC.

- **One-to-One computing:** The trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology.

- **Ubiquitous learning:** School systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere".

- **Gaming:** The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.

- **Personalized learning:** Education systems are increasingly investigating the use of technology to better understand a student's knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles.

- **Redefinition of learning spaces:** Schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning.

- **Teacher-generated open content.** OECD school systems are increasingly empowering teachers and networks of teachers to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their own purposes,

so that their students receive a tailored copy that exactly suits the style and pace of the course.

- **Smart portfolio assessment.** The collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches.

- **Teacher managers/mentors.** The role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning pathways.

Conclusion

The ICT has become indispensable and will remain so with the growth of higher education and the civilization in future. At the same time care must be taken by the governing authorities for proper control and licensing to ensure quality, accountability and certification in higher education.

Information and communication technologies (ICTs) are a major factor in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. They have produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. They also have the potential to transform the nature of education-where and how learning takes place and the roles of students and teachers in the learning process.

Teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. For education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. Teacher education institutions and program must provide the leadership for pre-service and in-service teachers and model the new pedagogies and tools for learning. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country. To accomplish these goals, teacher education institutions must work closely and effectively with teachers and administrators, national or state educational agencies, teacher unions, business and community organizations, politicians and other important stakeholders in the educational system. Teacher education institutions also need to develop strategies and plans to enhance the teaching-learning process within teacher education programs and to assure that all future teachers are well prepared to use the new tools for learning.

ICTs are indispensable to the functioning of modern societies, these same technologies are equally indispensable to learning institutions, Students and professors should address this change in our society as a chance to improve our educational

practices in order to achieve an education with quality. The changing role of teachers, as seen before, is an essential part of this changing process. Their role should turn to be that of a "guide of learning" better than being a "font of knowledge". As ICT are incorporated in education, the trend of a classroom and textbook based educational system is becoming more and more outdated.

It can clearly be seen that the education system should change to adapt to modern requirements and to incorporate new technologies. By incorporating these technological trends into the educational system a higher quality education can be provided at a cheaper cost and spread over a larger segment of the population.

References

Altbach, P. (1991) Patterns in Higher Education Development Toward the year 2000. Review of higher education, 14(3), 293

Anderson, J. (2010) ICT transforming Education. A regional guide. Bangkok: UNESCO.

Anderson, J. & Van Weert, T. (Eds). (2002) *Information and Communication Technology in Education: A Curriculum for Schools and Programme of Teacher Development*. Paris, UNESCO. http://unesdoc.unesco.org/ images/0012/001295/129538e.pdf (Accessed 28 Feb, 2016).

Blurton C. (1999). New directions of ICT-use. Retrieved on 24(1999): 2012.

Definition of technology, Merriam-Webster. http://mw1.merriam-webster.com Retrieved 2007-02-16.

Dennis P. (2002*). Information Technology – The Breaking Wave*. New York: Tata McGraw-Hill Publishing Company Ltd.

Floridi, L. (2006) Information – A Very Short Introduction (Oxford University Press). [ruct/Communications/default.aspx "communication"]. *Office of superintendent of Public Instruction*. Retrieved March 06, 2016.

Graham, C. Blended learning systems. Definition, current trends, and future directions. Inc.

J. Bonk. & C. R. Graham (Eds),(2006) *The Handbook of Blended Learning: Global Perspectives, Local Designs* (pp. 3-21). San Francisco: Pfeiffer.

Giddens, A. (2001). *Sociology*, 4th Ed. London: Blackwell.

Guruz, K. (2011) Higher Education and International Mobility in the Global Knowledge Economy. Revised and updated 2nd SUNY PRESS.

Littlejohn, Allison, Margaryan, Anoush & Vojt, Gabriele.(2010) Exploring Students, use of ICT And Expectations of Learning Methods. *Electronic Journal of e-Learning* Volume 8 Issue 1 2009, (pp13 -20), available online at www.ejel.org.

Laudon, Kenneth C. & Laudon, Jane P. (2010) *Management Information Systems*. Eleventh Edition. Pearson Global Edition. New Jersey: Upper Saddle River.

Oliver, R. (2000). Creating Meaningful Contexts for Learning in Web-based Settings Proceedings of Open Learning, 2000, (pp 53-62) Brisbane: Learning Network, Queensland.

Pelgrum, W.J. (2001) Obstacles to the integration of ICT in education: results from a worldwide educational assessment. Computers & Education, Volume 37, Issue 2, September 2001, Pages 163–178.

Popkewitz. T.(2000) Educational Knowledge. Changing Relationships between State, Civil Society and the Educational Community. New York: State University of New York Press.

The Commonwealth of Learning, "An Introduction to Open and Distance Learning"; available from http://www.col.org/ODLIntro/introODL.htm; accessed 14 August 2002.

Victoria L. Tinio. (2003). ICT in Education, http://www.scribd.com/doc/2999093/ ICTin- Education-by-Victoria-L-Tinio, viewed on 25 June 2009.

www.col.org/ODLIntro/introODL.htm