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Impact of Information and Communication Technology (ICT) on the Teaching of Arts, Humanities, and Science Subjects in Nigerian Schools

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Abstract

The paper focuses on the impact of *Information and Communication Technology* (ICT) in Nigerian schools. Information Communication Technology *has had a significant impact on* teaching and learning processes all over the *world*. The paper examines the use and role of ICT in primary, secondary and tertiary institutions. *Some of the benefits of using ICT* at all stages in Nigerian education *provides opportunities* in primary, secondary and tertiary education. It improves educational outcomes, *reduces inequities* between groups, facilitates communication between teachers and students, facilitates access to *up-to-date information* irrespective of geographical location and time. Despite the benefits of ICTs in Nigerian schools, *the following factors inhibit its use*: unavailability of some ICT components in schools, limited or poor information infrastructure, inadequate ICT facilities in schools, *frequent electricity interruptions*, *weak ICT policy implementation strategies*, inadequate ICT manpower in the schools and high cost of ICT facilities. However, *a qualitative survey and exploratory research design were adopted to elicit relevant data on the subject matter.*

Keywords: Evaluation, ICT, AHS, Stages and Nigerian Education

I. Introduction

The world is rapidly becoming a global village due to the advent of Information and Communication Technology (ICT), which has gained widespread application in diverse fields of human endeavour such as accountancy, agriculture, aviation, banking, commerce, communication, culture, entertainment, education, global security, journalism, librarianship, research, science, socialisation, sports technology, and related areas. However, the adoption of computers and microcomputers in education has been relatively recent compared with their earlier application in science and technology, even in developed countries. The effective integration of Information and Communication Technology into educational practice is even more recent in developing countries such as Nigeria. Consequently, the advantages of Information and Communication Technology are often acknowledged only rhetorically, as ICT has not yet gained widespread and effective application in Nigerian schools. Moreover, computers remain relatively scarce in many Nigerian schools, despite the widespread recognition that ICT is indispensable for achieving educational goals through effective teaching and learning.

Concept of Information and Communication Technology (ICT)

The integration of telecommunications and computer systems in the late twentieth century led to what is now referred to as Information and Communication Technology (ICT). Information and Communication Technology pervade modern society to such an extent that many countries now regard proficiency in ICT as essential for effective participation in contemporary life. Technology is a core element of basic education, alongside literacy and numeracy; however, ICT is more than merely another subject for students to study. ICT is a valuable tool for enhancing the quality of teaching and learning. For example, radio programmes used in classrooms can provide engaging and relevant content in subjects such as Geography, History, Chemistry, Biology, and English, while computer simulations and visualisation technologies can help students understand complex concepts more concretely. The world is increasingly becoming a global village as a result of rapid developments in information and communication technology. The computer remains a key instrument driving this process of globalisation. Computer-mediated communication is increasingly becoming a defining feature of everyday life, particularly in developed countries and some developing economies. ICTs are computing and communication facilities and features that variously support teaching, learning and a range of activities in education. For example, the use of broadcast materials or CD ROM as sources of information and microcomputer with appropriate keyboards and other devices to teach literacy and writing.

In many primary and secondary schools including some tertiary institutions chalkboards or markboards, textbooks, charts and seldom, radio and television are still being used as instructional materials. The use of computer for instruction is still a mirage. Therefore, information and communication technologies that are already of common usage in the developed countries for educational purposes should also be embraced in Nigeria, particular the computer. The use of computer today has made the whole world to be a "global village". Moreso, computer performs host of functions in teaching and learning.

Faloye & Opara (2007) identified six ways through which ICT can facilitate teaching:

- It transforms and helps lecturers to be more effective and hence, it promotes lecturer's enthusiasm in teaching.
- It can assist in the organization and structure of the course and the course materials, thereby promoting a rethink and revision of curriculum and instructional strategies.
- It increase lecturers' emphasis on individualized instruction as it allows them to spend more time with individual students, with less time for lecturing to the whole class, thereby, involving students to carry out more independent work.
- It provides a multimedia presence in the classroom as it affords lecturers the opportunity to experiment with emerging technologies, thereby, facilitating the provision of interesting and creative presentation of content.
- It provides increased opportunities for lecturers to collaborate and network with colleagues on the one hand and with parents and the outside world on the other hand.
- It provides more time and resources for lecturers (course advisers in particular) to advise students.

The Advent of Information and Communication Technology

Information has always played a very important part in human life. However, in the mid-20th Century, the role of information increases immeasurably as a result of social progress and the vigorous development in science and technology. No wonder why Chukwudi, Nina and Nike (2009) writing on the emergence of Information and Communication Technology (ICT) submitted that ICT pervades in all aspects of human

life, and as such reduced the world into becoming a global village. The application of ICT is multiple and complex, hence, it has been viewed in different perspectives as a result of this complexity. The World Bank defines ICT as "the set of activities that is facilitated by electronic means, the processing, transmission and display of information". According to Ogunsola and Aboyade (2005), ICT includes the traditional and modern technologies of disseminating information. In defining ICT, Chowdhury (2000) states that:

> ICT encompasses technologies that can process different kinds of information (voice, audio, text, and data) and propitiates different forms of communication among human agents and among human and information systems.

They are about capturing, storing, processing, sharing, displaying, protecting and managing information. ICT also includes electronic networks embodying complex hardware and software linked by a vast array of technical protocols. ICT refers to a convergence of technologies which enable improvement in one area to translate to a more efficient usage in another. The information age has made the world a global village such as information can easily be shared, no matter where one is (Erwat, 2007). The effect of this is that peoples' lives are being influenced in almost every aspect. According to Erwat (2007), the information revolution is in its second phase. The first information explosion resulted in the invention of the printing press. Today the world is in the middle of a second "information technology revolution". The digital information technologies, which use binary digits to represent all information, are replacing the printed word technologies. In the process, people's lives are being transformed. Information, therefore, is power; it is power to influence, control or produce. Information is the basis of everything a person does. Information is considered today as one of the basic needs of people after air, water, food and shelter (Cambie, 1992). Information is not a luxury; it is essential for survival. Technology basically is a systematic and integrated organization of man, machines, ideas and procedures to achieve a designed goal (Abimbade, Aremu&Adedoja, 2003). The introduction of computer, which is the major and most influential technology of the last millennium, has made the impact of technology felt in every sector. Today, people talk of information technology, information communication technology and so on. Igbafe (2002) defines Information Technology (IT) as computers and other forms of technology that both share and generate information which can be transmitted widely by electronic means. ICT includes all the technologies used to transmit or disseminate information to an audience. These cover internet service provision, telecommunication equipment and services, information technology equipment and services, media and broadcasting, commercial information providers, and other related information and communication activities, International Network. According to Okwilagwe and Njoku (2002), ICT includes the traditional and modern technologies of disseminating information. The traditional ICT products are the printed page, radio, television, films and so on, while the modern technologies include e-mail, voice mail, FAX, Internet, electronic bulletin boards and cellular telephones, among others.

Communication is essentially central to every human activity. In the same vein, any facility that enhances the communication process is also regarded as vital to human existence. This underscores the relevance of Information and Communication Technologies (ICTs) in any given society as facilities for normalising, enhancing and improving the communication process in that society. It is a known fact that ICTs have greatly affected the existence of man on earth. As Onwubualili (2004) puts it, "the magical changes are quite glaring in every facet of our lives and touch the simplest of domestic service to corporate and limitless industrial applications". In every aspect of life in the society, ICTs are seen to be at work, facilitating communication for the purpose of development, innovation, adoption behavioural change of all shades, and improvements in every aspect of human endeavour. Information and Communication Technologies are being applied in the areas of advertising, banking, commerce, public relations and for other promotional

objectives. The advent of computer and internet technology gave rise to such things as e-commerce, e-banking, e-marketing, among others. Today, there exists what is known as e-Public Relations. It is a fact today that corporate reputation management for organization existing in any modern society requires effective application of ICTs for result to be achieved. Electronic, ICT-driven or digital-mediated knowledge, activities and strategies have become key imperatives for any organization in today's very slippery, competitive and globalized socio-economic development (Nwosu, 2004).

III. Relevance of Information and Communication Technology and Computers to Education.

Generally, the use of computers and information technology in Education has been increasingly acknowledged as veritable means of imparting knowledge. Though its introduction started gradually, it has gained appreciable momentum. Over the years educators have identified the relevance of information and technology to effective teaching and learning especially in this 'information age' during which new methods of teaching which depend solely on computers and information technology are in vogue. Aderogba (2007) was of the view that ICT is of immense contribution to the school curriculum because:

- It accelerates and deepens students basic skills in any school subject, especially reading, mathematics and the sciences
- It challenges students to learn to be independent and hence be responsible
- It helps to update students' academic knowledge and instructional practices
- It prepares the individual learners to economically survive and become productive in tomorrow's world of work that depends on ICT
- Teachers are provided with efficient and effective means to take care of students' individual differences.
- It provide an opportunity for close co-operation with colleagues in the same or even other countries through networking and internet services.
- It creates an avenue for educators all over the world to create and share knowledge.
- It provides teachers and students with free access to relevant information and development in different subject areas, while allowing them to contact other experts, peers and policy making institution easily.

The application of ICT in education obviously has a remarkable impact especially in removing conventional beliefs which tend to limit effective teaching and learning to the physical presence of a teacher. The use of ICT tools enable learners to gain free access to educational materials which enable them to learn at their own pace without the personal attention of teachers to individual students. Studies have shown that the use of Computer Assisted Instruction (CAI)a method which depends largely on ICT, leads to achievement effects which are superior to those obtained with traditional instruction alone. Computer Based Education (CBE) approaches led to higher achievement than traditional instruction by itself (Bangert-Drowns, Kulik and Kulik, 1985). Another relevance of Information and Communication Technology to Education is that it enhances learning rates. ICTs have been acknowledged to promote faster learning rates among students than conventional instruction (Bangert-Drowns et al 1985). Yet another merit of ICT in Education is that apart from ensuring faster learning rate among students, ICT also ensure that students enjoy higher retention of learning compared to conventional methods of teaching alone. Hadley and Sheingold (1993) in their study of American teachers who had used ICT in teaching discovered that students learn better using computers which make learning more real and practicable thereby increasing motivation in students and teachers alike. The study further revealed that the integration of ICT into education created more challenging goals to learners and enables them to learn independently. It was

reported that "integrating the computer has turned a teacher centered classroom into a student-centred one, with the teacher acting more as a coach than information dispenser, and with more collaboration and work in small groups going on" (Hadley and Sheingold 1993). Ruthven, Hennessy and Brindley (2004) while commenting on extent to which ICT, can be of advantage in fostering pupil independence and peer support declared that "... teachers identified a contribution of ICT use to creating opportunities for pupils to exercise greater independence, share their expertise and provide mutual support". The study observed that students develop affinity and confidence with ICT which ICT which they willingly share with other students who publicly acknowledge their expertise thereby creating a new classroom culture. Use of ICT, especially Computer Assisted Instruction (CAI) has also been found by many researchers to lead to the development of more positive students' attitude towards computers, course content, school, self and others than the use of conventional instruction. Another benefit of ICT in Education is that students in classes in which Computer Assisted Instruction has been used tend to have more of sense of self-efficacy than conventionally instructed students (Lopez and Harper 1989). It was also discovered that students attend classes better when ICT is being used than when conventional methods of teaching are applied. Furthermore, ICT facilitates effective teaching to most handicapped students like the learning disabled, mentally retarded, hearing impaired, emotionally disturbed and language disordered compared to conventional methods of teaching.

While identifying the benefits of ICT to education, Akinyede and Alonge (2007) conclude that ICT facilitates communication, helps in building and exploiting information bases, facilities interaction in resource, help in delivery of education resources and motivates learners. It is obvious that the merits of ICT cannot be over-emphasised in the Nigerian education system if the nation must match up with other countries of the world in which ICT has found its relevance in Education as well as other spheres of life.

IV. Government Integration of ICT into Teaching and Learning in Nigerian Education

Computer education stands out as one major pre-vocation elective subject at the elementary School level of education while at the higher level, it happens to be one of the vocational elective (FRN, 2004). This is in line with the need for individual and Nigerian society at large to keep abreast of developments in other parts of the world in which computers feature as tools for daily living.

The basic essence of using technology in education is to serve a dual purpose. In the first instance, it is meant for acculturation in order to prepare learners for technologically oriented world early in life by exposing them to forms of ICT in their education, thereby creating a new culture of information technology for the youths. On the other hand the use of ICT would stimulate learners' interest, spirit of co-operation and independence in learning. Faloye and Opara (2007) highlighted the fact that the Federal Government in line with her acknowledgment of widespread disadvantages in competition with the developed nations in terms of ICT has adopted several moves itemized by Aderogba (2007) in Faloye and Opara (2007) which include the following:

- The implementation of the New National Telecommunication Policy in September 2000, to liberalize the sector.
- The implementation of ICT as a national priority project.
- The approval of National Policy on Information Technology and establishment of the National Information Technology
- Development Agency (NITDA) in March/April 2001.

- The implementation of the National Space Research and Development Agency (NARSRDA) for Nigerian Satellite System.

Barriers to Effective Integration of ICT in the Nigerian Education

Although it is an accomplished fact that primary, secondary tertiary institutions worldwide are pre-occupied with "technology integration" (Ruthven et al, 2004), the effective integration of ICT into Primary, secondary and tertiary institution education has continuously suffered serious setbacks. These are more pronounced in developing countries such as Nigeria as a result of complexities emanating basically from the economy and other environmental and cultural factors. While students' access to technology at school and at home in advanced countries like US, Australia and Great Britain has increased astronautically (Ruthven et al, 2004), the same cannot be said of developing countries which grapple with multifaceted social and economic problems. Some problems which limit effective use of ICT in Nigerian education system include:

Financial Limitation: - This is a major constraint to the effective use of ICT in Nigerian primary, secondary tertiary institutions. Already, a rather high proportion of the nation's budget is believed to be channeled into the education sector. Therefore it becomes very difficult and almost impossible to embark on such a capital intensive project which might require the supply and maintenance of expensive ICT tools to secondary schools.

Lack of Adequate Internet Connectivity and Network:-This is a major hindrance to ICT use in Nigerian primary, secondary tertiary institutions because thin band-width and inefficient land lines are predominant means of accessing the internet. This makes internet unavailable, expensive and inefficient especially in rural areas.

Policy Issues:-Aderogba (2001) is of the opinion that the formulation and implementation of policies in the ICT sector is still very rudimentary and calls for an integration, set of laws, regulation and guidelines that can shape the generation, acquisition and utilization of ICT.

Poor Scientific and Technological Culture:-Nigerians lack adequate scientific and technological orientation which would ordinarily enhance the rate at which use of ICT is embraced by different strata of society.

Poor Supply of Electricity:-This is a major bane to widespread use of ICT in Nigeria. Energy supply is mostly irregular in urban centres or worse still, inexistent in rural areas. This limits consistent use of ICT tools in Education

Inadequacy of Trained Technical Support Staff:-The cost of training and sustaining technical support staff for all primary, secondary tertiary institutions is prohibitive. Hitherto there is a dearth of ICT teachers in Nigerian Education.

Training of Human Resources: Teachers are not regularly exposed to training and retraining exercise in order to learn the use of ICT tools in effective pedagogy.

V. Conclusion

This work explored the impact of Information and Communication Technology (ICT) on the teaching of arts, humanities, and science subjects in Nigerian schools. It argued that the use of ICT

in teaching and learning process in schools cannot be over-emphasized, meaning that it must be available and used by students, teachers or lecturers in various levels of education in Nigeria to benefit from the various opportunities being provided.

Recommendations

The paper therefore recommends the following as a means of enhancing the use of ICT in Nigerian schools:

- School Net programme embarked upon by the government should be restructured and competent personnel to be appointed to make it a reality,
- Adequate funds should be allocated and released to schools to acquire ICT infrastructures by State and Federal governments,
- Computer laboratory in primary, secondary and tertiary institutions in Nigeria should be well equipped with both human and material resources,
- Computer courses should be made compulsory for undergraduate students with emphasis on practical
- Teachers in various schools in Nigeria should be computer literate.

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