THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND HIGHER EDUCATION IN SUSTAINABLE DEVELOPMENT

Mary O. Aibangbe
Department of General Studies Education,
Federal College of Education, Kano,
Kano State.

Abstract

Information and communication technologies (ICTs) can be one of the strongest enablers in efforts to bring about positive and sustainable development in all the countries of the world in general and Nigeria in particular. Hence this paper examined the role of ICT and higher education in sustainable development in Nigeria. It aimed at understanding the need for ICT in higher education for sustainable development. ICTs provide new ideas to students and teachers to enhance the teaching and learning processes and researches in higher institution for development. This paper also deals with the clarification of concepts, higher education as an actor for sustainable development in the society, the role of ICT in sustainable development, challenges facing ICT and higher education in Nigeria that impede sustainable development, conclusion and recommendations.

Keywords: Information and Communication Technology (ICT), Higher Education, Sustainable Development.

The development of any nation is usually measured by the degree and extent of the socio-cultural, socioeconomic, and political improvement that are brought to bear through the integration of science, technology and mathematics. Sustainable development leads to fulfillment of societal ideals considered relevant to the needs and aspirations of the society (Olorundare, 2007). Factors, which influence such developments, are based on human ability to explore, invent, and utilize. Satisfaction of spiritual, physical and material needs and the mastery of the environment are benchmark of development when applied to the human society. It has been stated by several authors and scholars that the development of any nation depends very much on the advancement and application of science and technology (Nwabueze & Ozioko,

2011). The role of science in the development of modern societies is not in dispute more so now that the influence of modern technological innovations is far reaching in every sphere of man's life. If Nigeria is to build an organized, self-reliant, and technologically compliant society, much emphasis has to be continually made on science and technology (Nwabueze & Ozioko, 2011).

There is no doubt that Information and Communication Technology (ICT) has found its niche in every sphere of Nigeria's polity. ICT has become, within a very short time, one of the basic building blocks of modern society. ICTs have successfully changed the social, economic and political spaces globally. Through globalisation, ICTs have reduced the world to a global village. ICTs have enabled the globalised world become greatly interconnected, interdependent and without borders (Salawu, 2008). ICTs are changing the world rapidly, creating a distance-less and borderless world of instantaneous communication (Spence & Smith, 2009).

The impact of ICTs has virtually diffused through all sectors, forcing technological changes and creating a culture of dependence on technology (Patrick, Imhonopi, & Urim, 2014). ICTs have been reported to have played a significant role in redefining education across the sequential system of Nigeria education. It has brought massive regeneration and energy to teaching, research and learning and enhanced teacher-student interface by creating multiple channels of interaction.

Education is more than a means for enabling progress and preventing poverty; it is also critical for the development of knowledge societies and knowledge-based economies (Adu, Emunemu and Oshati , 2014). As suggested by many researchers, the role of Higher Education within the context of knowledge-based economies and globalization is to give individuals the ability to transform information into socially beneficial knowledge, skills, and values; modernize societies and improve the standard of living; as well as prepare and produce a skilled workforce (Shaikh & Khoja 2011). Amjad (2006) defined a knowledge-based economy as "one that bases its growth not only on increasing capital or land or labor inputs, but also on knowledge." The advent and spread of ICT in varying degrees over the last two decades have led to the advent of information societies which are sometimes called knowledge societies. Today, these societies play a momentous role in the development of knowledge economies. These ICT-driven knowledge societies necessitate a workforce skilled in the use of ICT, as well as government support, transparent and autonomous institutions, progressive attitudes, and a sound ICT infrastructure (Shaikh and Khoja in Adu et al., 2014).

A significant milestone in the development of the ICT industry in the country is the formulation of a National Information Technology Policy (NITP), which was approved in March, 2001 by the Federal Executive Council. With the enactment of this policy came the establishment of an implementing agency-the National Information Technology Development Agency (NITDA) in April 2001. This agency is charged with the responsibility of implementing Nigeria's Information Technology (IT) policy "as

well as promotes the healthy growth and development of the IT industry in Nigeria (Isoun 2003).

The major thrust of the IT policy in Nigeria can be gleaned from its vision and mission statement. According to the then Honorable Minister of Science and Technology, Professor Turner Isoun, the vision of the policy was to make Nigerian IT-capable country in Africa and a key player in the information society by the year 2015; this was with the aim of using IT as the engine for sustainable development and global competitiveness. On the other hand, its mission statement was to use IT for:

- Education,
- Creation of Wealth,
- Poverty,
- Alleviation,
- Job Creation and
- Global Competitiveness

The policy relied on human capacity building as the major strategy for realizing its vision and mission (Isoun in Adu et al., 2014)).

Conceptual Definition
Concept of Information and Communication Technology (ICT)

Sarkar (2012), referred to ICT as the varied collection of technological gear and resources which are made used to communicate. They are also used to generate, distribute, collect and administer information. ICT is a force that has changed many aspects of the way we live. ICTs consist of the hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services. ICTs can be divided into two components: Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize those (Internet, voice, mail, radio, and television), and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing, and presentation.   ICTs cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities (Garai, 2006). The emergence of ICTs has provided the means for faster and better communication and utilisation of information between and for users, be they individuals, groups, businesses, organisations or governments (Imhonopi & Urim, 2012).

Yusuf and Afolabi (2010) argued that ICT does not only help sustainable development in less developed countries to narrow the global digital divide and produce their own knowledge societies, rather it helps to improve the quality of learning and

educational outcomes. They further suggested that the state of any education system is determined through the quality of its higher education, given it con- tributes to the development of education at all levels.

Concept of Higher Education

Education has remained at the top of the development agenda in Nigeria. On one hand, basic education in Africa is championed by Education For All (EFA) and the Millennium Development Goals (MDG) as a key factor for the reduction of poverty while the World Bank and other international organisations under the World Conference on Higher Education (WCHE) have given greater recognition to the critical role of higher education in building the knowledge economy and enhancing economic development in Africa (Mohamedbhai, 2008). This has put higher education on the top of the political and economic agendas of most, if not all, African countries.

Simply put, higher education refers to the universities in some contexts, but generally the term represents post-school, post-secondary or tertiary institutions and includes roles played by other more vocationally or technologically-oriented institutions. According to Mohamedbhai (2008), although higher education and tertiary education are often used interchangeably, the term "higher education" represents all forms of organised educational learning and training activities beyond the secondary level. Higher education has been seen as a critical component of human development indices and a key driver to economic and national development of countries. Therefore, higher education is relevant to human development, capacity development and it plays an important role in providing high-level manpower in areas pertaining to social and economic development and in promoting research.

Concept of Sustainable Development

The concept of sustainable development in the past has most often than not been broken out into three constituent domains: environmental sustainability, economic sustainability and social sustainability. However, many other possible ways to delineate the concept have been suggested. For example, distinguishing the four domains of economic, ecological, political and cultural sustainability their important sources refer to the fourth domain as 'institutional' or as good governance' (Reinecke et al. 2012)

Sustainable development therefore is an organizing principle for human life on a finite planet. It posits a desirable future state for human societies in which living conditions and resource-use meet human needs without undermining the sustainability of natural systems and the environment so that future generations may also have their needs met. Sustainable development ties together concern for the carrying capacity of natural systems with the social and economic challenges faced by humanity. As early as the 1970s, 'sustainability' was employed to describe an economy "in equilibrium with basic ecological support systems". Scientists, in many fields have highlighted the limits to growth and economists have presented alternatives, for instance, a steady state

economy to address concerns over the impacts of expanding human development on the planet (Manning et al. 2011).

Higher Education for Sustainable Development

Knowledge is a key factor for sustainable development. Yet without the appropriate context and applications, knowledge cannot successfully catalyse sustainable development. Therefore, education should be considered as an enabling infrastructure for all sectors of the economy, for democracy and for good governance. Education empowers people for their role in society and, therefore, is of vital importance to promote the sustainable development of our global community. The Millennium Development Goals adopted by the UN General Assembly in 2000, and the WEHAB initiative proposed by the UN Secretary General Kofi Annan during the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg both underscore the role of education in improving peoples' lives. While it is broadly understood that literacy and education for all play a crucial role in preparing people for their future in a highly connected, interlinked and globalized world; higher education in particular occupies an important position in shaping the way in which future generations will learn to cope with the complexities of sustainable development. In nine of the forty chapters, Agenda 21 noted the key role universities have to play to achieve sustainability (Adu et al., 2014).

Universities form a link between knowledge generation and transfer of knowledge to society in two ways. First, they prepare the future decision-makers of society for their entry into the labour market. Such preparation includes education of teachers who play the most important role in providing education at both primary and secondary levels. Second, they actively contribute to the societal development through outreach and service to society. (UNESCO, 2002)

Higher Institutions as Actors in Society

Tertiary institutions as important centres of research and learning, play an important role in this context of acquiring, disseminating and applying knowledge. In addition to fundamental research, universities also have to undertake innovative, action-oriented research. They should be particularly attuned to the provision of appropriate knowledge and skills relevant for sustainable development to the local community as local knowledge centres. In addition to their traditional teaching functions, tertiary institutions must consider their role in retraining school teachers as well as other local professionals to contribute to learning for sustainable development.

In this observation, institutions are important actors in the community, as employers, purchasers and service users. They are also businesses where prudent use of resources saves money and safeguards reputations. Thus, tertiary institutions can be perceived as models for society in the pursuit of sustainable development. Tertiary institutions are expected to contribute to innovation, to contribute to reflection on

values and ethics, and to contribute to the transformation to a more sustainable society. The provision of knowledge as a "public good" is one of the tasks of higher education, and unhindered access to knowledge is a prerequisite for sustainable development.

Of particular importance are qualitative factors imparted by the education system, such as orientation towards innovation and learning, creativity and the willingness to take risks. According to UNESCO (2012), in considering the roles and functions of the tertiary institution in promoting sustainable development, the following issues should be particularly addressed:

• increasing the relevance of teaching and research for the societal processes leading to more sustainable and discouraging unsustainable patterns of life,

• improving the quality and efficiency of teaching and research,

• bridging the gap between science and education, and traditional knowledge and education,

• strengthening interactions with actors outside the university, in particular with local communities and businesses,

• Introducing decentralized and flexible management concepts.

The Role of ICT in Sustainable Development

The prime cause of poverty is isolation from the rest of the global community. Access to the internet and mobile networks can allow impoverished people around the world to access banking, medical services, and markets. Remote weather stations can be set up in new locations and connected via mobile networks to allow researchers to better study the local and global impacts of climate change.

The role of ICT to different sectors of national, economic and educational life of the nation cannot be overemphasized. The specific benefits of ICT to these sectors and how the use has been contributing to sustainable national development are discussed under this segment.

ICT for Good Governance

The potential attributes and benefits of ICT to policy makers in the society have been accepted as imperative paradigm (Attama and Owolabi, 2008). In all intents and purposes, ICT is the acclaimed engine room of modern day global development and sustainable growth (United Nations Conference on Trade and Development, 2005). In the same vein, Anehobi (2007) maintains that no institution or organization can still rely only on the traditional printed information resources to perform efficiently. The infusion of ICT into public administration enhances efficiency in the delivery of services to the people. Heber (1990) in his own view maintains that ICT helps in taking high quality decisions and at the same time saves time. It is in line with the laudable roles that the federal government of Nigeria in order to ensure the full exploitation of

the potentials of ICTs in sustainable democracy laid foundation for e-government in Nigeria (Aragba-Akpore, 2004).

Countries that have adopted and applied electronic services (ICT) to their operations have witnessed dramatic improvement in their development efforts. For countries such as Singapore, United States, Canada, Japan and most European nations, ICT is a strong tool for sustainable development and improving governance, widening democratic space, increasing productivity, administrative effectiveness and cost savings (Adamali, Coffey and Safdar, 2006). It is not surprising therefore that the application of ICT in governance is engendering much concerns in many countries of the world.

ICT Application in Education

Most of the discussions and initiatives on ICT in Education tend to focus on the use of ICT for teaching and learning only (Becta, 2004; Akale, 2003). This emphasis on instructional applications of ICT in education has an antecedent. From the earliest times, educational interest in technology has always centred on the instructional application of such technology to improve teaching and learning. The case of the computer provides a perfect illustration of this point. Long before the emergency of ICT, educational interest in the computer centred on its instructional applications as exemplified by computer-assisted instruction (CAI), computer-aided testing (CAT), etc.

It is perhaps easy to understand why the emphasis at the basic and secondary education levels should exclude research application of ICT. The primary responsibility of the teachers at these levels is defined exclusively in terms of teaching. However at the higher education level, teachers' primary responsibility is of a tripartite nature involving teaching, research and community service. In effect it can be suggested here that any approach to ICT adoption at the higher education level that stressed only instructional applications and ignores research applications, will be grossly inadequate in meeting the needs of both students and teachers:

The indispensability of ICT in education research in particular includes :

•   Learning how to optimize the creativity of African Scientists through participation in international networks and working with data sets.

•   Accessing various kinds of research information, which would necessitate a link to the libraries group

•   Learning new methods for disseminating knowledge produced in Africa and using them.

•   ICT applications run through the entire gamut of the educational research process. The advocacy for the indispensability of ICT in educational research can be further strengthened by the following arguments that tends to underscore the values derivable from applying ICT in educational research.

•   It reduced time and cost of conducting educational investigation.

- Data sets and library resources can be shared by institutions in different locations
- Educational researchers have easy access to current literature materials
- Data sets, irrespective of size can be stored and retrieved when needed.
- Researchers in different locations can collaborate more easily, etc (Nworgu, 2007)

Ijatuyi and Adebanjo (2006) while speaking on the usefulness of ICT in sustainable development advised on the need for a well-equipped ICT centres in all educational institutions to enable them live up to their social and political responsibilities.

Roles of ICT in Legal System

Globalization driven by ICT is having a phenomenal impact on acquisition of legal, and other relevant learning, teaching and research materials in law libraries across the country. Through ICT, lawyers and students can have access to current court proceedings/cases and law reports anywhere, any time and in any form in the country.

There is no doubt that the integration of ICT into the practice of law is of much benefit to the profession in Nigeria in the 21st century. ICT is a remarkable tool for providing comprehensive, current and timely legal services to the citizenry. (Okon and Bassey, 2008). The relevance of ICT adoption and utilization in Nigerian legal system for effective and efficient service delivery is a contributory factor to sustainable development in Nigeria.

ICT in Business Management

Information and Communication Technology (ICT) is an essential part of national infrastructure and factors greatly in both public and private sector business enterprises. It creates business opportunities, especially for companies located far from urban centres, and improves links among firms, suppliers and clients. When used well, ICT can also make management and operation more efficient. In another development, Sangowusi cited by Attama and Owolabi (2008) maintains that ICT is very useful in corporate environment because it promotes performance and improves efficiency.

Challenges Facing ICT and Higher Education in Nigeria that Affects Sustainable Development

The challenges facing higher education in Nigeria are as follows:

a) Poor funding has remained a tall challenge for robust and effective higher education in Nigeria. Granted that funding higher education in any economy, whether developed or developing, is expensive, in Nigeria, higher education has received several knocks from the establishment as the government has failed in its commitment to invest heavily in the subsector.

b)   Spotty power supply is also another challenge that throttles efforts to mainstream ICTs for higher education development in Nigeria. Nigeria currently produces less than 4,000 megawatts of electricity which is incredibly insufficient to meet the needs of Nigeria across all sectors, including the education sector.

c)   Lack of infrastructure is another challenge to higher education in Nigeria. There are mountains of evidence showing that existing higher institutions in the country lack the requisite physical classes, teaching and learning tools, and modern ICTs that could help them conduct teaching, learning and research processes in a clement ecology. This is why, for instance, the Academic Staff Union of Universities always goes on strike to draw government's attention to the sorry plight of Nigerian universities. Until the infrastructure deficits in place are arrested, higher education in the country may continue to slide into decay.

d)   A notable problem facing higher education in the country is the question of brain drain. There is a massive exodus of Nigerian scholars, academics and professionals to Western countries to look for greener pastures as this corps of domestic intelligentsia has found it difficult to put up with the putrescence that characterizes higher education management in Nigeria. According to Imhonopi & Urim (2012), the aetiologies of brain drain in Nigeria are traceable to such inextricable conundrums as the breakdown of social infrastructure, low-income nature of academic work, corrupt and irresponsible political leadership, lack of commitment to and investment in the educational sector and the lack of development of other sectors and the general climate of ennui which typify academic modus vivendi. Imhonopi & Urim (2012) submit that through brain drain, Nigeria, nay Africa, is losing its finest people to developed countries.

e)   Official corruption and other vices within the governance plane have also created a serious conflation of forces to undermine higher education in Nigeria. The implication of the several financial crimes committed by elected and appointed government officials leaves the government prostrate to meet its obligations towards higher education development in the country.

f)   Lack of political will and prioritisation of investments by government are other problems that frustrate ICT and higher education development in Nigeria. The government, represented by some of its eggheads, seems to be caught in endless and meaningless vacillations because it does not have the political will to bring about the needed turnaround in higher education in the country nor does it prioritise its investment. For instance, the government spends so much on needless items of recurrent expenditure, some of the monies which could have been channeled into education funding.

g)   Lack of investment in ICTs for higher education development is another drag on the development of the subsector. No nation that wants to lead others hates or despises technology. Without technology tools as provided by ICTs, higher education will be greatly stifled with the lack of optimisation of many benefits.

Conclusion

It has been commonly accepted and proven that information and communication technology (ICT) is the engine of the 21st century and beyond; as it will chart the economic, religious, cultural, legal and social life of nations, particularly that of developing countries. The importance of information and communication technology for sustainable development, has long been recognized by developing countries. Tertiary institutions are important actors in the community, as employers, purchasers and service users; they are also businesses where prudent use of resources saves money and safeguards reputations. Thus, tertiary institutions can be perceived as models for society in the pursuit of sustainable development. ICT has impacted on different sectors of the Nigerian economy. The application of ICT has emerged as the most radical development of the 21st century. It has facilitated speedy information transmission, high level decision making, reduces cost in resources/organizational management and as well opens vast opportunities for information sharing among individuals, companies and governmental institutions. It is a truism that information and communication technology (ICT) is very indispensable to Nigerian sustainable development drive. Today, ICT has been successfully integrated in the process of state administration, leading to a view concept of e-government. The potential benefit of ICT to sustainable development in Nigeria has been accepted as an imperative paradigm.

Recommendations

The following recommendations were made;

1. People should be sensitized on the importance of information and communication technology in all sectors i.e. socially, politically, economically and educationally.
2. Government should also create an enabling environment for ICT to strive
3. Public-private organizations should partner with each other in information and communication technology for efficiency and effective utilization of both the hardware and software.
4. Professional organizations and government agencies should organize seminars and conferences to update and increase lecturers' and students' ICT knowledge and competencies.
5. Governments at the state and federal levels should endeavor to increase funding for the education sector to enhance procurement of ICT equipment and facilities for effective educational activities in the country.

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