

RESEARCH AND DEVELOPMENT IN HIGHER EDUCATION IN DEVELOPING COUNTRIES: THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY

Soala Obadiah ABALI

National Association of Educational Administration and Planning
University of Port Harcourt
dynamicsole0@gmail.com

Beatrice Leesi NABIE

Department of Educational Management,
Rivers State University, Port Harcourt, Nigeria

Ngozi Evelyn DIKE

Department of Educational Management,
Ignatius Ajuru University of Education,
Port Harcourt, Nigeria

ABSTRACT

This paper analyzed the concept of research and development, examined the concept of higher education, assessed research and development in higher education in developing countries, and highlighted the role of information and communication technology in research development in higher education in developing countries. The paper concluded that research and development is an indispensable tool for economic growth and national development. Thus, countries in dire need of development should give priority attention to research and development especially now that the world is currently passing through an era of technological advancement which is powered by information and communication technology. Through the processing of research data; the use of online full text databases and online research libraries / virtual libraries, information and communication technology is playing significant role in research and development in higher education. To sustain this role therefore, attention in developing countries should be given amongst others to the availability of high tech equipment and internet connectivity for all institutions; reforms to refocus the institutions in specialized and targeted research and development activities; legal and institutional framework for the protection of copyrighted materials and other intellectual properties; and linkages between information and communication based companies and research institutes in targeted areas of information and communication solutions.

Keywords: Research, Development, Higher Education, Developing Countries, ICT.

Reference to this paper should be made as follows:

Abali, S. O., Nabie, B. L., & Dike, N. (2019). Research and Development in Higher Education in Developing Countries: The Role of Information and Communication Technology. *International Journal of Institutional Leadership, Policy and Management*, 1(1), 46-54.

INTRODUCTION

In this 21st century, the developing countries in Africa, Asia and South America are striving to be in tandem with the advanced economies of the world, as they have in the present circumstance, come to grip with the reality that Research and Development (R&D) is an indispensable tool for economic growth and national development. In every sector of the economies of the developed countries of America and Europe, R&D has brought about massive increase in productivity and solutions to so many unimaginable problems. Through R&D programmes, the developed countries around the globe have achieved functional knowledge and improvement in medical care, food production, information dissemination, transportation system, and the development of new products and services.

In the light of the above facts therefore, countries in dire need of advancement should give priority attention to R&D in their higher institutions of learning in order to attain the level of development so far attained by the developed countries of the world. It becomes imperative, therefore, that the peculiar problems of funding (Abali & Nwapi, 2017), research equipment and personnel inhibiting the conduct of effective and efficient R&D programmes in higher education in developing countries are tackled. The specific actions that Nigeria as a developing country has taken to address some of these problems are the provision of ICT infrastructure and equipment in all schools; introduction of e-learning to expand access to quality education; and the implementation of the provisions of the National Technological Education Framework (Federal Republic of Nigeria, 2008).

At this juncture, it becomes imperative that ICT plays significant role in R&D in higher education, especially now that the world is currently passing through an era of technological advancement which is powered by ICT (Egu, Ememe & Njoku, 2011). The world is fast changing; ICT has reduced the world to a global village. Technological advances in the education industry have necessitated the development of new products and services through R&D. Thus, the attendant benefit of ICT in the educational and economic advancement of developing countries in the 21st century cannot be over-emphasized. Digital literacy should therefore be an integral part of the educational pursuits for national development of countries in dire need of advancement. This will no doubt help them access information and be enlightened through all available digital means (Abdulrahman-Yusuf, 2015). In line with the foregoing therefore, this paper analyzes the concept of research and development, examines the concept of higher education, assesses research and development in higher education in developing countries, and highlights the role of information and communication technology in research and development in higher education in developing countries.

CONCEPT OF RESEARCH AND DEVELOPMENT (R&D)

Research and Development (R&D) could be conceptualized in varied perspectives as it is composed of two different terms namely ‘research’ and ‘development’. Thus, it is pertinent to take a cursory examination of the component terms in order to have an in-depth understanding of the meaning of R&D. Hornby (2010, p. 1255) perceives research as “a careful study of a subject, especially in order to discover new facts or information about it”. Nworgu (2006) avers that research is the search for solutions to problems or answers to questions. Ali (2006) posits that research is a major way man acquires and expands knowledge, gains better and more reliable understanding of concepts, events, techniques and products. Vielle in Okeke (2004, p. 14) reiterates that research is an “intentional and systematic activities of search that lead to the conceptualization, expression, design and production of something new”.

On the other hand, Cisse in Ezimah (2004) perceives development as a result of man's action on nature. It is man's attempt to transform nature in order to improve his own condition. Thirlwall in Ezimah (2004, p.40) opines that:

Development is used ... to describe the process of economic and social transformation within countries We can say that development has occurred when there has been an improvement in basic needs, when economic progress has contributed to a greater sense of self-esteem for the country and the individuals within it, and when material advancement has expanded the range of choice for individuals.

In the same vein, Ihejirika in Abali and Nwapi (2017) affirms that development is the transformation of society from backwardness to what is desirable and good. It is progress and the movement to a more optimum condition or state of human welfare. In consonance with the above postulations therefore, the writers aver that R&D is the intentional and systematic activities of search for solutions to problems in order to transform a society from backwardness to what is desirable and good.

Research and Development (R&D) is a relatively new type of research that is costly and time demanding. It is the class of research conducted with a view to producing immediate functional knowledge for developing new products and practices (UNESCO in Asiabaka, 2009). Its programmes provide valuable means of achieving educational improvements and national development. R&D programmes ensure that educational products in use are of proven quality (Nworgu, 2006). The programmes are aimed at producing materials used in schools; such materials include teaching aids to facilitate learning as well as teacher training programmes (Ofo, 2009). In the industries, R&D programmes find new products and processes or improve on existing ones (Hornby, 2010). Consequently, Ebong (2006) avers that one way to promote national and international understanding and interaction is through R&D, a global activity that binds scholars at international level; hence, the necessity for R&D in higher education.

CONCEPT OF HIGHER EDUCATION

In Nigeria, higher education is the education given after secondary education in universities, colleges of education, polytechnics, monotechnics including those institutions offering correspondence course (FRN in Abali & Suanukordo, 2015). The goals of higher education as stipulated by the Nigerian national policy on education (FRN, 2013) include among others to contribute to national development through high level manpower training, and promote national and international understanding and interaction. The policy document states among others that higher institutions of learning shall pursue these goals through quality teaching; research and development; generation and dissemination of knowledge, skills and competencies that contribute to national and local economic goals which enable students to succeed in a knowledge-based economy; and inter-institutional cooperation and linkages. It is deducible from the above facts that the global perspective puts knowledge ahead of other factors that contribute to the development of a nation. Economic, social and technological developments are driven by the advancement and application of knowledge which is a derivative of education in general and higher education in particular (Odunlade & Agabi, 2015).

The importance of higher education has been emphasized by authorities and policy documents of government including the Nigerian National Policy on Education (NPE). The role of higher education in a nation's life is enormous. Ojule (2015) avers that higher

educational institutions, especially universities and research based institutions constitute the hub of most nations aspiring to take the lead in scientific, technological and economic development. Most knowledge-based economies in the world today, invest most of their financial resources in researches carried out by these institutions. Consequent upon the aforementioned facts, Akpan and Afangideh (2007) suggest that higher institutions of learning could also undertake researches for big organizations like the oil firms operating in developing countries.

Research and Development (R&D) in Higher Education in Developing Countries

The words “developing”, “underdeveloped” or “less developed” are used interchangeably to refer to countries that have not attained a certain level of development in terms of structural transformation and improvements (Anyanwuocha, 2013). Most countries of the third world prefer to use the word “developing” to show some degree of optimism that they will become economically developed in the near future. Thus, a closer look at the developing countries around the world reveals that they vary enormously. Some, like China are huge; others, like Ghana are small. Some, like Taiwan have lots of people jammed into every square mile of land; others, like Brazil have relatively few people spread over lots of land. Some, like Nigeria have important natural resources (notably crude oil and gas) and others, like Principe and Tobago have few resources. Besides suffering from relatively low productivity, the developing countries are characterized by marked internal inequalities in the distribution of wealth (Ake, 1989).

Arising from the above facts therefore, it is very glaring that R&D in higher education in developing countries is yet to attain an impressive status. Consequently, Yakubu in Onyeike (2015) comments that despite the fact that Nigeria has a population of 160 million and ample natural resources, only 15 scientists and engineers engage in R&D per million persons in the country. This compares with 168 in Brazil, 459 in China, 158 in India and 4, 103 in the United States of America (USA). These figures indicate that the United States has invested heavily in its R&D programmes. Gaillard (n.d) posits that while R&D investments in most developed countries are between 1.5% and 3% of the Gross Domestic Product (GDP), most developing countries invest much less than 1% of GDP in R&D. Thus, research equipment and facilities in many research institutions in developing countries are scarcely available due to the low rate of investment in R&D.

The R&D budgets of sub-Saharan African countries is around or less than 0.3% of GDP, with the exception of South Africa (0.9%). Morocco (0.75%) and Tunisia (1.03%) have increased their R&D investments in recent years, while Egypt and Algeria have kept theirs relatively low. In Latin America, Brazil reported the highest level (0.9%), followed by Chile (0.7%) and Cuba (0.6%) (Gaillard, n.d). The low relative R&D budgets in some of these developing countries may be due to the lack of commitment on the part of the government to R&D programmes (Nworgu, 2006) or due to the low absorption capacity of the national scientist communities (Gaillard, n.d).

The developed countries such as the United States of America, Japan and Britain are where they are today because of their commitment to R&D. In sharp contrast to what obtains in the developed nations, the governments and people in developing nations have very poor attitude towards R&D. Most people in these societies do not see R&D as a profitable venture; thus, they castigate researchers and do not see why financial and time resources should be expended on R&D programmes that do not contribute immediately to their material wellbeing (Nworgu, 2006). The governments and the society generally seem not to realize that R&D is costly and time demanding. The role of R&D in national development is not

fully appreciated as researchers using human subjects find it difficult in obtaining the cooperation of the citizenry in the collection of research data.

Research and development is one of the means through which higher educational institutions contribute to national development. In universities (particularly in Nigeria), the emphasis on research publications for academic promotion is very high. Promotion on the job is tied to the number of research publications one has been able to accumulate (Nworgu, 2006). Consequently, not well thought out and properly articulated R&D programmes that can generate the desired impact on the economies of the developing countries are conducted. In developing countries, the conducting of meaningful R&D programmes in higher institutions is hampered due to inadequate research equipment, facilities, materials and personnel resulting from low investment in R&D. Presently, Nigeria's production level is 80% below its capacity and this corresponds with the low rate of R&D investment embarked upon in higher institutions (Ajayi & Adeniji in Onyeike, 2015). Onyeike (2015) avers that an increase in R&D investment will significantly lead to an increase in Nigeria's production capacity, thus, leading to economic development.

It is surprisingly interesting to note that in this 21st century, many researchers in universities and other research centres in developing countries are yet to have access or connected to the internet. The internet is the heart of the information age. It is a network that connects smaller networks in the world. The networks link educational, commercial, non-profit organizations, and military institutions, which have reduced the world to a global village (Ekemezie & Ngene in Anyaogu, 2015). The communication networks of many developing countries are still far from being well developed. There is lack of effective and efficient transport systems. This situation has made scientist, engineers and educationists engaged in R&D programmes to trek long distances in search of research data. No meaningful R&D programmes can be conducted under this condition, especially now that the world is passing through an era of technological advancement which is powered by ICT. To overcome some of these problems therefore, it is imperative that ICT plays significant role in R&D in higher education in developing countries if the desired level of development must be attained and sustained.

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN RESEARCH AND DEVELOPMENT (R&D) IN HIGHER EDUCATION IN DEVELOPING COUNTRIES

Scholars of diverse fields have given varied definitions to explain the acronym ICT. Kundishora (n.d) avers that Information and Communication Technology (ICT) is a generic term referring to technologies that are used for collecting, storing, editing and passing on information in varied forms. Sarkar (2012) posits that ICT is the varied collection of technological gear and resources which are made use of to communicate, generate, distribute, collect and administer information. Similarly, Bema and Uwaezuoke (2011), Yusuf in Wosowie (2014) and Camilus (2015) are of the view that ICT is an electronic technology used for accessing, processing, gathering, manipulating, presenting, communicating, storing and retrieving of information.

The above facts reveal that ICTs are tools and processes to retrieve, store, organize, manipulate, produce, present and exchange information via electronic and other automated means. These tools, according to UNESCO in Onyezere and Ray-Offor (2011) include hardware, software and telecommunications in the forms of personal computers, laptops, scanners, digital cameras, phones, faxes, modems, CD and DVD players and recorders, digital video, radio and TV programmes, database programmes and multimedia programmes. Considering all the definitions given above, it is pertinent that ICTs are significantly applied

in R&D for the advancement of knowledge, attitudes and skills that are necessary for effective functioning in the modern world (Nwanekezi & Ugonna, 2011).

Bema and Uwaezuoke (2011) have identified information technology, telecommunication technology, and networking technology as categories of ICT. Although, there are wide variations in their usage both within and between countries and regions of the world, the discussions on the role of ICT in R&D in higher education shall be done under these categories (Egu, Ememe & Njoku, 2011).

INFORMATION TECHNOLOGY

Information is the result obtained from processed data and the means of processing data is via the use of information technology. Information technology is a category of ICT that is widely used within industries. It uses the computer which is indispensable in ICT to process research data. The computer is used to provide or design instructional materials needed in the education industry, such as graphics, overhead transparencies and animation of sequences, slides, charts, project development, implementation and evaluation (Anyaoagu, 2015). With computers, information or data on R&D programmes are stored and retrieved without problems whenever needed. In research presentation, researchers use Power Point to present their research findings (Zwalchir & Buenyen, 2009).

The use of computers as information technology has reduced the time, cost and workload of researchers engaged in R&D programmes in higher institutions. According to Sarkar (n.d), the computer power provides opportunities for analyzing/processing huge amount of data and performing complex computations on them in a manner that is extremely fast, accurate and reliable. Sarkar (n.d) reiterates that the computer data processing not only frees researchers from cumbersome task of manually analyzing data but more importantly facilitates quick and accurate analysis of huge amounts of data from whole lot of samples covering tens of thousands of respondents.

TELECOMMUNICATION TECHNOLOGY

Telecommunication is the sending, transmission or transfer of messages, signals, information, ideas or knowledge from one person to another over long distances using electronic equipment. Telecommunications technologies in this modern era include telephone, cell phones, GSM handsets, the broadcasting on radio and television, often through satellites. These tools have to do with any act or process that entails a form of exchange of information between a researcher and his respondents based on mutually understandable codes. Thus, Obasi and Asodike (2007) contend that effective communication depends on the medium used.

The new telecommunications technologies, from cellular telephone to teleconferencing or videoconferencing, allow people of different fields in higher institutions of learning to share knowledge without having to be in the same place (Nzokurum, Amaeze & Awah, 2011). Through these technologies researchers become more able, physically, culturally and psychologically, to engage in R&D programmes. In affirming the above fact, Anyaoagu (2015, p. 17) asserts that:

In less than few years of GSM (Global System for Mobile Communication), there are more GSM roaming traffic via satellite. This has contributed a lot in the education sector as it has reduced the rate and risk of traveling from place to place as well as easy accessibility to information.

Research and development is a global activity that binds researchers at national and international levels. Thus, an important role of ICT in R&D in higher education is the use of online full text databases and online research libraries/virtual libraries which are the direct outcome of the growth in the telecommunications networks and technology (Sarkar, n.d). These databases and libraries provide researchers engaged in R&D programmes with online access to the contents of hundreds of thousands of books from major publishing houses, research reports and peer reviewed articles in electric journals.

NETWORKING TECHNOLOGY

Networking technologies are central in R&D in the modern world. In Nigeria particularly and the developing countries generally, social networking technologies have only been introduced in very recent times, but they are already eliciting a noticeable impact on academics and R&D. Nwabueze and Obara (2011) posit that online social networking is a range of activities enabled by social technologies and operationalized by a group of people. Online communities such as Facebook.com and Hi5.com originated with an academic focus. Social media or networking outlets allow the schools (researchers) to engage in two-way communication and receive feedback from their various stakeholders (respondents).

Through social networking technologies, universities and researchers engaged in R&D programmes cross-fertilize ideas, knowledge and experiences. One can easily read or listen to edu-bloggers and find articles, notes and an increasing number of print books on Web 2.0. Social networks technologies' popularity can be credited to highly utilized services like blogging, video sharing and social networking sites. In recent times, an increasing number of colleges, universities and other research centres are adopting social networking technologies as research tools. Consequently, Nwabueze and Obara (2011, p. 73) opine that:

A new social networking site like www.skoola.com has been launched. The site is aimed at bringing students, graduates and educationists to get to network, share problems and help each other in academic field. At Skoola you enjoy the following benefits and more: submit questions, projects and assignments online and get answers to them in a jiffy....

Consequent upon the above discussions therefore, it could be deduced that if researchers or institutions are making use of computers, phoning, browsing, sending e-mail, using virtual library, recording, e-recording, blogging, and other social networking sites, such researchers or institutions are making use of ICTs. Through these mediums, R&D programmes are enriched as research findings in any subject areas are easily obtained through the internet. The internet is today the most sophisticated and modern way of interactive networking. It has offered global access to all kinds of information generation and sharing across the world. The use of the internet has revolutionalized access to information for R&D in higher education.

Information technology, telecommunication technology, and networking technology have come to stay in order to play vital roles and overcome some of the problems associated with R&D in higher education in developing countries. Technology is a way of thinking about problems and the feasibility of the proposed solution (Anyago, 2015). It is the application of scientific discovery or knowledge to solve the problems of man (Chux-Nyeche, 2014). In the light of these facts therefore, it becomes imperative to sustain the role ICT plays in R&D in higher education by paying attention to the following issues as stipulated by the Federal Republic of Nigeria in Wosowie (2014, p. 300):

- The competencies and capabilities of researchers and research institutes and tertiary institutions should be globally competitive in targeted ICT areas;
- Availability of high tech equipment and internet connectivity for all institutions;
- Reforms to refocus the institutions in specialized and targeted R&D activities;
- Linkage between ICT based companies and research institutes in targeted areas of ICT solutions; and
- Legal and institutional framework for the protection of copyrighted materials and other intellectual properties.

CONCLUSION AND RECOMMENDATIONS

Research and Development (R&D) is an indispensable tool for economic growth and national development. Thus, countries in dire need of development should give priority attention to R&D in higher education especially now that the world is currently passing through an era of technological advancement which is powered by ICT. Through the processing of research data, the use of online full text databases and online research libraries/virtual libraries, ICT is playing significant role in R&D in higher education. To sustain this role therefore, attention in developing countries should be given amongst others to the availability of high tech equipment and internet connectivity for all institutions; reforms to refocus the institutions in specialized and targeted R&D activities; legal and institutional framework for the protection of copyrighted materials and other intellectual properties; and linkage between ICT based companies and research institutes in targeted areas of ICT solutions.

REFERENCES

- Abali, S. O., & Suanukordo, B. G. (2015). Educational innovations and reforms at the tertiary institutional level in Nigeria. *African Journal of Higher Education Studies and Development*, 3, 11 –132.
- Abali, S. O., & Nwapi, M. I. (2017). Funding and corruption in tertiary education in Nigeria: Implications for national development. In A. A. Adeyinka, J. C. Buseri, T. T. Asuka, A. C. Egumu, A. A. Agih & F. G. Paulley (Eds.), *Education for the Reduction of Corruption in Nigeria* (pp. 129-136). Port Harcourt: University of Port Harcourt Press.
- Abdulrahman–Yusuf, M. (2015). A theoretical explanation on the trends and innovation in education of Nigerian nomadic population. In J. O. Ajuonuma, J. D. Asodike & R. O. Anyaogu (Eds.). *Issues and Trends in Change and Innovation in Nigerian Educational System* (pp. 259 - 276). Port Harcourt: Pearl Publisher.
- Ake, C. (1989). *The political economy of crisis and underdevelopment in Africa: Selected works of Claude Ake*. Lagos: JAD.
- Akpan, R. J., & Afangideh, N. (2007). Funding initiatives in higher education. In J. B. Babalola, G. O. Akpa, A. O. Ayeni & S. O. Adedeji (Eds.), *Access, Equity and Quality in Higher Education*. Benin City: Nigerian Association for Educational Administration and Planning.
- Ali, A. (2006). *Conducting research in education and the social sciences*. Nsukka: Tian Press.
- Anyanwuocha, R. A. I. (2013). *Fundamental economics (Third edition)*. Onitsha: Africana.
- Anyaogu, R. O. (2015). Factors influencing educational change and innovation in Nigeria. In J. O. Ajuonuma, J. D. Asodike & R. O. Anyaogu (Eds.). *Issues and Trends in Change and Innovation in Nigerian Educational System* (pp. 12-28). Port Harcourt: Pearl Publishers.

- Asiabaka, I. P. (2009). Career development in educational management. In J. B. Babalola & A. O. Ayeni (Eds.), *Educational Management: Theories and Tasks* (pp. 406-427). Lagos: Macmillan.
- Bema, B. N., & Uwaezuoke, U. V. (2011). Quality assurance in primary education: The role of information and communication technology. *African Journal of Educational Research and Development*, 4(2a), 345–352.
- Camilus, B. B. (2015). Information and communication technology application in agricultural programmes in Nigerian universities: Eminent challenges. *African Journal of Higher Education Studies and Development*, 3, 69–84.
- Chux-Nyeche, G. C. (2014). Use of information and communications technology for education and economic development. *African Journal of Educational Research and Development*, 7(1), 200-214.
- Ebong, J. M. (2006). *Understanding economics of education*. Port Harcourt: Eagle Lithograph Press.
- Egu, R. H. N., Ememe, O. N., & Njoku, N. C. (2011). Gender gap in information and communication technology (ICT) usage among secondary school students in Nigeria. In S. O. Osaat (Ed.), *Education in Africa* (pp. 154-167). Nigeria: University of Port Harcourt Press.
- Ezimah, M. O. A. (2004). *Knowing adult education: Its nature, scope and processes*. Nigeria: Springfield.
- Federal Republic of Nigeria (2008). *National policy on education*. Lagos: NERDC Press.
- Federal Republic of Nigeria (2013). *National policy on education*. Lagos: NERDC Press.
- Gaillard, J. (n.d). *Measuring research and development in developing countries: Main characteristics and implications for the Frascati Manual*. Retrieved from horizon.documentation.ird.fr/exl-doc/pleins_textes/divers11-04/010051097.pdf.
- Hornby, A. S. (2010). *Oxford advanced learner's dictionary of current English (8th ed.)*. Oxford: Oxford University press.
- Kundishora, S. M. (n.d). *The role of information and communication technology (ICT) in enhancing local economic development and poverty reduction*. Retrieved from http://www.siteresources.worldbank.org/CMUDLP/Resources/Role_ICT_paper.pdf.
- Nwabueze, A. I., & Obara, R. C. (2011). Social networking and instructional enhancements in tertiary institutions in South-South Nigeria: A new educational tool for quality improvement. *African Journal of Educational Research and Development*, 4(2b), 72-84.
- Nwanekezi, A. U., & Ugonna, R. C. (2011). Integrating information and communication technology (ICT) into basic science curriculum for quality assurance at the primary education level. *African Journal of Educational Research and Development*, 4(2a), 381-388.
- Nworgu, B. G. (2006). *Educational research: Basic issues and methodology*. Nsukka: University Trust.
- Nzokurum, J. C., Amaeze, F. E. & Awah, O. A. (2011). Use of information and communication tools for quality assurance in public secondary schools in Imo State. *African Journal of Educational Research and Development (AJERD)*, 4(1), 45-52.
- Obasi, F. N. & Asodike, J. (2007). *Resource management in Nigerian schools*. Owerri: Alphabet.
- Odunlade, P. K., & Agabi, E. (2015). Comparative analysis of higher education policies in Nigeria and Canada. *African Journal of Higher Education Studies and Development*, 3, 85-96.
- Ofo, J. E. (2009). *Research methods and statistics in education and social sciences*. Lagos: Joja Press.

- Ojule, L. C. (2015). Trends in financing education in Nigeria. In J. O. Ajuonuma, J. D. Asodike & R. O. Anyaogu (Eds.), *Issues and Trends in Change and Innovation in Nigerian Educational System*. Port Harcourt: Pearl Publishers.
- Okeke, B. S. (2004). *Qualitative research in education: Supervisor's perspective*. Choba: Pam Unique.
- Onyeike, V. C. (2015). Recent trends in the development of tertiary education in Nigeria. In J. O. Ajuonuma, J. D. Asodike & R. O. Anyaogu (Eds.), *Issues and Trends in Change and Innovation in Nigerian Educational System* (pp. 56-69). Port Harcourt: Pearl Publishers.
- Onyezere, C. C., & Ray-Offor, I. P. (2011). Quality assurance in secondary schools in Nigeria: The role of information and communication technology. *African Journal of Educational Research and Development*, 4(2a), 267-273.
- Sarkar, S. (2012). *The role of information and communication technology (ICT) in higher education for the 21st century*. Retrieved from [http://citeseerx-ist.psu.edu/viewdoc/download?Doi=10.1.1.463.2380&rep=rep1&type=pdf](http://citeseerx.ist.psu.edu/viewdoc/download?Doi=10.1.1.463.2380&rep=rep1&type=pdf).
- Wosowie, M. (2014). Information and communication technologies in schools. In F. N. Obasi & J. D. Asodike (Eds.), *Education Resource Management* (pp. 298-322). Port Harcourt: Pearl Publishers.
- Zwalchir, L., & Buenyen, H. N. (2009). Workload management in the school system. In J. B. Babalola & A. O. Ayeni (Eds.), *Educational Management: Theories and Tasks* (pp. 833-838). Lagos: Macmillan.