Impact of Information and Communication Technologies (ICTS) On Higher Education in Nigeria in the 21st Century

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Abstract: The importance of ICTs globally and to the instruction and learning process in particular can never be over emphasized. ICT is used to collect, store, edit and pass information to various people in diverse places in various forms, higher education inclusive. The increasingly rapid advances in ICT have and will continue to have profound impact on teachers' teaching and how learners comprehend. The advancement of novel broadband interaction services, harnessing of telecommunication and computers, recent advances in the field of interaction protocol have fostered numerous proposals for the uses of ICT to support the instruction and learning environment in higher education. The incorporation of computers and interaction offer unimaginably novel opportunities to the teaching-learning system with the capacity to fuse and interact with people over a wide geographical coverage in a reasonable manner to achieve the instructional objectives. The metamorphosis of these interaction and computer systems, their easy utilization, the power and variety of information transfer allow teachers and students to have access to a world beyond the classroom. It has the potential to transform the nature and process of the learning environment. Interactivity, changeability and conduciveness have become the norm of the time in the ICT aided environment. Thus, this work presents an in-depth knowledge of the impact of ICT in post-secondary education in Nigeria in this century. The research showed that ICT has become an basic part of contemporary society. The advantages abound to be harnessed and as the phenomenon of ICT continues to gain awareness in the whole gamut of higher education, all stakeholders must continuously plow the ground to foster ICT-enabled development in the Higher education sector of Nigeria. Aspect such as concept of ICT, tools of ICT in higher education, problems, challenges, benefits, and prospects of ICT in Nigeria higher education were discussed. Important suggestions were also made from the study.

Key words: Information and Communication Technologies, Teaching and Learning, Higher Education.

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I. INTRODUCTION
A distinguishing characteristic of humans is their aptitude to acquire knowledge, and what makes knowledge an ever-thriving prerequisite is man's capability both to possess and then to transmit this knowledge to others. Knowledge transmission, which is a basis of learning, is among the most basic social advantages of human beings (Sarkar, 2012). Education is one of the most significant needs for the well-being of individuals and that of the society. Thus, schooling is a potential instrument of social-political and economic advancement, without which neither an individual nor a society can achieve professional advancement.

ICTs are requisite aspect of the present world. Indeed, way of life and society should be modified to meet the tasks of the information age. ICTs are forces that have altered many facets of people's ways of life. Considering fields such as architecture, banking, medicine, tourism, engineering, travel, business and law, the impact of ICTs20 to 30 years ago has been monumental. The way the subareas function today is greatly diverse from the way they operated before now. However, if one critically considers the educational sector, there seems to have been insignificant impact of ICTs application and far fewer changes than other fields have experienced. Nevertheless, a high number of people have attempted to explore this deficiency in activity and influence. The pervasive impact of ICT has brought about a swift technological, social, political and economic metamorphosis, which has paved way for societal network systematized around ICT. The field of education has not been unaffected by the penetrating influence of ICTs.

ICT can help not only local but universal pathway to education, educational equity, the delivery of quality scholarship and teaching, teachers' professional advancement and more efficacious educational management, ruler ship and administration (UNESCO, 2015). ICT has greatly widened the openings for people to possess information, interact, network, treat problems of common concern, create income and function in society. Some institutions of higher education today for instance have in various ways and times incorporated science and technology into its daily operations such as communication, dissemination, interactions, collaboration, research, teaching, learning and administration. This is further seen in the curriculum of these schools. Universities in the western part of Nigeria pride themselves as foremost in the use of science and technology in education with its operation as a dual mode institution. Some of these Universities use Google Apps for education as one of the ICT tools for communication among the students, staff and faculties. According to (Akwaja, 2015) one of the basic requirements for education in the 21st century is to prepare populations for participation in a knowledge-based economy. Such Universities are in the frontline doggedly pursuing excellence in education delivery.

Many higher education institutions within and outside Nigeria now offer distant learning through the aid of ICT tool, virtual reality and related technologies are transforming science and science education by introducing discipline simulation laboratories that accelerate learning and experimentation at much lower cost. Lagos State University is planning of incorporating voice technology into engineering students' residential community and their curriculum to give them a unique opportunity to use their living experiences to improve their learning, and vice versa.

ICT in Nigeria Higher Education

While we acknowledge that the utilization of teaching technology in tertiary education instruction and learning processes is still at its early phase in Nigeria, ICT teaching use is crucial to the progression and advancement of knowledge and scholars alike. Tertiary education institutions, especially those in western Nigeria have adopted ICT as a means of imparting knowledge and skills upon students demanded by 21st century educational advancement (UNESCO, 2010). UNESCO (2010), observed that ICT currently pervades the education arena and reinforces the very success of 21st century education. ICT also inputs value to the progression of learning and the arrangement and control of learning institutions. Technology is the accelerator behind much of the development and innovations in both developed and developing nations of the globe. As such, all nations must seek to benefit from technological development. To do so, professionals must be schooled with sound ICT backup, independent of definite computer platforms or software environments to achieve the obligatory competencies of the ever-changing universe.

When ICT in instruction does not obtain anticipated objectives or when it presents complex educational improvements, students and instructors can lose concentration on the prerequisites and become abstracted by the rapidly shifting technologies themselves. This outcome is likely when scholars and instructors have not been capable of acquiring a full comprehension of the technologies, the role ICT plays, what technology to use and how to use them. When the import of ICT and its limitless capacities in the educational arena are comprehended, rapidly varying technologies are not viewed as overwhelming, but as enhancers of greater critical thinking and problem-solving in education (Gulati, 2018).

Tools of ICTs in Higher Education

ICTs its tools are digital infrastructures such as computers, laptops, desktops, data projectors, software programmes and so on. These ICT tools are used to interact, create, circulate, store and control information. ICT consists of various tools that can be exploited by capable and creative teachers as well as learners to improve the teaching and learning process. Some of these tools include: Computers, Radios, Televisions, The Internet and Telephones.

One of the tools of ICT in higher education is the computer. It is used as an information processing tool. It could still be used in data collection and analyses, data retrieval as well as computer mediated communication where the computer passively mediates communication between identifiable individual (learners and teachers). Example includes e-mail and teleconferencing. There are many ways in which the computer can be used in education. However, the method of use that is most directly related to instruction is the Computer Assisted Instruction (CAI). In CAI, the computer works with a programmed software (built-in codes) that instructs the user. Other main uses of computer in education are: Computer Managed Instruction (CMI), Computer Supported Learning Aids (CSLA), and Computer-Based Education (CBE). The Computer-Based Education is a general term and is often used to refer to any computerized system of education. It has no fixed hardware or software system. It merely stands as a term used to describe an educational environment which is characterized by the use of computerized technology to aid the learning process. It is an amalgam of CAI, CMI and course development system.

Next is the radio. The use of radio in education started around 1930. Its first application was in the form of Farm Radio Forums of 1950 but the United Kingdom's Open University made its utilization effective. Educational broadcasting takes two forms: Education Radio and Community Radio. Whereas, Education radio is the term given to the medium's use in formal learning system, whether primary or higher education, community radio involves informal processes whereby communities plan, own, and operate radio stations. In education radio, broadcasts are used as a way for course material delivery and often integrated with various kinds of interactions for example, in classrooms, discussion groups or via the telephone. This contrasts with the community radio in which radio materials are in local languages, and include songs, stories and drama with topics such as child nutrition, family planning and agriculture featuring.

Third on the list is the television. The television like the radio has been widely used in teaching and learning processes since the 1950s. Most people the world over now have access to television even if they are not privileged to own one. Generally educational television programmes are recorded and relayed over the television during designated times. They can be accessed by the teacher either by organizing the learners to watch them live or by recording the relayed programmes and relaying them to the learners at convenient times. Also, some features that students cannot go to see live or lessons that only specified teachers know can be shot on video CDs and played for the students' consumption. Worthy of mention is that the television has been a suitable medium for distance learning and open broadcast programmes. It is also used together with the telephone for video conferencing.

Another ICT tool is the internet. it serves different purposes for the stakeholders in education, i.e. the learner, the teacher and the educational administrators and policy makers. To the learner the internet has been helpful in fostering learner autonomy. Condie and Munro (2017) defined learner autonomy as the ability to take personal or "self regulated" responsibility for learning.

Through the internet, individual learners are able to gain knowledge in almost any field and can teach themselves or learn on their own as well as evaluate their performances. The internet is also used as a source of reference materials for the learner in doing his assignments, research work and/or term papers. To the teacher, the internet is a 'do without'. It is used as instructional materials, reference materials for lessons, research works and even publications. The internet could also be used by the teacher to collect data via e-mail, Facebook, etc., as well as provision of ample opportunity to have contact and network with other teachers all over the world.

Last but certainly not the least is the telephone. It has also found use in education. Teachers give assignments and even discuss lessons with students through the telephone. The telephone is also an integral part of the equipment needed in both audio and video conferencing. Most telephones (especially mobile telephones) now have internet facilities which also help both students and teachers.

Challenges of ICT in Nigeria Higher Education

Mikre (2017) stated that technology and its contributions are evolving and altering the arenas of knowledge very rapidly. It is here that it can be treasured that education as an area of study is taking on new tasks that deserve a more exhaustive study. Instructors faced with the transformative sagacity of a society that requires integrating ICT into the classroom, have seen their role change into that of agents with the capability of generating the necessary skills for a society 'yearning' for technological knowledge and the consistent and regular use thereof in various educational matters.

ICT integration into education is hindered by: Lack of qualified teachers, Cost of equipment, Management's attitude, Inconsistent power supply and Teacher's training curriculum

Lack of Qualified Teachers

Successfully integrating ICT into education depends to a large extent on the teacher's ability to structure the learning environment (UNESCO, 2015). There is much to talk about giving the "leap" forward and "breaking up" traditional formulas with cooperation and teamwork-based learning. However, the use and involvement of ICTs in education has not yet been understood as a tool through which meaningful learning can be generated. Frequent mistakes at school minimize ICT as a tool allowing access to and transmission of information, a misconception that continues to plague traditional education.

Cost of Equipment

The cost of ICT equipment should be affordable. With the high demand of technology in education comes high prices of ICT tools which have hindered the full integration of ICT into education. Due to the high cost of equipment, educational institutions are not well equipped. Some institutions barely have enough ICT equipment, while some have equipment that are not working and such equipment are just occupying space in the ICT labs to be viewed by external supervisors. The high cost of ICT equipment leads to the unavailability or insufficiency of these equipment for the learners and this in turn leads to poor knowledge on ICT as learners

barely have access to ICT equipment. They cannot fully maximize them, thereby limiting the impact of ICT in education.

According to Walter (2010), the pace of new investment largely determines the rate at which new technologies spread. Adequate supplies of ICT equipment to educational institutions will ease the impartation of knowledge or skills on the learners on the part of the educators and reduction in the cost of these equipments will facilitate their availability for individuals and enable them explore ICT tools at their own time and pace.

Managements' Attitudes

The attitudes of various managements in and outside institutions towards the development of ICT related facilities such as the internet and procurement of computers is rather slow in some instances, and in others there are no aids or support by the government at all. Most educational administrators do not see the importance of ICT in some educational institutions. They still prefer to do things manually, so, they pay little attention to the supply and maintenance of ICT equipment. In some cases where ICT equipment are supplied, the management restrict their use and this does not in any way help the learners to fully explore the equipment. Sometimes, internet use is restricted, and the importance of learners' access to the internet cannot be overemphasized. Aside the use of internet in the classroom, it goes a long way in achieving learner autonomy.

Inconsistent Electric Power Supply

Fluctuating power supply in most parts of the country and also inadequate telephone and broad band lines particularly in the rural areas have limited the full integration of ICT into education, and this is a major problem in the use of ICT equipment in educational institutions in developing countries, especially Nigeria. The fluctuation in supply of electricity frustrates the efforts of both teachers and learners in fully utilizing ICT equipment. ICT equipment are as good as useless without power supply. Also, the use of individual power sources such as generators and solar panels are also very expensive.

Teachers' Training Curriculum

Non-inclusion of ICT programmes in teachers' training curricula and or at the basic levels of education is a challenge to ICT use in the Nigerian educational system, and has led to producing graduates who are not compute rate and unemployable in today's world. It is the duty of the teachers to impart knowledge on the learners, and they cannot give what they do not have. ICT seems not to be included in the teachers training curricula; hence, teachers do not have broad knowledge on the use of ICT. The absence of ICT programme poses a major challenge to effective higher education in Nigeria. ICT should be integrated in our day to day learning and not seen as a separate branch of education. The process of technology transfer and development should be equitable for nations, gender and social status, bearing in mind the linkage and interdependency of all in the context of sustainable development (Walter, 2010).

Benefits of ICT in Higher Education
Shaping Education Policy

Science and technology have contributed immensely to strengthening and rejuvenating a system of democratic as well as transparent education planning and management. Through the use of ICT, educational policies have expanded access to learning, leading to improved quality and guaranteeing inclusion. The policy of education that allows inclusion will lead to the achievement of society where the level of literacy is high and the rate of development is exponential (Kozma, 2008). In Nigerian post-secondary instructional institutions today where resources are scarce, Science and Technology provide a solid platform that enables access to open source materials (Olaniyan & Okemakinde, 2008). The proper and judicious use of open-source materials provide the means to bypass the bottleneck of textbook production, distribution and updating thus reducing the cost of education. Policy decision that encompasses this can influence education for the betterment of all stakeholders in higher education.

Improved Teacher Education

The need for competent and professional teachers has never been more necessary than it is today. According to Thakral (2015), the number and quality of teachers, teaching practice and teacher education are facing serious systemic challenges across the world. UNESCO aptly observed that we are at a critical time and that at present the world needs an estimated 9.1 million new teachers to reach internationally-agreed education targets by 2020. Hence, the quality of teachers, their continuing professional education and training remain cardinal to the achievement of quality education. These challenges facing teacher education can be addressed through a holistic and systemic approach to education and teacher development systems through incorporating ICT. Existing teacher development practices, multi-stakeholder partnerships, capacity building of policy-makers

and the development of international standards via ICT and on ICT competencies for teachers can mitigate the challenges that currently bedevil higher education (Usun, 2009).

Through government interventions and training seminars organized in developed nations, ICT tools stimulate teachers. According to a recent research, majority of teachers in Europe (90%) claim to use ICT to do tasks such as preparing lessons and sequencing classroom activities. These enable teachers to plan their lessons more efficiently. ICT also helps teachers to work in teams and share ideas related to the school curriculum. There is also evidence that broadband and interactive whiteboards play a central role in fostering teachers' communication and increasing collaboration among educators. (Kozma, McGhee, Quellmalz and Zalles, 2014).

Better Open Educational Resources (OER)

OER are teaching-learning or research materials that are in the public domain or that can be used under an intellectual property license that allows re-use or adaptation (e.g Creative Commons) (UNESCO, 2015) The potential of opening up educational resources for use and adaptation by everyone, especially those in resource-poor environments, is a great opportunity to achieve quality education. The National Open University of Nigeria (NOUN) for example makes its educational materials available for others to use freely.

Today, the broad movement working to encourage creators of knowledge and information (including software), are actively active in promoting OER. It is worth noting that according to UNESCO, Nigeria has a very low percentage of its publications available on-line and in Open Access (UNESCO, 2015). UNESCO itself, for instance, has bought into OER, thus allowing learners, teachers, administrators and governments to freely access, create and share open document-format educational resources (UNESCO, 2015).

The Internet Revolution

According to the Internet world statistics (2014), the internet usage in Nigeria has grown from 200,000 users in the year 2000 to about 70 million users as of June, 2014. This implies that the current internet penetration (of Nigerian population) is 39.7%. The Internet has truly revolutionized how knowledge is communicated. In the world's most developed economies, the presence of ICTs has expanded exponentially and touched virtually all dimensions of the higher education enterprise (Altbach, Reisberg and Rumbley, 2009).

Resolving the Problem of Education in Nigeria

Plethora of problems plague education in Nigeria today and though the Educational system in Nigeria is decades behind compared to the rest of the developed world, the viable ways to catch up is to take a giant leap at ICT Solutions. The problem of inadequately incorporating ICT in our educational system can be overcome by educating people on the tremendous benefits. For instance, education delivered through ICT can bring the best quality of education at a low cost deployed across all spheres to the doorsteps of students nationwide at the same time delivered in the simplest and most understandable way to individual student. This will inspire and task students' independent thinking. The possibilities of such solution are endless because when students are inspired, they can imagine solutions from what they learn and apply it in their daily lives and environments. Challenges such as poor quality of teachers, lecturers and administrators, poor delivery of educational content, non-conducive learning environments, increasing cost of education, etc., can all be addressed by ICT, through collaboration with the developed world.

Prospects of ICT in Higher Education in Nigeria

The use of ICT in higher education has increasingly become an essential element of the educational environment. Accompanied by technological tools, the use of ICT in higher education is to become an increasingly ever-present reality in society, hence expansion to embrace students, teachers and educational institutions will result in optimization of the teaching-learning process. Undoubtedly, an analysis of different views about higher education shows the importance and growing perspective of technology, which would advance social and collaborative learning with a dimension capable of fostering the liaison between current societies and an education that is both transformative and adaptive.

At present, higher education may not be conceived separately from ICT or deny the support lent by ICT to education. From this perspective. it is hard to evoke any educational innovation that is not tied to technological developments. The 2002 publication *2020 Visions, Transforming Education and Training Through Advanced Technologies* show the different contexts in which educational institutions will foster the use of ICT in education. Considering the feasibility of this technology where assessment of aspects such as physical space, materials, teaching models, monitoring, evaluation and teacher training are some of the issues to be addressed by education if the latter is to adopt a more objective approach towards the importance of ICT in education.

Integration of ICT in education must be accompanied by a series of guidelines defining a framework for decision-making regarding the actions to be taken during the process. It identifies three dimensions: (1)

Information related to access, shaping and transformation of new knowledge and digital environmental information; (2) Communication connected with collaboration, teamwork and technological adaptability; (3) Ethics and Social Impact, linked to the competencies needed to face the ethical challenges of globalization and the rise of ICTs.

II. CONCLUSION

In conclusion, ICT has become an integral part of modern day society. The advantages to be harnessed abound and as the phenomenon of ICT continues to gain awareness in the whole gamut of higher education, all stakeholders must continuously plow the ground to foster ICT-enabled development in the higher education sector of Nigeria. The world as a global village will not wait for the giant of Africa, Nigeria, if she slumbers on, taking no deliberate and planned actions to be at par with the rest of the world. ICTs, as technological tools have increased the degree of significance and educational conception, establishing new models of communication, besides generating spaces for training, information, debate, reflection, among others, as well as breaking up the barriers of traditionalism in the classroom.

The teaching-learning process in the classroom, using ICT, requires a set of skills to be developed by the teacher with a view to internalizing a methodology to make the most of technological tools, in which teacher training shall be deemed among the first options prior to facing new educational challenges. Today, Nigerian higher educational institutions are not relenting on their achievements but scaling greater heights with the introduction of one-student-one-tab in some higher educational institutions for educational purposes to improve the level of ICT integration into education. These will enable better learning and teaching experience in the wider scope.

Suggestions
The following suggestions are made based on the results of the study:
1. Information and Communication Technology (ICT) facilities should be made more readily available in higher educational institutions in Nigeria by involving all other stakeholders in higher education (outside the government) in voluntarily assisting to make these facilities available. Also, government should reduce the cost of ICT tools for schools by subsidizing as long as it can be confirmed that the tools/facilities are going into education.
2. Information and Communication Technologies (ICTs) should be properly utilized during teaching and learning in the classroom and lecture rooms in higher educational institutions in Nigeria by providing uninterrupted power supply, and limiting students' restriction to the use of the internet and ICT facilities in higher educational institutions in Nigeria.
3. Training, workshops and refresher courses should be organized by the managements of higher educational institutions for Information and Communication Technologies (ICTs) instructors.

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