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# Use and Application of ICT in Teaching and Learning for Quality Higher Education in Nigeria: A Literature Analysis

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# Use and Application of ICT in Teaching and Learning for Quality Higher Education in Nigeria: A Literature Analysis

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**ABSTRACT**

**Although, the roles of educators in higher institutions in Nigeria have been expanded to include the use of information and communication for teaching and learning, there seems to be less achievement in this area. This paper argues that ICTs for educational purposes, such as to aid teaching and learning and for research activities including collaborative learning is sacrosanct, if they must be compared favourably with their counterparts at the global arena. This study focused on the clarification on the concept of ICT, the status of ICT use for teaching and learning in higher education in Nigeria, technology for teaching and learning and the challenges in the adoption of ICT in teaching and learning for quality higher education in Nigeria. Nigerian higher institutions which have been ranked higher on the African continents, have not done well in competing globally due to certain challenges. This reveals a gap which needs to be filled by taking necessary steps in putting Nigerian higher institutions forward in the international scholastic arena. This paper argues that proper use of information and communication technology for teaching and learning can be used to fill this gap in higher institutions in Nigeria. The paper concludes that, although technology provides greater opportunities for higher institutions in Nigeria to propel teaching and learning processes, majority of the higher institutions in developing countries possess basic ICT infrastructure. The paper recommended that ICT integration in Nigerian higher institutions must be adopted to support curricular goals of the institutions for higher quality education.**

**Key Words: Application of ICT, teaching and learning, quality higher education, Nigeria**

## INTRODUCTION

Within the Nigerian educational context, the roles of academic staff especially, in the development of young generation of a nation in the scientific and cultural community engaged in higher education and research cannot be over-emphasized (Bakare, 2015). Kolawole (2015), noted that lecturers are central to the realization of all the objectives of higher institutions for the development of Nigeria and even globally. This is to the extent that, they are employed to teach, carry out research, serve the community, provide leadership to students, set academic standards and ensure that students meet such standards through regular consultations, meetings, briefings, seminars, lectures, examinations and other activities.

The teaching and learning activities in higher institutions in Nigeria are dominantly characterised by traditional methods, where the teacher interact with students based on face-to-face arrangement. Meanwhile, higher institutions in Nigeria according to Ojedokun (2007) cited in Issa et al (2013) are expected to equip students with varieties of technical skills, access to numerous types of accepted knowledge sources, critical thinking capacity, cultural and civil values and beliefs, and certification in scores of different disciplines. He further states that with the accelerated increase in the numbers of Nigerian academic institutions especially the entrant of private higher institutions into the Nigerian educational systems, the sector has greater competitive and several measures to take to be among the continental and global best higher institutions. Issa et al (2013) are of the opinion that higher institutions are mostly known for their teaching, learning, research and community developments activities. According to them, if these aims are to be achieved, the institutions need to put all resources together in a coordinated form to meet her objectives. However, with the application of ICT, students can independently proceed in mastering teaching

materials, choose the pace of work, repeat the material that is not sufficiently clear, and track their progress. For instance, interactive multimedia content, especially, provides a great advantage of modern learning over traditional learning. Also, with the application of ICT for education feedback between the teacher and the students is enhanced (Stosic, 2015).

Information and communication technology can be referred to as any device that can be used to store, retrieve, manipulate, transmit or receive information in a digital form. The use of technology in education is referred to as educational technology which according to (Stoistic, 2015) is a systematic and organized method of applying modern technology to enhance the quality of education. It is a systematic process of conceptualizing the execution and evaluation of the educational procedures with the deployment of modern educational teaching techniques. It includes instructional materials, methods and organization of work and relationships among the participants in the educational process. There are many factors that are driving higher learning institutions to adopt electronic teaching and learning. These factors are sometimes pedagogical and socio-economic in nature and include but not limited to enhanced information access; significant improvement in communication through electronic facilities; synchronicity in learning; increased cooperation and collaboration, and cost-effectiveness as well as greater pedagogy through simulations, virtual experiences, and graphic representations (Fisser, 2001; Pelliccione, 2001) cited in (Sife, Lwoga, and Sokoine, 2007).

Bearing in minds that all nations in the world are becoming increasingly more technology-dependent with the aim of producing students for the real world environment, this paper therefore argues that proper use of ICT will play a crucial role in teaching and learning in higher institutions in Nigeria if one of the intentions of its government is to provide the most comprehensive education possible for its citizens within the limit of its available resources.

## REVIEW OF LITERATURE

### Concept of ICT and relevance to learning

ICT involves systems, from simple ones to the complex ones, with subsystems and/or components that interact to achieve a goal. In this context it refers to Instructional materials for teaching and learning for quality higher education especially in Nigeria. Sazali, Raduan and Suzana (2012) quoting Kumar et. al (1999), states that ICT consists of two primary components: a physical component which comprises items such as products, tooling, equipments, blueprints, techniques, and processes; and the informational part which consists of know-how in management, marketing, production, quality control, reliability, skilled labor and functional areas. Citing further Burgelman et al. (1996), the author refers ICT as the theoretical and practical knowledge, skills, and artifacts that can be used to develop products and services as well as their production and delivery systems. ICT is also embodied in people, materials, cognitive and physical processes, facilities, machines and tools (Lin, 2003). Most of these ranges of technologies are used as e-learning for classroom instructions by lecturers and students for teaching and learning.

According to Yusuf et al (2013) information and communication technology (ICT) is a force that has changed many aspects of people's ways of life. Considering such disciplines as medicine, tourism, travel, business, law, banking, engineering and architecture, the impact of ICT in the past two or three decades has been enormous. Information and communication technology (ICT) is an indispensable component of the contemporary world. Presently, culture and society have to be adjusted to meet the challenges of the information age. Moreover, most institutions of learning especially in the developed world use ICT for teaching and learning.

Sife, Lwoga, and Sokoine, (2007) refers to E-learning as "the use of ICTs to enhance and support teaching and learning processes". It is the instructional content or learning experiences delivered or enabled by electronic technologies and it incorporates a wide variety of learning strategies and technologies. They further quoted Commission on Technology and Adult Learning, (2001; OECD 2005) and expressed that e- learning ranges from the way students use e-mail and accessing course work, and following courses and programmes offered entirely online. It is thus an alternative solution, which enlarges accessibility to training and becomes essential to complement the traditional way of teaching (i.e. face-to-face).

E-learning encompasses a continuation of integrated educational technologies. At one end are applications such as PowerPoint, which have little impact on learning and teaching strategies or the organization. At the other end are virtual learning environments (VLEs), and managed learning environments (MLEs), which can have significant impact upon learning and teaching strategies, and upon the organization (OSU, 2003; Julian et al, 2004) in Sife et al (2007). Broadly, OSU (2003) views the continuum of e- learning as "the educational technology from the supplemental use of technology in the classroom, through blended or hybrid uses comprising a mix of face-to-face and fully online instruction, to fully online synchronous and asynchronous distance learning environments delivered to remote learners".

Arabasz and Baker (2003) express the view that "in the supplemental use of ICTs to complement traditional learning experiences, the instructor teaches all sessions in the classroom but with the occasional use of technology, such as Web- based activities, multimedia simulations, virtual labs, and/or online testing. This results in blended learning which according to Mortera-Gutierrez (2005) denotes "a solution that combines several different delivery methods, such as collaboration software, web-based courses, computer communication practices with traditional face-to-face instructions". Apart from this, distance learning may also be conducted exclusively online where interaction may be synchronous or asynchronous (OSU, 2007). Chen et al., (2004) opine that synchronous learning "requires the teachers and students to interact at the same time though they may be dispersed geographically. While, asynchronous learning allows teachers and students to interact and participate in the educational process at different time irrespective of their locations". However, the use of synchronous with asynchronous activities is determined by the technology availablility, cost, and maintenance and is adjusted to suit each course, instructor and audience (Graziadei et al., 1997 quoted in Sife, Lwoga, and Sokoine, 2007).

**The state of ICT use for Teaching and Learning in Higher Education in Nigeria**

Education is one of the most important needs for the well being of individual and that of the society. Shamsideen (2016) suggests that "education is the primary agent of transformation towards sustainable development since it increases people's capacities to transform their visions into reality". He further notices that "education not only provides scientific and technical skills, it also provides the motivation, justification, and social support for pursuing and applying them".

Thus, Yusuf et al (2013) concludes that "education is a powerful instrument of social, political, and economic progress, without which neither an individual nor a society can attain professional growth". Issa etal (2013), observe that higher education in Nigeria has not been the same in the last two decades or so. A lot of transformation and reformation has taken place over the past few years. This is evident in the numbers of public and private higher institutions springing in quick succession in the country. Over the past decade, Nigeria higher institutions have been ranked higher on the African continents, but have not been doing well in competing globally due to certain challenges that facing higher education in Africa. This according to Issa etal (2013) reveals a gap that needs to be filled by taking necessary steps in putting Nigerian higher institutions forward in the international scholastic arena. This paper argues that information and communication technology can be used to fill this identified gap in higher institutions in Nigeria.

This is to the extent that Davis and Tearle (1999) cited in Yusuf et al (2013) stresses that "ICT for teaching and learning in Nigerian higher institutions has the potential to accelerate, enrich and deepen skills, motivate and engage students learning, helps to relate school experience to work, practice, helps to create economic viability for tomorrow's workers, contributes to the total development of the institution, strengthens teaching and learning and provides opportunities for connection between the school and the world". Despite this enormous advantage, however, Stosic (2015) declares that teaching process in Nigeria is still dominated by traditional methods. The author notes that "it is dominated by the frontal form of work where the teacher had enough interaction with students". In this kind of situation the students fail to thrive at their own pace. Apart from this, insufficient activity of students is also one of the drawbacks of this type of learning.

Meanwhile, with the application of ICT in form of educational technology, students can independently master teaching materials, choose the pace of work, repeat the material that is not sufficiently clear and track their progress. Interactive multimedia content, especially, provides a great advantage of modern learning over traditional learning. ICT application in teaching and learning also facilitate feedback between the teacher and the student.

Stosic (2015) observes that, there seems to be two categories of teachers in the understanding of the use ICT for teaching and learning in Nigeria. "Some of them have thorough understanding of modern technical appliances and their operation while others think it is necessary for them to gain additional technical knowledge of the appliances and methods, teaching methods, student-teacher relationship. These two groups represent a group of teachers between older and younger teachers. Older teachers during their study did not have the possibility of training with modern technical appliances, did not have the information technology, educational technology while the younger generation of teachers possess the knowledge required for the use of educational technology".

**ICT in Teaching and Learning for Quality Higher Education in Nigeria**

Sife, Lwoga, and Sokoine (2007) state that functionally, e-learning includes a wide variety of learning strategies and ICT applications for exchanging information and gaining knowledge. Such ICT application according to the authors "include television and radio; Compact Discs (CDs) and Digital Versatile Discs (DVDs); video conferencing; mobile technologies; web-based technologies; and electronic learning platforms".

One of the technologies known as video conferencing is a method where two or more participants, based in different physical locations, can see and hear each other in real time (i.e. live) using special equipment. It is a process of performing interactive video communications over a regular high-speed Internet connection. Sife, Lwoga, and Sokoine (2007) further categorise a videoconference into either "two-way (point-to-point) or multipoint, linking three or more sites with sound and video. It can also include data sharing such as an electronic whiteboard where participants can draw on, or text based real time 'chat'". As for interactive whiteboard, it is simply "a surface onto which a computer screen can be displayed, via a projector" (Department for Education and Skill, 2004).

Mobile e-Learning (sometimes called 'm-Learning') is another latest way of learning, using small, portable computers such as personal digital assistants (PDAs), handheld computers, two-way messaging pagers, Internet-enabled cell phones, and hybrid devices that combine two or more of these devices into one (Hunsinger, 2005) cited in (Sife, Lwoga, and Sokoine, 2007). These technologies have enormous potential as learning tools.

World Wide Web (WWW) also, is a set of software tools and standards which allows users to obtain and distribute information stored on a server and connected to Internet. WWW is a decentralized information system, in which anyone can add new information anytime. Lecture notes and other teaching materials are placed on the WWW including linkable useful websites to these resources for students to access. In the recent years, Chen et al. (2004) stresses that "web and Internet technologies have matured significantly by providing a uniform access media for both asynchronous and synchronous learning. This phenomenon has significantly increased the popularity of on-line learning". To Anderson (2007) "the usage of web technologies in e-learning are further enhanced with the web 2.0, which is a set of economic, social, and technology trends that facilitate a more socially connected Web where everyone is able to add to and edit the information space. These include blogs, wikis, multimedia sharing services, content syndication, podcasting and content tagging services".

Furthermore, e-learning platforms (sometimes called learning management systems (LMS)) are applications used for delivery of learning content and facilitation of learning task. According to OECD (2005) "they are developed for administration and teaching in tertiary education and this software enables the administrators and lecturers to treat enrolment data electronically, offer electronic access to course materials and carry out assessments". These activities facilitated by the LMS vary from instructor-led classroom training, educational seminars to Web-based online training. In addition to managing the administrative functions of online learning, some systems help create, reuse, locate, deliver, manage, and improve learning content. These systems are called Learning Content Management Systems (LCMS) (Rengarajan, 2001). LCMS actually provide tools to deliver instructor-led synchronous and asynchronous online training. The LCMS makes possible the provision of tools for authoring content as well as virtual spaces for learner interaction (such as discussion forums and live chat rooms). Rengarajan (2001) emphasizes the importance of integrating both LMS and LCMS because "they share different levels of administrative interests in the same entities".

Many e-learning platforms (both LMS and LCMS) currently available are based on either proprietary e-learning software (PES) or open source e-learning software (OSS). OSS usage in implementing e-learning systems is more emphasized in developing world due to the challenges faced when implementing the PES. If according to Udida et al (2009), higher educational institutions in Nigeria from their modest beginning are expected to offer services that significantly contribute within the context of a sound macro-economic and political environment to the growth of the society, then, they must adopt many of the above range of technologies in teaching and learning for quality higher education in Nigeria.

**Challenges in the Adoption of Technology in Teaching and Learning for Quality Higher Education in Nigeria**

Yusuf et al (2013) in one of their studies observe that if one looks at education sector in Ngeria, it seems there is a little influence of ICT utilization and far less change, than other fields have experienced. Stosic (2015) corroborates this by stating that educational technology is not still being applied sufficiently, mostly for reasons of lack of school equipment, necessary resources and insufficient qualification of teachers for the purpose of implementing this ICT utilisation.

There are many challenges which universities in developing countries face as they seek to implement the e-learning systems. AAU (2001) in Sife, Lwoga, and Sokoine (2007) asserts that "African universities which should be in the forefront of ensuring Africa's participation in the ICT revolution, they are themselves unable and ill-prepared to play such a leadership role". This is because the information infrastructure which most African universities rely on for this purpose is poorly developed and unequally distributed.

Challenges for integration of these technologies in higher institutions in developing countries according to Sife, Lwoga, and Sokoine (2007) include:

i. ICT challenges: With the socio-economic and cultural challenges of ICT experienced in developing countries like Nigeria, it is highly difficult to deploy and sustain the use of ICT for teaching and learning activities. Training the students on ICT application for teaching and learning is capital intensive, which may not be totally achievable due to the current economic challenges experienced in the country.
ii. Inadequate facilities and instructional materials: High cost of facilities and instructional materials equally pose threats to ICT for teaching and learning activities in the country. To equip an ICT Centre requires a huge monetary investment. Therefore, higher institutions need to make do with the little resources in their possession just to meet up with the minimum standard requirements set by the regulatory bodies.
iii. Lack of systemic approach to ICT implementation: Inclusiveness of ICTs in the functions of any organization is a complex process that requires to be maximally conceptualized and defined from the beginning.
iv. Number of staff and students in each department and projected growth.
v. Administrative support: This is critical to the successful integration of ICTs into teaching and learning process. There is a need for administrators to provide the conditions that are needed, such as ICT policy, incentives and resources. The commitment and interest of the top management and other leaders at every level is the most critical factor for successfully implementing ICTs.
vi. Technical support: This includes issues like installation, operation, maintenance, network administration and security. This is an important part of the implementation and inclusiveness of ICT in education system. Technical support, in most cases however, is not available, which implies that lecturers and students require some basic troubleshooting skills to surmount technical problems when using ICTs.
vii. Inadequate funds: Financial resources are key issues to the successful implementation and integration of ICTs in education. It is obvious that countries with greater financial resource bases stand good chances than those with limited resources to reap benefits offered by ICTs. In addressing the problem of limited funds and in order to sustain donor funded projects, higher learning institutions need to do the following: (i) adopt freeware and open source software for teaching and learning activities; (ii) continuously urge their governments to release more funds; and (iii) diversify their sources of funds to have a wide financial base.

Finally, Yusuf et al (2013) summarise the various constraints to ICT utilisation as a change agent for higher education in Nigeria are as follows: Inadequate computer trained and certificates teachers; Poor funding; Irregular power supply; Cost of equipment; Lack of Relevant Software. Quoting Salomon (1989), they concluded that there are clear indications from many countries that the supply of relevant and appropriate software is a major obstacle hindering wider application of the computer especially for teaching and learning in higher institutions of learning.

## CONCLUSIONS AND RECOMMENDATIONS

Although, technology provides great opportunity for higher institutions in Nigeria to enhance their teaching and learning processes, most of the higher institutions in developing countries still possess basic ICT infrastructure. Yet, while many are just beginning to take advantage of the true potential technology offers for teaching and learning, others are delaying its imminent usage in the classroom as the valuable teaching and learning tools. Proper use of technology will help students in higher institutions in Nigeria acquire the requisite skills they need to survive in a complex and highly technological knowledge-based economy.

It is therefore, recommended that, higher institutions in Nigeria imbibe holistically, advanced technologies to improve teaching and learning processes so that students are prepared well for the real world competitive environment. Particularly, technology integration in higher institutions in Nigeria must be adopted to support curricular goals of the institutions for higher quality education.

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