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Information and Communication Technology (ICT) Integration: A Veritable Technique for Quality Secondary Education

*Hammed Olalekan Bolaji, Ismaeel Saka Ajia**

Al-Hikmah University, Ilorin, Nigeria

*Correspondence: E-mail: Ismaeel.ajia@gmail.com

ABSTRACTS

Information and communication technology (ICT) is an indispensable tool for teachers to meet the global expectation of modern teaching techniques with the use of technology-based teaching and learning tools and facilities. This paper examines how schools can best integrate Information Communication, and Technology to support the teaching and learning process in the classroom, and enhance quality secondary school education. Some of the problems that serve as obstructs in the wheel of quality education system include inadequate funding, lack of readiness, human readiness, system readiness, physical readiness, and teacher awareness, knowledge, and understanding of the benefits of ICTs in the effective management of secondary education among others in Nigeria. The Nigerian government is the primary driver of ICTs for education in Nigeria and other ICT providers as Donors. Some identified factors for the effective use of ICT were detailed and the greatest obstacle to technology use in secondary schools is a lack of readiness. Solutions to those challenges were enlisted among others are the planning process of integration of ICT should involve all stakeholders and national action plans must take cognizance of local constraints and salient educational needs. It was recommended among others that teachers should use ICT with students to collaborate with their peers and provide a high-quality education.

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1. INTRODUCTION

The Nigerian Government sees Information and Communication Technology (ICT)'s an essential tool to be part of any education reform efforts to scale innovations and provide educational services that might be otherwise (Bolaji & Adeoye, 2022). Hence, students are taking advantage of ICT for additional tutoring, remediation, and exam preparation. One of the biggest technology-related growth areas in secondary education is taking place in after-school and at-home online tutoring, remediation, and exam preparation services through desktops, laptops, or smartphones (Bolaji & Jimoh, 2023). Integration of ICT can enhance the quality of secondary education through the right policies and implementation, and problems of unavailability and inaccessibility of ICT; curriculum reform, improvement of the quality of teaching and learning, achievement of learning outcomes, and training and retraining of teachers can be solved (Obioha, 2005). ICT equipment created a more interesting environment for teaching and learning, to improve teachers' confidence in the instructional process as a whole. Insurgency across northern Nigeria that led to the closure of many secondary schools can benefit from it, although ICT cannot replace a functioning educational system, is increasingly being utilized to provide educational opportunities to students and their teachers.

2. METHODS

This is a literature review. Data were obtained from internet sources, including articles from international journals. Data were collected, analyzed, and finally summarized.

3. RESULTS AND DISCUSSION

3.1. Problems in Nigeria

Some of the problems serving as clogs in the wheel of the quality education system from achieving its goals include inadequate funding for the effective management of secondary education in Nigeria. Money is a very important factor in education which other vital elements in the school depend upon, such as school building, purchase of equipment, payment of teachers' salaries, and allowance and running expenses (Adeniyi, 2019). Immediately after Nigerian independence, student enrolment started to increase tremendously and became a responsibility for government to shoulder. Hence inadequate funding has resulted in poor teaching and dilapidated buildings (Capan, 2012). The poor funding of education state of education in Nigeria is a reflection of dilapidated infrastructure in Nigerian schools. Inadequate Facilities: These are the material resources needed to facilitate effective teaching and learning processes in schools. Adeniyi (2019) explained that educational facilities are those things that help the teacher to achieve a level of instructional effectiveness that is far beyond what is possible when they are not provided. Another clog is Staff Morale: If the morale of the teacher is low, there is a likelihood that the teacher's performance will not be as expected. Teachers as major stakeholders in the educational system are facing challenges such as irregular promotion, low pay packages, societal perception of the job and many more have dampened the morale of teachers (Adeniyi, 2019).

3.2. Concept of quality education and ICT

Generally, quality can be seen as a standard, peculiar and essential character when compared to something like it that cannot be removed from something; a distinguishing attribute of something. Quality involves how good or bad something is. When talking about

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quality, it implies the standard set against something when compared to other things. Quality education is indispensable for the national prosperity and security of any nation and quality of education cannot be achieved without the quality of its surrounding factors. For the realization of quality education, all its components should be taken into consideration and realized. All educational space is the component itself: standards and curricula; academic literature; teaching staff (their professional skills); monitoring of education; moral and patriotic education; scientific research in the sphere of education; the system management; material and technical base (Abioye & Akintayo, 2017). Development of information technology in several providers such as enlarging the motivation of learners; enriching basic skills; and increasing teacher training in technology among others can enhance quality education. If information and communication technology is properly employed, it will not only serve as a curriculum/subject transformation tool but, can also create an environment learner centered. Quality of education includes improving the quality of standards and curricula as stated by (Abioye & Akintayo, 2017).

According to Adeniyi (2019), quality education includes Quality improvement of academic literature: It is important to organize unified author groups for the development of a set of textbooks or innovative methodical complexes for some subjects; to enhance practical competence; to realize the technology of interactive education; to create orientation of teaching materials, and proportion of various creative tasks should be increased; to form information culture. Improving the quality of capacity development of the school personnel: The improvement of capacity development of the teachers can be classified into two methods: Improvement of the quality of teachers' training and increasing the competence of teachers' staff.

Quality for the professional development of teachers is a large independent program, it is a known fact that, due to several objective and subjective reasons, professional competency of the teaching staff. It became imperative to increase the competency of all teachers according to the content for the level of education. Improving the quality of monitoring in school: Evaluation of the ICT program aims at improving the quality needed, identifying its demerits, and determining how to rectify the identified problems. Designing suitable instruments for education quality evaluation of academic subjects for the students and efficient assessment of learning outcomes in different subjects do help to realize high-quality secondary education.

Improving the quality of scientific research in the sphere of education: To improve the quality of secondary education, it is necessary to embark on research based on the objectives, as the level of the development of the system quality depends on the level of achievements of the science of instruction. Quality improvement of the management system: Since the improvement of the education quality is achievable in schools, therefore, to improve the education quality for secondary education all the institutions of the management system should work cooperatively. Quality improvement of material and technical base: To improve the material and technical base of schools, especially in rural areas, the government should pay great attention to quality secondary education. It can be summed up that to improve the quality of all the components of the education system, is essential to mobilize and ensure the efficient performance of a large team of scientists, teachers, and parents, scientific research organizations and educational institutions, textbook authors and publishers, the teaching staff, and the public among others.

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3.3. Concept of quality education and ICT

ICT stands for Information and Communication Technologies, which includes all technologies for the manipulation and communication of information (input, store, convert, save, transfer, and retrieve data). Akudolu (2002) explained that ICT will help facilitate the transaction between producers and users of ICT by keeping the students updated and enhancing the teacher's job performance and development and facilitates contact between the teacher and the student through e-learning, e-mail, web-based learning such as internet, intranet, extranet, TV audio-videotape, CD-ROM, Wilds, enhancement of Browsers, among others. U-learning has been gaining more recognition in teaching-learning processes in the classroom. ICT can improve educational quality by providing a remedy for shortcomings in classroom instruction. Technology stands for modernity and progress; digital literacy and ICT skills are essential for youth employment and higher education in this 21st century. According to Dede (2000), ICT integration implies the use of computer-based communication mediums in the classroom instructional process. Teachers are the major players in preparing students for the current digital era in their daily classroom activities. If students are familiar with technology, they will learn better within the technology-based environment, hence ICT integration in schools is vital. The process of technology in education cannot be overemphasized in terms of its effectiveness as modern teaching and learning technique and it will support effective learning with its elements and components (Jamieson-Procter *et al*., 2013).

The integration approach of ICT in education involves the implementation of the right use of technology in a particular subject area that involves complex concepts and skills to improve learners' performance and achievement (Shah, 2022). A review of the curriculum is also needed to relate ICT resources and appropriate software to the main aims and objectives of the curriculum set. Another approach enhancement approach has to do with the use of ICT to give great emphasis on the topic at hand. Through the integration of ICT into secondary education, ministries of education could make available data on their websites inaccessible to donors, the private sector, universities, and NGOs could target their programming to the greatest national needs. While, at the school level, the use of simplified digital data collection tools, along with school-based "data conversations," can improve the monitoring and attainment of student learning outcomes. The needs for quality education of students with special needs can be met like their normal counterparts through the integration of good software design. In Nigeria like other developing countries of the world, students with special needs need to use assistive technology to access the internet to meet global practices but, available records show that only a small percentage of curriculum materials are currently available in alternative formats accessible for special education.

ICT comprises the effective use of technology equipment and programs to store access, convert, organize, manipulate, retrieve, and present data and information (Basri & Suliman, 2012). ICT covers the use of computers, the internet, and electronic delivery systems such as radios, televisions, and projectors among others, that are now in vogue in the field of education. Osborne and Collins (2000) identified some factors for the effective use of ICT that include:

(i) The first factor to be considered when a teacher wants to use ICT should be when appropriate for lesson objectives

(ii) Students need the necessary information, literacy, and analytical skills to successfully use ICT and these should be provided by the teacher; Students need the freedom to manipulate or explore and test their ideas

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(iii) Teachers need to develop confidence in addition to the training acquired on a range of different ICT applications by exploring them independently
(iv) Discussion and interaction between students and teachers should be encouraged
(v) The provision of reliable technical support is crucial in the use of integration of ICT
(vi) For ICT to be integrated safely and easily for practical work use, the laboratory design must well plan
(vii) Time saved through ICT needs to be used effectively to avoid data subscription wastage.

The benefits of ICT for teachers and students identified by Osborne and Collins (2000) and other scholars are summarized as follows:

(i) ICT provides quicker and more accurate data collection, saving lesson time and giving better quality results.
(ii) Authentic data are easily and increasingly accessible on the internet.
(iii) ICT simulations help teachers to show experiments that would not otherwise be possible.
(iv) Students will be more engaged and motivated with the integration of ICT to a greater degree.
(v) ICT allows access to new sources of data in various experimental settings, particularly in science subjects through data logging and digital video recording.

The benefits for students include:

(i) ICT help by providing instant feedback to students to refine experiments and hypotheses.
(ii) ICT help in providing a greater capacity for project-based learning on topics relevant to students' interests.
(iii) Visual modes of presentation in the use of ICT help understanding of concepts and processes.
(iv) Electronic communication (ICT) enables students to become part of a community of learners.
(v) ICT provides more opportunities for independent and self-directed learning.
(vi) ICT allows students to pay more attention to interpreting and analyzing data while the mechanical aspects of practical work are reduced.
(vii) School networks and the internet can provide students access to learning resources outside of school hours and even outside the school premises.

3.4. Policy environment and procurement rules for ICT in education

Broadband listed countries like Ghana, Guinea, Madagascar, South Africa, Benin, Cameroon, and the Gambia, that have complementary or supplementary plans or policies that support ICTs in education. While Nigeria like some other nations are still battling with how to meet up with the Universal Primary Enrollment goals of the Education for All (EFA); Millennium Development Goals (MDG) and Suitable Development Goal (SDG). There are complaints of misappropriations of funds allocated for ICT for education from some quarters, hence there need to prevent or minimize corruption in the provision of ICT for school or educational purposes: federal or state ministries of education should have very strong procurement rules such as procurements must be extremely specific before issuing a call for tenders, and it is difficult to promote innovation within the education system because ill-defined or exploratory ideas testing or proofs-of-concept cannot get through the procurement system (Jo-Shan, 2013). Some technology companies should be allowed to tender their quotations to the ministries and abide by the Procurement Act and tendering

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procedures are another way of curbing corruption in the provision of ICT for school or educational purposes.

3.5. Challenges facing ICT integration in the educational system

In Nigeria, the greatest obstacle to technology use in secondary schools is a lack of readiness. According to Akudolu (2002) and Agbatogun (2012), most secondary schools are simply not ready to use ICT to improve the quality of education. Readiness here covers physical, human capacities, technical and educational aspects.

(i) Physical readiness: Some secondary schools are in rural areas in Nigeria, there is no electricity supply or fuel to run generators; lack of physical space for computers, security, and clean environments.

(ii) Human readiness. Many teachers lack the basic set of skills to use technology such as a lack of understanding of how to integrate ICT into their subject areas. For example, how to guide students to use ICT for data analysis; or to guide students on how to use technology to learn basic facts in their subject areas. Human readiness also involves students, who suffer from ICT readiness issues. Many policymakers lack a real comprehension of the affordances and drawbacks of technology and of what it can and cannot do (Ghavifekr & Rosdy, 2015). There is often a lack of understanding of what a high-quality secondary system that uses technology to promote twenty-first-century learning looks like and what it requires.

(iii) System readiness: Many or even most Nigerian educational systems are simply not set up to incorporate and capitalize on the affordances of technology. Where technology is included in many of these systems, it is included as an examined subject, which downgrades ICT skills to mere knowledge of ICTs (Obioha, 2005). Lack of high-quality digital content and online assessments that automate testing and provide timely feedback, lack of adequately trained educators; and inadequate operating systems and digital content in languages that students speak are other educational obstacles that can be associated with a lack of readiness.

(iv) Teacher awareness, knowledge, and understanding of the potential of ICTs: This awareness relates to its positive development (Akinoso, 2023). Some teachers have been exposed to technology at home or school and younger teachers understand technology. More teachers know more about ICTs nowadays and are more likely to use technology as part of their professional work; teachers are more likely to undertake some form of interactive teaching, however modest; and they are more likely to express enthusiasm about ICTs. ICT is expected to be used to provide students with personalized content-specific remediation and enrichment. These help teachers pay more attention to learner-centered techniques and project-based activities in classrooms. Computer desktops or laptops are the more common configuration of ICTs in secondary schools in some Nigerian secondary schools.

3.6. Solution

The Government should develop an enabling and integrated policy environment for ICTs. Both federal and state governments need a robust and integrated policy environment that involves. Teachers need capacity development and support to help them meet their professional roles of supporting the incorporation of ICT into teaching and learning. The current global educational practices call for the integration of ICT based education in different subject areas to arose the interest of the learners in the particular subject areas in their

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learning environment. Therefore, it is necessary to give ICT an important place when formulating educational policies, particularly for secondary education

(i) The planning process of integration of ICT should involve all stakeholders and national action plans must take cognizance of local constraints and salient educational needs
(ii) ICT integration should cut across all content areas (not to be treated as a stand-alone subject but as a skill that must be acquired by students to enhance quality education)
(iii) Maintenance, repair, replacing old equipment, training, security, and support should be provided to improve their efficiency and effectiveness in our secondary schools
(iv) Government/school authorities should liaise with non-governmental organizations to achieve high-quality secondary education by ensuring that private-sector initiatives are addressing government secondary-school educational ICT priorities
(v) Government can invest in satellite-based internet; provide government-owned networks, and telecommunications providers should be provided with incentives to subsidize access to rural areas.

4. CONCLUSION

The development of ICT integration in the many subjects among students and in their learning, environment is merited by the existing educational practices. According to several reviews of the available literature, the three main obstacles to integrating ICT in schools are a lack of time, a lack of understanding of the educational uses of ICT, and a lack of expertise about the available software. Teachers and support personnel in our schools need training and retraining programs to make informed decisions about the technological needs of all kids (including those with special needs). The use of ICT in secondary education will improve students' learning opportunities for critical thinking and creative communication. It will also assist students in developing successful jobs and personal lives in an increasingly ICT-based world. ICT bridges all geographic divide by enabling students to participate in international projects. It offers the kids the option to learn different subjects from the school curriculum, creates a realistic setting in the classroom, and enables students to communicate with one another through the use of ICT. ICT facilitates the use of cooperative learning for a deeper comprehension of the subject matter with quick and simple conceptualization. Recommendations are in the following:

(i) The Government should develop an enabling and integrated policy environment for ICTs.
(ii) Teachers should use ICT with students to collaborate with their peers and provide a high-quality education.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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