

Article

## Barriers to Deployment of Information Communication and Technology in Tertiary Institutions in Nigeria

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**Abstract:** This paper discussed the barriers preventing effective deployment of information communication technologies in the tertiary institutions in Nigeria. The paper is a review paper. The paper used secondary data to support every point raised. The paper employed systematic review system to collect data online and in the print resources. The paper identified poor funding of ICT, inadequate ICT facilities, unstable power supply, weak internet connection, High Cost of Internet Services, poor ICT literacy among academic staff and students and poor implementation of ICT policies as barriers to the effective deployment of information communication technologies in the tertiary institutions in Nigeria. Based on this findings, the paper recommends that the government and other stakeholders in the tertiary institutions should increase funding to information communication technology programme in the tertiary institutions. Government should provide adequate ICT infrastructure facilities in all the institutions. Government should ensure constant supply of electricity in all the campuses. Government should direct internet service providers to improve their services in all the institutions. Government should subsidize the price of ICT facilities for students and lecturers. Government should implement all ICT policies in the tertiary institutions.

**Keywords:** Information Communication, Technology, Tertiary Institutions

### 1. Introduction

In her 2013 national policy on education, the Federal Republic of Nigeria defined tertiary education as the education provided following post-basic education in establishments like universities and inter-university centers like the Nigeria French Language Village, Nigeria Arabic Language Village, and National Institute of Nigerian Languages; institutions like Innovation Enterprise Institutions (IEIs); and colleges of education, monotronics, and polytechnics, as well as other specialized institutions like the National Teachers' Institutes (NTI), Colleges of Agriculture, and Schools of Health and Technology (FRN, 2013). Higher education promotes personal growth and development and has a beneficial effect on society as a whole (Schrader-King, 2024). According to Ogunode, Edinoh, and Okolie (2023), tertiary education is a planned and structured system of learning intended to use teaching, research, and community service to improve society overall and aid in the complete development of people. According to Idowu (2020), tertiary education, often known as higher education, encompasses a broader spectrum of higher education establishments, including universities and other institutions including polytechnics, monotronics, colleges of education, and technical training institutes. Higher education institutions are crucial instruments for addressing a nation's sociocultural and developmental demands, according to Ibrahim (2017). Nigeria's higher education objectives The National Policy on Education (NPE) outlines the following goals for education: reducing skill shortages by producing skilled labor relevant to the labor market; fostering and encouraging scholarship, entrepreneurship, and community service; fostering and cementing national unity; providing accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians; and providing high-quality career counseling and lifelong learning programs that equip students with the knowledge and skills for self-reliance and

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the workplace (FRN, 2013). The availability of people and material resources, including information, communication, and technologies, is essential to achieving the goals of postsecondary education. In the modern world, higher education plays a huge, intricate, and essential role with a variety of opportunities and obstacles. Because they can connect to the local and global environment in a variety of ways, tertiary education institutions have a long history of interacting with the outside world and can impact social change. One of the main reasons for the rising demand for higher education is the recognition of its critical role in a country's sociocultural and economic development. ICT integration in higher education gives students access to a wider range of more complex subjects and helps them hone their analytical abilities. It is important to support tertiary educational institutions in taking the lead in utilizing ICT's benefits and potential (Ijov & Wombu, 2019). ICT is a tool or equipment that makes it possible to gather, store, process, and share information (Nwachukwu 2005). Information and communication technology (ICT) includes the use of hardware, software, networks, and media for the gathering, storing, processing, transmitting, and presenting of information (text, pictures, audio, and data) and associated services (World Bank, 2007). Any technology used for the production, storage, sharing, transferring, or exchanging of information is referred to as ICT by the United Nations Educational, Scientific, and Cultural Organization (2007). The concept was created to include hardware and software for radio, television, video, DVD, telephone, and networks, as well as associated services like video conferencing and email. The more broad term "ICT" highlights the role of unified communications and the integration of audio-visual systems, intelligent building management systems, and telecommunications (wireless signals and telephone lines) in contemporary information technology. Information technology (IT) is commonly used as an extended synonym for it. ICT encompasses all technological tools used to handle information and promote communication, such as computer and network hardware, communication middleware, and necessary software. To put it another way, ICT encompasses network-based control and monitoring, broadcast media, telecommunications, IT, and all types of audio and video processing and transmission. The integrated use of electronic tools and systems, such as computers, media technologies, and telecommunications, that make it easier to gather, store, process, transmit, and share information is known as information and communication technology, or ICT. ICT in educational settings refers to a broad spectrum of networks, software, and hardware that facilitate teaching, learning, administration, and research, among other activities. These technologies change how information is sent and received within institutions by facilitating data access and manipulation, improving communication, and streamlining procedures. Through enhancing knowledge availability, encouraging teamwork, and supporting creative learning opportunities, ICT is essential to modern education (Ogunode, Olatunde-Aiyedun, Ukozor, & Ayeni, 2024). Knowledge and Interaction Numerous facets of people's lives have been altered by technology. For undergraduate teaching, learning, research, and publication, information is a vital resource. As a result, efficient techniques for processing and transmitting information are required (Nwosu & Ogbomo, in Ijov & Wombu, 2019). This has made it possible to alter and reorganize conventional tertiary education paradigms in addition to changing how society evaluates knowledge. One ability that is currently crucial for young people to enter the workforce in both developed and, increasingly, developing nations is information technology (Laura & Brown, in Ijov & Wombu, 2019). Due to the newly obtained ability for professors and students to have internet access at any time, higher education institutions are currently concentrating more on e-learning environments and less on traditional approaches. To improve conventional teaching techniques, ICT also helps students and teachers actively participate in online collaborative work (Oliver, in Ijov & Wombu, 2019).

#### Barriers to Deployment of Information Communication and Technology in Tertiary Institutions in Nigeria

There are many barriers to effective deployment of information communication technologies in the tertiary institutions in Nigeria. Some of these barriers includes; poor funding of ICT, inadequate ICT facilities, unstable power supply, weak internet

connection, High Cost of internet services, poor ICT literacy among academic staff and students and poor implementation of ICT policies.

## 2. Materials and Methods

The study employed a systematic review approach, utilizing secondary data sourced from both online repositories and print materials. This method was chosen to comprehensively examine the barriers to the deployment of information and communication technology (ICT) in tertiary institutions in Nigeria. The research involved an extensive analysis of existing literature, policy documents, and reports from relevant academic and institutional sources. The study focused on identifying recurrent themes in ICT deployment challenges, including poor funding, inadequate facilities, unstable power supply, weak internet connectivity, high service costs, low ICT literacy among academic staff and students, and ineffective policy implementation. The selection of sources was guided by their relevance to the Nigerian higher education landscape and their alignment with the study's objectives. Data extraction involved a thematic synthesis of findings, allowing for an integrated discussion of the key barriers affecting ICT implementation. The credibility of sources was ensured by prioritizing peer-reviewed journal articles, government publications, and reports from recognized international organizations. The study's systematic approach enabled a structured analysis of factors hindering ICT deployment, emphasizing patterns and gaps in institutional strategies and government interventions. The findings reflect the multifaceted nature of the challenges, indicating the need for coordinated efforts between stakeholders, including policymakers, educational institutions, and technology service providers. This methodology ensured a rigorous examination of existing knowledge, forming a basis for proposing viable recommendations to enhance ICT deployment in Nigeria's tertiary education sector.

## 3. Results

### Poor funding of ICT

The use of ICT for teaching and learning is being hampered by Nigeria's public tertiary institutions' inadequate finance. In Nigeria, a large number of public postsecondary institutions lack adequate funding. Adequate funding is unavailable to school administrators for the deployment of ICT programs. Due to inadequate funding, many ICT facilities are unavailable at the institutions. According to Ogunode (2021), one of the main issues facing Nigeria's public higher education administration is a lack of financing. He continued by saying that one of the reasons Nigerian higher education is underdeveloped is the government's incapacity to carry out the UNESCO 20% yearly budget proposal for education. According to Gbadamosi in Ijov and Wombu (2019), financing is the main obstacle to the adoption of ICT in higher education. Nigerian education is woefully underfunded, which has had an impact on several educational fields. For instance, providing technology infrastructure, educating and retraining instructors, supporting ICT projects, developing software, and maintaining electricity reduction stations. The quantity and diversity of knowledge, skills, and talents needed to succeed in the technological environment must constantly increase due to the complexity of modern society and the speed at which technologies are changing. One of the ongoing challenges in ICT is the pursuit of new technologies and ongoing development (Johnson, 2007). According to Ogunode, Adamu, and Ajape (2021), the poor use of ICT by academic staff in the many higher education institutions located around the nation is caused by insufficient funding for ICT programs at Nigerian public universities. ICT programs receive extremely little financing, which hinders their development in the nation's largest public universities. Many school administrators cannot afford to buy ICT for academic staff to be deployed for teaching, assignment giving, and online marking because the Nigerian government is unable to provide sufficient funds for the administration and management of ICT in Nigerian higher institutions (Olatunde-Aiyedun, Daniels, and Olamoyegun, 2024b).

### Inadequate ICT facilities

The use of ICT for teaching and learning is hampered by the tertiary institutions' poor ICT infrastructure. It is regrettable that many Nigerian institutions lack sufficient ICT resources, such as computer systems, laptops, printers, etc., to enable their administrative staff to perform official duties, according to Umar, Rosnaini (2018), and Livinus (2013). Few public higher education institutions in the nation are able to address the ICT needs of their employees and students, according to Adavbiele (2016). According to Adeyemi, Iduwo, and Esere (2013) and Olatunde-Aiyedun (2024), Nigeria does not have the infrastructure required to take use of ICT. Once more, the majority of ICT infrastructures, including email, telefax, and the internet, rely on services provided by PHCN (Power Holding Corporation of Nigeria), NITEL (Nigerian Telecommunications Limited), and NIPOST (Nigerian Postal Agency). These services are delivered in an epileptic manner and come with exorbitant costs. The authors examined staff computer access in an education faculty in relation to insufficient infrastructure. The survey specifically asked about the staff-to-computer ratio. Five departments in all were taken into consideration. Four of these five departments have relatively few employees with computers in their offices—as little as 1:5, or one computer for every five employees. In order for staff to use ICT as a tool for education delivery, the ideal staff-computer ratio should be 1:1. Unfortunately, as of right now, no Nigerian university has this optimum ratio.

### Unstable power supply

The use of ICT to carry out academic tasks is being impacted by Nigeria's higher institutions' inadequate electrical supply. According to Adavbiele (2016), science and technology labs rely on electricity to function. Computers need electricity to function, even if they have all the necessary hardware. When faced with this new technology and the jargon involved in its use, many instructors nowadays are extremely bashful and have never used a computer in their lives. Other teachers may not have the financial means to purchase one for themselves, and other schools do not supply them to their staff. It is regrettable that less than 10,000 megawatts of electricity are generated in Nigeria for the country's 200 million+ inhabitants. One of the main issues affecting the nation's economy and all educational institutions is the inadequate electricity supply. According to Ogunode, Abubakar, Abashi, Ireogbu, and Longdet (2021), power issues prevent many public institutions from using their ICT resources for instruction and learning. Because there is inconsistent electricity and the expense of fueling the generator to power the ICT facilities is significant, some higher education institutions have not made use of computer centers that have been given or constructed. In order to provide academic services, many public colleges rely on generators, which is quite costly. Many academic staff members are unable to deliver lectures using the minimal ICT facilities available in lecture halls because of the power issue. According to Ohiwerei, Azih, and Okoli (2013), Nigeria, being a developing country, cannot claim to have a 24-hour electrical supply for its people. Despite having a direct connection to Power Holdings Company of Nigeria, the institutions do not receive any electricity or power. Unfortunately, several of the institutions' departments and faculties lack the funds to purchase a generator set that would be able to power every computer used for instruction. As a result, the computer lesson may not be available to the teachers and students due to their disabilities.

## 4. Discussion

### Weak internet connection

Nigeria has poor and erratic internet service. The country's service providers' quality is suffering as a result of their failure to invest in high-quality ICT facilities. For online teaching and learning to be possible, the computer system requires internet services. The implementation of teaching and learning is impacted when these services are unstable or inadequate. The issue of erratic and inadequate internet connectivity hindered the efficient implementation of ICT resources for educational purposes. According to Ohiwerei, Azih, and Okoli (2013), some Nigerian universities are unable to connect to the internet. Even if they do, the department of business education, which instructs students in information and communication technology, is not connected because of the high cost

of the connection. According to Ogunode, Adamu, and Ajape (2021), internet access is essential for the operation of other ICT infrastructure. Other ICT resources are pointless without reliable and high-quality internet access. Internet services can be thought of as the fuel that keeps the ICT running or moving. For ICT facilities at educational institutions to function and be used, internet service is crucial. Internet services in Nigeria are of low quality and inefficient. The different internet service providers haven't made any real investments in offering high-quality services. The inefficiency of internet service provision can be attributed to the extremely weak federal government agencies that oversee its operations. The use of ICT for instruction is being impacted by the fact that many higher education institutions lack adequate internet coverage. Weak internet services prevent many academic staff members from using their ICT resources efficiently. Some public institutions have ICT equipment in their lecture rooms to help with the delivery of lectures. However, the academic staff who are intended to be using these ICT facilities for lecturing abandons them because of inadequate or nonexistent internet access.

#### High Cost of Internet Services

Another significant issue that hinders the efficient use of ICT for teaching and learning in Nigerian higher institutions is the high cost of internet services. In Nigeria, internet services are quite costly. A weekly or monthly subscription costs a lot of money, which many students cannot afford. Due to inadequate funding, many public higher education institutions are unable to cover the burden or expense of offering these services to students and faculty members in a classroom setting at no cost. According to Ogunode (2021), Bayo (2018), and Musa (2017), one of the biggest obstacles to the use and implementation of ICT resources in Nigerian higher education is the exorbitant cost of internet services. After weighing the costs of implementing virtual learning during the COVID-19 pandemic, a number of Nigerian public universities chose to close their doors and wait to be asked to restart in-person instruction. The high cost of internet data and electronic services, which essentially determines ICT usage and value, is one of the obstacles to ICT deployment in Nigerian colleges (Babatunde & Paschal undated, Tongia, 2004). It appears that this has an impact on the implementation and complete use of ICTs in these developing nations, including Nigeria. One of the obstacles of ICT deployment in Nigeria is the high cost of internet data and the quick tariff set by internet providers, which are primarily foreign firms operating in the country with the primary goal of making money (Babatunde & Paschal undated).

#### Poor ICT literacy among academic staff and students

Another issue impeding the successful implementation of ICT in Nigerian tertiary institutions is low computer literacy. Computer literacy is lacking among Manu academic staff, particularly among senior instructors. Another factor contributing to the issue is the kids' inadequate ICT proficiency. According to Ogunode (2020), a large number of students at higher education institutions lack computer literacy, which is one of the reasons why they do not use ICT for teaching and learning. In a study on undergraduates' ICT literacy, Airen (2011) discovered that, when the average for very poor and poor ICT knowledge was calculated, students in the Faculty of Social Sciences had poor computer and Internet skills (with over 33%), while over 34% of respondents in the Faculty of Arts had poor telephone skills. In Nigerian institutions, a large number of academics, non-teaching personnel, and students lack computer literacy. The degree to which administrative staff, instructors, and students use ICT resources to assist teaching, learning, and administrative tasks is being impacted by the high percentage of computer illiteracy in the university system (Dada, Olowonefa, & Ogunode, 2022). Resistance to change is the root cause of academic staff members' low ICT literacy. Albirini (2006) came to the conclusion that both students and academics were resistant to switching from conventional pedagogical approaches to more creative, technology-based teaching and learning strategies. In some cases, the government provides no assistance or support at all, while in others, the attitudes of different managements inside and outside of institutions regarding the development of ICT-related facilities like the Internet and computer purchases are quite slow.

### Poor Implementation of ICT Policies

During the COVID-19 epidemic, the deployment and utilization of ICT for teaching, research, and academic service was also hindered by the numerous tertiary institutions' inadequate execution of ICT policies. The usage and application of ICT for teaching and learning is being impacted by the incomplete implementation of the different policies intended to foster ICT development in Nigerian higher institutions. The COVID-19 pandemic revealed Nigeria's educational system's shortcomings. According to Ogunode, Adamu, and Ajape (2021), inadequate ICT policy implementation in Nigeria's public institutions is another barrier keeping academic personnel from utilizing ICT to fulfill their duties as researchers, teachers, and community service providers. The Nigerian government created and designed numerous ICT policies for all educational institutions in an effort to advance Nigerian education to the next level, where ICT will be utilized for both teaching and learning. To produce ICT software for the different educational institutions, agencies were established. It is astounding that despite the excellent nature of these ICT policies, their execution was not carried out for a variety of reasons, including insufficient money, institutional corruption, unstable educational policies, and political instability. One of the main obstacles to the academic staff's efficient use of ICT resources is the country's higher education institutions' inadequate implementation of ICT policies.

### 5. Conclusion

This study looked at the obstacles standing in the way of the efficient use of information and communication technology in Nigerian higher education institutions. The study found several obstacles to the successful implementation of ICT in Nigerian tertiary institutions, including low ICT funding, inadequate ICT facilities, unstable power supplies, weak internet connections, high internet service costs, low ICT literacy among academic staff and students, and poor ICT policy implementation. The report suggests that the government and other tertiary institution stakeholders enhance financing for the information and communication technology program in tertiary institutions in light of these findings. All institutions should have sufficient ICT infrastructure facilities provided by the government. All campuses should have a steady supply of electricity, according to the government. Internet service providers should be instructed by the government to enhance their offerings across all institutions. The cost of ICT resources for instructors and students should be covered by the government. All ICT policies should be implemented by the government in postsecondary educational institutions.

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