



ROLES OF INFRASTRUCTURE AND ICT FACILITIES IN ENHANCING CURRICULUM IMPLEMENTATION IN NIGERIAN TERTIARY INSTITUTIONS

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ABSTRACT: *This paper explored the role of infrastructure facilities in enhancing curriculum implementation in Nigerian tertiary institutions. The paper used secondary data, sourced from print and online publications. The study highlights that infrastructure facilities, including physical and technological resources, is crucial for the effective delivery of curricula. Key findings indicate that well-developed infrastructure significantly enhances teaching, learning, and administrative processes, thereby promoting successful curriculum implementation. The paper emphasizes the growing importance of modern facilities such as ICT resources, which are integral to advancing education in the 21st century. In light of these findings, it is recommended that the government prioritize the provision of adequate and modern infrastructure across all tertiary institutions. Additionally, tertiary institution management should adopt public-private partnerships to foster infrastructure development, and private organizations should contribute to the enhancement of facilities in Nigerian higher education. Further studies should conduct empirical research on the impact of infrastructure facilities and ICT resources on curriculum implementation in tertiary institutions.*

KEYWORDS: Curriculum implementation, Infrastructure facilities, Tertiary education, ICT in education.



INTRODUCTION

Tertiary education is an education designed for post-secondary education. Tertiary education is a social agent of progress and development in society and aids technological advancement. Tertiary education is designed to help in the development of nations by providing the high as well as middle-level manpower needed for the social, economic, and political advancement through the programs of teaching, learning, research, and community services (Ohiare-Udebu, 2014). This places tertiary education at the apex in the ranking of educational institutions and is designed to accommodate knowledge acquisition and production. Tertiary institutions of higher learning provide facilities for teaching and research and are authorized to grant academic degrees such as bachelor, master, and doctorate (Ogunode & Adamu, 2021). The term tertiary or higher education in Nigeria is used to refer to the education obtained in higher institutions. It is however accepted by most stakeholders that the importance of higher education lies in the fact that it imparts in-depth knowledge, understanding, and professionalism that seem to advance the students to new frontiers of performance, achievement, and attitudes in different aspects of life and engagements (Olorundare, 2014; Ohiare-Udebu, 2024).

The goals of Tertiary Education shall be to contribute to national development through high-level manpower training; provide accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians; provide high-quality career counseling and lifelong learning programs that prepare students with the knowledge and skills for self-reliance and the world of work; reduce skill shortages through the production of skilled manpower relevant to the needs of the labor market; promote and encourage scholarship, entrepreneurship, and community service; forge and cement national unity; and promote national and international understanding and interaction (FRN, 2013).

The role of technology, particularly information and communication technology (ICT), has also become paramount in tertiary education. ICT enhances accessibility and affordability of education by providing virtual learning environments, fostering innovation, and improving communication channels among institutions, educators, and students. Digital infrastructures like e-learning platforms, virtual libraries, and video-conferencing tools are critical in achieving these goals. ICT enables institutions to cater to the diverse learning needs of students, increasing flexibility in course delivery and expanding access to tertiary education.

The realization of the objectives of tertiary education depends on the effective implementation of the curriculum. The curriculum implementation is also hinged on the availability of adequate modern infrastructure facilities, including ICT resources, which facilitate access to instructional materials and virtual collaboration (Bello, Chukwuemeka & Ohiare-Udebu, 2024). It is based on this that this paper seeks to assess the role of infrastructure facilities, including ICT, on curriculum implementation in Nigerian tertiary institutions.

Concept of Infrastructure Facilities

Infrastructural facilities, according to Ogunode (2020), are those facilities aiding the delivery of academic and non-academic services in educational institutions. Infrastructural facilities include libraries, laboratories, halls, offices, administrative blocks, hostels, road facilities, water, electricity, and internet, among others. Ehiamezor (2001) described infrastructure as the operational inputs of every instructional program and constitutes elements that are necessary for teaching and learning. Such include buildings, laboratories, machinery, furniture, and electrical fixtures. These must be functional in relation to other aspects of the community,



such as health centers, libraries, and good roads, and must be large enough to allow for expansion as enrollments grow.

With the increasing reliance on technology in educational delivery, ICT infrastructure such as broadband internet, computers, smart classrooms, and servers have become critical components of infrastructure in tertiary institutions. ICT facilities enhance the scope of learning by providing access to global knowledge resources, e-learning systems, online research databases, and collaboration tools that support innovative pedagogy.

Lawinsider (2020) viewed infrastructure facilities to mean any works, structures, or improvements to land or waters other than Ancillary Project Area Infrastructure, which directly or indirectly provide a service or any other benefit to: (a) the general public; or (b) the Island community, including – (c) offices, depots, and staff housing by or for the benefit of the Commonwealth of the State, any local government, statutory authority, or government-owned corporation, (d) any electricity generation, distribution, or transmission facility; (e) public education facilities; (f) public health facilities; (g) police facilities; (h) emergency facilities; (i) transport facilities (including pedestrian paths, cycleways, transfer facilities, freight storage and logistics areas, bus stops and layovers, ferry stops, taxi stops); (j) sewage pump stations and sewerage treatment facilities; (k) solid waste transfer and treatment facilities; (l) water supply pump stations, raw water storage, clear water storage, dams, weirs, bore field infrastructure; (m) the things listed in section 24KA(2) of the Native Title Act to the extent that they are not Ancillary Project Area Infrastructure; and (n) any IBIS Store; but not including – (o) Social Housing.

Osagie (2003) opined that infrastructure represents the aesthetic picture of the school conveyed by the position of structures in relation to one another. It also represents the empirical relevance of the totality of the school environment for the realization of the school business (teaching/learning). He asserted in specific terms that the school plant is made up of landscape, trees, lawns, hedges, and accompanying paths, playgrounds, buildings, security facilities, and utilities. However, a well-equipped and well-maintained physical plant, including ICT facilities, can make learning a more pleasant experience and discourage early dropouts. It can as well attract better quality teachers.

According to Chukwuemeka et al. (2021), digital infrastructure, including e-learning systems, virtual classrooms, and ICT training facilities, has become central to the administration and delivery of modern educational services. These ICT-driven facilities not only enhance student engagement but also enable the integration of global resources and best practices into the learning process, ultimately improving educational outcomes.

The importance of infrastructural facilities in educational institutions, according to Ogunode and Agwor (2021), includes aiding the effective delivery of administrative functions in schools; making the delivery of services fast and reliable; enabling teachers to deliver lessons efficiently; and providing a conducive working environment for both teachers and students. Infrastructure facilities, particularly ICT tools, enable learners to learn with ease and engage in virtual learning experiences. ICT-driven infrastructure also enables teachers to prepare lessons and deliver them online effectively.



Concept of Curriculum

Curriculum is the structured set of planned learning experiences provided by a school or educational institution, aimed at helping learners achieve specific educational goals (Babarinde, 2002; Bello, Chukwuemeka & Ohiare-Udebu, 2024). It is a legal and public document that reflects the aspirations and needs of a society at a given period, outlining the knowledge, skills, and attitudes that individuals should acquire. It also defines the sequence and methods through which these experiences are to be attained, often articulated as goals and objectives to guide the educational process (Okorie, 2010).

According to Akande (2012), the curriculum encompasses the organized learning experiences offered by schools, institutions, or other training environments, whether formal or informal. These experiences aim to equip learners with the knowledge, skills, and attitudes needed for life. Schools serve a crucial societal function by transmitting and refining the culture, knowledge, and traditions of a society for the benefit of future generations. This ongoing process of societal continuity is encapsulated in the curriculum, which represents the totality of the educational experience (Nigeria Certificate in Education, 1990).

Furthermore, the curriculum can be seen as a carefully organized series of learning experiences designed to maximize individuals' potential and help them realize their inherent abilities. It operates within broader social, cultural, economic, and political contexts, where various interest groups compete to influence its content and direction. As such, the curriculum serves as a battleground for competing socioeconomic, cultural, and political interests, making it a key instrument for implementing educational policies and programs (Ikechukwu & George, 2023).

Concept of Curriculum Implementation

Curriculum implementation refers to the process of putting the planned curriculum into action in the classroom. It involves executing the curriculum as outlined in the curriculum document, translating educational objectives into practical teaching and learning experiences (Isife & Ogakwu, 2016; Ohiare-Udebu, 2023; Ohiare-Udebu, 2024). Essentially, curriculum implementation is the transformation of the theoretical aspects of the curriculum into the operational or functional curriculum used by teachers in the classroom (Offorma, 2005).

Effective curriculum implementation requires teachers to engage in various activities such as lesson planning, using reinforcement and motivational strategies, maintaining classroom control, building positive relationships, applying educational theories and principles, utilizing appropriate evaluation techniques, and considering the learners' cognitive styles (Okorie, 2010). Ivowi (2004) noted that curriculum implementation involves translating curriculum documents into classroom practice through a series of activities aimed at achieving the educational goals for which the curriculum was designed.

Curriculum implementation involves putting the curriculum into operation to achieve its intended outcomes. This process involves not just the teachers and students but also school administrators, parents, and the educational environment itself. The successful implementation of the curriculum depends on the availability and interaction with physical facilities, instructional materials, and the psychological and social environments in which learning occurs.



Impact of Infrastructure Facilities on Curriculum Implementation

The role of infrastructure facilities in curriculum planning, development, and most importantly, implementation, cannot be overstated. Infrastructure supports the effective execution of teaching and learning activities in schools (Emetarom, 2004; Ebehikhalu & Dawam, 2016). The successful implementation of the curriculum is closely tied to the availability of adequate infrastructure in universities (Ejike & Ejike, 2018). Without these facilities, educational programs cannot be delivered as intended, resulting in gaps in student learning outcomes.

A study by Ajayi, as cited by Ojo (2020), examined the relationship between infrastructure availability and curriculum implementation in Nigerian schools. It found that there was no significant relationship between the availability of school facilities and curriculum implementation in Nigeria's secondary schools. This lack of infrastructure negatively impacted the curriculum's implementation, leading to underperformance. However, Anyakogu (2002) argued that a relationship does exist, noting that the availability of functional school facilities is essential for successful curriculum implementation. Without such infrastructure, skill-based curricula, particularly those focused on vocational and technical training, are rendered ineffective. This, in turn, hampers students' ability to acquire the practical skills needed for economic empowerment and meaningful employment.

Ogunode (2020) concluded that the availability of infrastructure in sufficient quantities is crucial for the effective administration of educational institutions. Conversely, infrastructural inadequacies hinder administrative and instructional effectiveness. The importance of infrastructure in educational institutions is evident in various areas: it facilitates efficient administration, ensures swift and reliable delivery of services, and enables teachers to provide lessons more effectively. Additionally, well-maintained infrastructure offers a conducive learning environment for both teachers and students, enabling students to learn with greater ease and promoting the use of ICT for enhanced teaching delivery (Ogunode & Jegede, 2021; Ogunode & Ibrahim, 2024).

Research by Femi (2018) highlighted a positive correlation between the availability of infrastructure and successful curriculum implementation. This suggests that infrastructure is a fundamental component of educational institutions, directly supporting the effective delivery of curricula. Ohiare-Udebu, Jacob and Sarafadeen (2021), as well as Ogunode and Ohiosumua (2023), affirmed that infrastructure plays a crucial role in both curriculum planning and implementation in Nigeria. Further research by Ogunode and Akpakwu (2023) found that the presence of adequate infrastructure significantly enhanced academic staff job performance in Nigerian tertiary institutions.

The increasing importance of information and communication technology (ICT) infrastructure further underscores the critical role of modern facilities in curriculum implementation. ICT resources, such as high-speed internet, smart classrooms, and digital learning platforms, have become integral in delivering curriculum content, especially in fields requiring advanced technological skills (Chukwuemeka, 2014). As the global trend moves toward digital and hybrid learning environments, tertiary institutions that lack ICT infrastructure face challenges in keeping pace with global educational standards.



FINDINGS

The studies reviewed revealed that infrastructure facilities are important for the effective implementation of the curriculum in tertiary institutions. Both physical and technological infrastructure significantly influence the quality of education. Adequate and functional facilities, including classrooms, laboratories, libraries, and ICT resources, directly enhance the teaching and learning environment, enabling educators to deliver curriculum content effectively and students to engage in meaningful learning experiences.

Modern ICT infrastructure, such as high-speed internet and digital libraries, has become essential for both in-person and online learning (Alabi et al., 2020; Chukwuemeka et al., 2021). Integrating ICT into educational settings fosters interactive learning and provides students with access to diverse resources, ensuring they acquire relevant skills in today's technology-driven workforce (Falode et al., 2022).

Inadequate infrastructure presents substantial barriers to curriculum implementation. Institutions lacking essential facilities struggle to execute skill-based and technical courses effectively, limiting students' practical exposure and hindering their development of problem-solving and critical thinking skills.

Furthermore, well-maintained infrastructure contributes positively to the academic performance of students and staff. It creates a conducive learning environment, facilitating efficient lesson delivery and greater engagement with curriculum content. Studies cited in the paper (Ogunode & Jegede, 2021; Ogunode & Ibrahim, 2024) emphasize that well-resourced institutions produce better educational outcomes, as both educators and students are more motivated and equipped to achieve academic goals.

The findings also highlight the increasing relevance of ICT infrastructure in the post-pandemic era, where blended and online learning models are becoming more common (Falode, Chukwuemeka & Falode, 2022; Chukwuemeka et al., 2021). Institutions with robust ICT facilities are better equipped to provide flexible learning options, allowing students to access content remotely and interact with educators in virtual classrooms (Falode et al., 2020). This adaptability is essential for maintaining educational continuity and supporting a diverse student body.

CONCLUSION AND RECOMMENDATIONS

This paper explored the role of infrastructure and ICT facilities on the effective implementation of curriculum in Nigerian tertiary institutions. The findings reaffirmed that infrastructure—both physical and technological—plays a pivotal role in supporting curriculum delivery. Functional infrastructure such as well-equipped classrooms, laboratories, libraries, and ICT resources were identified as essential for enabling both educators and students to engage with the curriculum effectively. The absence or inadequacy of these facilities hampers the overall quality of education, particularly in skill-based and technical fields.

The paper concluded that the availability of modern infrastructure is indispensable for the effective execution of the curriculum, and therefore, a top priority for achieving the educational goals of Nigerian tertiary institutions. The integration of ICT infrastructure has become



increasingly significant, enhancing the flexibility, accessibility, and quality of education. Without these crucial facilities, the capacity of tertiary institutions to deliver high-quality education, foster student engagement, and produce employable graduates is greatly diminished.

Recommendations

1. **Government Investment:** The government should prioritize the provision of adequate, modern infrastructure in all tertiary institutions. This includes building and upgrading classrooms, laboratories, libraries, and ICT facilities. Continuous investment in maintaining and expanding these resources is essential to support growing student populations and evolving educational needs.
2. **Public-Private Partnerships (PPP):** Tertiary institutions should actively pursue public-private partnerships to fund and develop infrastructure projects. These collaborations can leverage the resources and expertise of private entities to enhance the quality of educational facilities, thereby reducing the financial burden on the government and institutions.
3. **Support from Private Institutions:** Private sector organizations and philanthropic entities should be encouraged to contribute to the development of infrastructure in public tertiary institutions. This support can come in the form of grants, donations, or direct involvement in building projects, particularly in areas such as ICT, research laboratories, and student accommodation.
4. **ICT Integration:** Institutions should focus on integrating ICT into their infrastructure development plans. The incorporation of digital learning tools, high-speed internet, and smart classrooms will improve access to learning resources and facilitate both in-person and online education. Additionally, ICT facilities will help prepare students for the demands of a technology-driven global workforce.

By implementing these recommendations, Nigerian tertiary institutions will be better equipped to deliver high-quality education, thereby improving student outcomes and aligning with national goals for educational and economic development.

Further studies should consider empirical research on the impact of infrastructure facilities and ICT resources on specific aspects of curriculum implementation in tertiary institutions. This research could include quantitative assessments of how various types of infrastructure affect student performance, engagement, and skill acquisition. Additionally, qualitative studies exploring the experiences of educators and students regarding the usability and effectiveness of these facilities could provide deeper insights. Investigating the long-term effects of infrastructure improvements on educational outcomes and workforce readiness would also be beneficial. Furthermore, examining the role of public-private partnerships in enhancing infrastructure development could offer valuable perspectives on sustainable funding models for tertiary education.



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