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TRANSFORMING FROM TRADITIONAL TO SMART EDUCATION IN NIGERIA: CHALLENGES AND OPPORTUNITIES FOR LEARNING

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Abstract

This paper examines the transformation of Nigeria's education system from traditional, teacher-centered methods to smart, technology-driven learning environments. The traditional Nigerian educational system, characterized by local methodologies and limited technological infrastructure, fails to foster essential 21st-century skills like critical thinking, creativity, and problem solving. The growing global emphasis on digital literacy and smart education presents Nigeria with an urgent need for reform to meet the demands of the evolving global workforce. Smart education leverages advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and cloud computing to create interactive, personalized, and efficient learning experiences. Smart classrooms, in particular, offer collaborative and flexible learning opportunities, fostering innovation and creativity. Despite the potential benefits, the integration of smart education in Nigeria faces challenges, including inadequate infrastructure, insufficient teacher training, and the rigidity of existing curricula. However, successful implementation of smart education could bridge Nigeria's technological gap and empower students with the skills needed to compete globally. This study critically analyzes the benefits and challenges of adopting smart education, comparing it with traditional methods, and highlights the importance of creating inclusive, high-quality learning environments that prepare students for the digital age. The study calls for comprehensive policy frameworks and strategic investments to facilitate this educational transformation, aligning Nigeria's education system with global standards and ensuring its contribution to the country's broader socio-economic development.

Keywords: Smart Education, Traditional Education, Educational Transformation, Digital Literacy, Technology Integration

Introduction

Education in this tech-savvy world is undergoing a profound transformation, it is driven by rapid technological advancements and the ever-evolving demands of a knowledge-based global economy. In Nigeria, the shift from traditional methods of education to smart learning systems represents both a necessity and a significant challenge. Traditional education, often characterized by rote learning, limited access to resources, and outdated infrastructure, is no longer sufficient to prepare learners for the complexities of modern life and work. Smart education, on the other hand, leverages digital technologies, interactive platforms, and data-driven approaches to create more engaging, personalized, and effective learning experiences. However, as global educational paradigms shift towards digital literacy and smart education, there is an increasing recognition of the need for Nigeria to transform its conventional education system into one that is technology-driven and student-centered (Aregbesola & Ojelade 2023). Technological advances, including digitalization and automation are radically bringing reforms to all aspects of life including entertainment, agriculture, education and workplace among other sectors of the economy in this era ever than before.

Specifically, the development of advanced information and communication technologies is reforming education from the traditional perspectives to a more innovative education, accompanied by smart teaching and learning environments (Du, 2023; Chukwuemeka & Garba, 2024). The traditional Nigerian education system is largely characterized by the use of outdated teaching methodologies, which rely heavily on memorization and lecture-based learning (Iwu, 2019). Many schools lack the infrastructure and resources to implement modern educational technologies, leading to a gap between Nigerian students and their peers in more developed countries. This conventional system often fails to promote critical thinking, creativity, and problem-solving skills, which are essential for students in this dispensation. The recent shift towards technology-based economy requires greater levels of innovation and creativity (Akram, 2022). Manual labourers with manual skills are increasingly becoming irrelevant to the economy.

Therefore, development of an active, confident, creative and technology inclined labour force is a necessity for positive economic growth. Achieving this will require massive deployment of new learning paradigms in the education systems. Smart education, or the integration of advanced technologies in teaching and learning, represents a paradigm shift in global education systems. It leverages digital tools such as artificial intelligence (AI), virtual learning environments, interactive multimedia, and cloud-based resources to create an engaging and efficient learning experience (Zhao & Liu, 2022). For Nigeria, adopting smart education is more than just a trend. It is a necessary transformation to bridge the technological and educational gap between the nation and the rest of the world. Perhaps, this may be rooted in the globalisation idea that has cut across so many areas of human endeavours. Advanced smart technologies, smart systems, and communication devices are creating unique and unlimited opportunities for academic, training and organizational management that fosters new approaches to education and administrative services to both on-campus and remote learning avenues.

Shoikova et al. (2017) have described smart learning environments as a new wave of educational delivery systems, involving a positive interplay of technology, pedagogy, and their connectedness for the improvement of teaching and learning processes. The concept of smart education revolves around the integration of modern technology, personalized learning, and interactive methodologies that promote collaboration, creativity, and student autonomy (Zhong, 2020). Smart education goes beyond simply using digital tools; it involves transforming the entire educational ecosystem to meet the demands of a rapidly changing world. Technologies such as Artificial Intelligence (AI), cloud computing, interactive multimedia, and data analytics are central to smart education, allowing for a more engaging and adaptive learning experience (Adebayo et al., 2021). The development of smart education has evolved over time. Hwang (2015) opined that from its inception, smart education has systemically invented in terms of teaching and learning practice to ensure that students are ready for the challenges of the present era.

Thus, it was basically developed and focused on implementations of synchronous delivery of learning content to local and remote/online students as well as synchronous teacher-students and local student-to remote student communications. Subsequently, Zhu et al., (2023) have observed that the development of smart classroom systems was mainly based on active use of mobile technology, internet of things, mobile devices and the automatic communications between them and the smart environment. More recently, smart classrooms have allowed the integration of internet of things technology with social and behavioral analysis that aids teachers' presentation and students' satisfaction (Rawia et al., 2019). However, it can be noticed that smart education technology has integrated the interactive management solution, the learning management system, and the student information system in order to increase students' learning interactivity, personalized learning, effective and efficient classroom management, and better students' monitoring. This is a deviation from the traditional education delivery system to a most modern education delivery system.

Aregbesola et al. (2025) submits that education is an important process in human and society's development, it is not just schooling but schooling that can be regarded as one of the processes of instruction by which knowledge is transmitted, mental abilities are trained and different skills are acquired and developed. Also, Nakosteen et al. (2023) conceived education as a discipline that is concerned with pedagogies of teaching and learning in schools or school-like environments, which is not the same with the various non-formal and informal means of socialization. Education is a dynamic instrument of change and its process involves constant reconstruction of experience, rather than transmission of past values, which makes it more meaningful and capable of solving present and future problems (Ibanga, 2016). Webster, an online dictionary (2018) defined education as a process of educating or training acquired through a prescribed course of study or discipline. This means that it is the act of educating or applying discipline on the mind; or a process of character training that is affected to condition the social behaviour of a person.

According to Aregbesola, (2023) education empowers individuals by giving them the knowledge and skills to make informed decisions and take control of their lives. It

allows people to pursue their goals and improve their quality of life. This means that education is the process of transmission of the values, beliefs and accumulated knowledge of a society. It is a life-long process encompassing the sum total of knowledge, skills, attitudes and values of what is received through learning and or training. In this sense, education involves the development of the intellect, critical thinking abilities and problem-solving skills, social and cultural skills in the individual. Hence, education can be said to be the process of integrating young ones into the society. A significant issue within Nigeria's traditional education system is the reliance on a rigid curriculum that lacks flexibility and fails to incorporate innovative skills such as digital literacy, problem solving, collaboration, and creativity (Ogunleye & Ayodele, 2021). This approach hinders students' ability to adapt to the changing demands of the global workforce, especially in industries that are rapidly evolving due to technological advancements. According to UNESCO (2020), Nigeria has one of the highest numbers of out-of-school children globally, and those within the system face challenges such as inadequate teacher quality, insufficient learning materials, and a lack of access to modern technologies. Therefore, this study examines transforming from traditional to smart education in Nigeria: challenges and opportunities for digital age.

Theoretical Framework

There are theories that support transforming from traditional to smart education in Nigeria: Challenges and opportunities for learning. First is the Constructivist Learning Theory by Piaget, (1936) & Vygotsky, (1978); Connectivism by Siemens (2005) and Technological Pedagogical Content Knowledge (TPACK) Framework (Mishra & Koehler, 2006). Constructivist Learning Theory, initially developed by Jean Piaget in (1936) and later expanded by Lev Vygotsky in (1978), emphasizes that learners actively construct knowledge based on their experiences and interactions with their environment. Learning is not simply the absorption of facts but involves critical thinking, problem-solving, and engagement with real-world contexts. In the discourse of transforming from traditional to smart education in Nigeria, constructivism offers a theoretical foundation for student-centered learning environments enabled by technology. Traditional Nigerian classrooms are predominantly characterized by teacher-centered approaches and rote memorization, limiting students' engagement and critical thinking.

However, smart education powered by digital tools such as virtual labs, simulations, and interactive learning platforms provides the opportunity for students to explore, create, and collaborate in meaningful ways. For example, in smart classrooms, learners can conduct virtual science experiments, participate in global discussion forums, and solve real-world problems using digital tools, aligning with the constructivist idea of active knowledge construction. The challenge lies in the lack of infrastructure, digital literacy, and teacher preparedness to implement these methods. Nevertheless, the theory supports the opportunity to cultivate a generation of independent, critical thinkers prepared for the digital economy if the right investments are made.

Connectivism, introduced by George Siemens in (2005), is a theory of learning for the digital age. It argues that knowledge is distributed across a network of connections, and learning involves the ability to navigate, form, and understand these connections.

Unlike earlier theories that focus on individual cognition, connectivism sees learning as a process that occurs in digital networks and communities. Connectivism directly supports the shift from traditional to smart education in Nigeria by framing learning as a dynamic and technology-mediated process. Traditional education systems in Nigeria often isolate learners from real-time, global information sources, while smart education leverages the internet, social media, mobile devices, and digital learning platforms to connect students with vast learning networks. This theory underscores the importance of equipping Nigerian students with the ability to locate, evaluate, and apply knowledge from diverse digital sources. For instance, students can learn coding from global platforms like Khan Academy or Coursera, interact with peers through educational forums, and access multimedia content to supplement textbook knowledge. Challenges include digital divides many students, especially in rural areas, lack access to the internet or digital tools. Additionally, without proper guidance, students may struggle to assess credible information sources. However, the opportunities are profound: students can become self-directed learners and global citizens, developing skills that extend beyond the classroom.

The TPACK Framework, developed by Punya Mishra and Matthew Koehler in (2006), provides a model for integrating technology effectively into teaching. It combines three core types of knowledge content (CK), pedagogy (PK), and technology (TK) and asserts that meaningful technology integration requires a deep understanding of the interaction between all three domains. In the transition from traditional to smart education in Nigeria, TPACK offers a vital roadmap for teacher development and instructional reform. In traditional settings, Nigerian teachers often rely solely on content knowledge delivered through lectures and textbooks. The TPACK framework challenges this by demanding that teachers not only understand their subject matter but also how to teach it effectively using appropriate digital technologies (Chukwuemeka, 2014; Chukwuemeka et al., 2019). For instance, a teacher using TPACK in a smart classroom might blend video tutorials, interactive quizzes, and real-time assessments to teach mathematics. This ensures that technology enhances not replaces sound pedagogical practices.

However, the challenge in Nigeria lies in inadequate teacher training programs that fail to integrate technology pedagogically. Many teachers are either unfamiliar with digital tools or lack confidence in their use. Moreover, schools may lack access to modern educational technologies. Despite these setbacks, the framework reveals significant opportunities: when educators are trained using TPACK, they can design engaging, adaptive, and inclusive learning experiences, ensuring the effective implementation of smart education (Chukwuemeka, 2014; Chukwuemeka et al., 2019). Theories such as Constructivist Learning Theory (1936; 1978), Connectivism (2005), and the TPACK Framework (2006) provide strong theoretical backing for Nigeria's shift from traditional to smart education. Each theory highlights both the challenges such as digital infrastructure, teacher readiness, and resource gaps and the opportunities like learner autonomy, global connectivity, and improved instructional quality. By aligning national education strategies with these theories, Nigeria can better navigate the complexities of educational transformation in the digita; age.

Traditional Education Delivery System

Ikechukwu and Amos (2023) have regarded traditional training and or education methodologies as a learning system in which the instructor is handed the task of translating the curriculum in the classroom and the students complete the exercises at home. United Nations Education, Scientific and Cultural Organisation: UNESCO (2022) characterized its delivery modes by the application of traditional/analogue technologies such as instructional print materials such as blackboards, textbooks, workbooks, prints and posters among others. As digital technologies continue to gain acceptance in education, it is necessitating a shift from traditional education to smart education. Twenty-First century students present unique learning characteristics that require improved pedagogies and resources to meet their learning needs. In fact, they are digital natives that require more than just the core curriculum to succeed in this ever-changing world (Dominic et al., 2022). This means going beyond just technology integration but also involves redesigning educational delivery systems and adopting frameworks and models that help implement the curriculum (Chukwuemeka et al., 2021; Chukwuemeka et al., 2020). Hence, there is a need for educators to re-envision the role of technology in classroom business. Rawia et al. (2019) have opined that a simple display of images during class presentations, surfing the Internet, multiplication game, or even taking turns at an interactive whiteboard is no longer enough for these students.

Today's learners are highly relational and demand quick access to new knowledge through pedagogies that are capable of engaging them at a whole new level (Dominic et al., 2022). Innovative learning environments like smart classrooms offers hand on supports that allows for the development of 21st century capabilities, including problem-solving skills, critical thinking skills, creative and innovative skills as well as collaborative skills which are basic requirements for successful operation in this ever-changing work environments and or world (Shen, Yin, Jiang, Long, Li, & Zeng, 2023). The use of new intelligent smart technologies, such as the artificial intelligence, internet of things, augmented/virtual reality, and wearable technology in the form of an accessory like eyeglasses, smart pen, and cloud computing among others enable the learners to learn more effectively, efficiently, flexibly and comfortably. With appropriate learning strategies, smart technologies will help to ensure mastery of basic competencies and promote total development of the learner, accommodate individual different learning styles to boost performance and promote a classroom atmosphere that is compatible with different teaching-learning strategies.

Smart Education: A Paradigm Shift for Nigeria Education System

Prof. Peter Okebukola has been a leading advocate for integrating digital technologies into Nigeria's higher education system since 2003. He promoted virtual learning environments, smart classrooms, and ICT-based teaching through policies and initiatives under the National Universities Commission. His efforts have focused on building infrastructure, training educators in digital pedagogy, and promoting the use of artificial intelligence and e-assessment tools, making him a key figure in advancing smart education in Nigeria. However, UNESCO (1999) has supported smart education globally

by promoting ICT in education, developing Open Educational Resources (OER), and assisting countries in creating digital learning policies. In Nigeria, UNESCO has provided training for teachers, policy guidance, and support for remote learning platforms, especially during the COVID-19 pandemic. Its initiatives aim to ensure inclusive, technology-driven education that aligns with Nigeria's goals for smart learning transformation.

Educational technologies have evolved from simple audiovisual aids to individual/networked computers, and increasingly include various mobile and smart technologies, as well as virtual and augmented realities, internet-based immersive environments, cloud computing, and wearable devices. Smart education is an educational technology concept that emerges as a result of the technological growth and diffusion of ideas and technologies in the society and the growing influence on education and training systems globally. According to Chukwuemeka (2025), *"smart education is the concept of learning in the digital age. Hence, it is founded on two types of technologies namely smart devices and intelligent technologies which are more prevailing technologies in this century, although distinct but are not independent of each other"* Smart education as a new approach to teaching and learning in a digital era which encompasses the use of mobile and wireless communication technologies, remote sensing technologies, artificial intelligence and the internet of things to provide rich learning experiences. It is effective and efficient content delivery system and provide different academic support services and on-demand services for both students and teachers in real-time and or delayed that guarantee quality and equity of education (Chukwuemeka, 2025). Although the innovation of smart education was conceived long ago, however, UNESCO (2022) had opined that it has been on constant evolution and improvement since its emergence.

Key components of smart education include:

Smart Classrooms: Smart Classrooms are learning environments that are well equipped with new wave of educational technologies, which allows for effective and efficient interplay of technology, pedagogy, and the effective interaction between the two particularly towards improving teaching and learning processes (Damola et al., 2023). According to Hwang (2014), a smart classroom is a smart learning environment that includes context-aware ubiquitous learning through sensing technologies, web-based learning, mobile learning, technology-enhanced learning, intelligent tutoring systems, and adaptive learning systems. These settings give students the ability to engage with learning systems and access digital resources at any time and from any location. They actively provide the necessary learning guidance, hints, supportive tools or learning suggestions in the right place, at the right time and in the right format. Zeeshan et al., (2022) regarded it as a medium of learning which enables learners to think intelligently, act efficiently, and solve problems effectively. Equipped with interactive whiteboards, VR headsets, and AI-driven tutoring systems, these spaces facilitate immersive and personalized learning experiences (Damola et al., 2023). This modern classroom provide effective and efficient content delivery system and different academic support and on-demand services for both students and teachers in real-time and or delayed, which guarantee quality and equity of education (Chukwuemeka, 2025).

Personalized Learning: Adaptive learning platforms use data analytics to tailor instruction to individual student aptitudes, addressing the limitations of one-size-fits-all curricula (Chen et al., 2021). The flexibility of learning content related to smart classrooms is offering and expanding new educational opportunities to manage learning differences, improve quality and increase access to education. Learners can make use of smart devices to access learning resources through internet services and engage in both personalised and collaborative learning. Smart classroom pedagogy gives opportunities for learners to learn more effectively, efficiently, flexibly and comfortably. Ikechukwu and Amos (2023) maintained that the smart classroom has been designed to promote intelligent environments by using smart technologies and suitable pedagogies so as to provide personalized learning services and empower learners to develop talents of problem solving, higher thinking ability, higher value orientation and strong conduct ability. The use of smart technology will provide students to study with divergent learning materials based on their interests, aptitudes and intellectual levels (Hussain, Abid & Butt, 2018). These makes learning more interesting, motivating, stimulating and meaningful for students.

Ubiquitous Learning: Mobile technologies enable access to education beyond physical classrooms, critical for reaching marginalized populations (Zeeshan et al., 2022). From a theoretical perspective, Siemens' (2005) *connectivism* provides a robust framework for understanding smart education's potential. In a knowledge economy, learning is increasingly networked and decentralized. Smart technologies facilitate these connections, allowing students to engage with global resources and collaborative projects—opportunities that traditional methods cannot offer.

For Nigeria, the shift to smart education presents compelling opportunities:

Economic Alignment: Given the complexity of the global economy, a country like Nigeria must immediately begin to transform its system of education so as to preparing students for tech-driven industrail skills to meet the challenges of the 21st century and participate in the advancement of the 21st century economy (Akram, 2022). Digital literacy is therefore essential for navigating the modern information-driven world.

Equity: Mobile learning can bridge gaps for out-of-school children, particularly in conflict-affected regions (Demir, 2021).

Smart Education vs Traditional Education

The sophistication of the global economy has necessitated the urgent need for a transformative strategy that favours transition from traditional to a digital way of working that is, meaningful, engaging and connected. Just as the industrial society of the 20th century paved the way to the digital society of the 21st century, even so is the traditional pedagogies, competences and learning spaces giving way for the modern and digitized pedagogies, skill and competences. This has pushed nations to initiate a change in their education system by developing new paradigms for teaching/learning and supporting it with a systematic technology structure that improves; supplements and or reinvents school and or classroom systems. Achieving these changes will depend on how the nation is re-thinking its education system in such a way to accommodate the 21st century

technology integration in its curriculum delivery systems (Chukwuemeka et al., 2019; Chukwuemeka, et al. 2025). The essence is to provide relevance, engagement and needed motivation for learning (Dominic et al., 2022).

Smart schools/classrooms can be assumed as a proposed solution to increase the capabilities of today's students in the era of digital technology. Thus, increased access to digital technologies will help to accelerate this shift by providing opportunities to connect the learning that takes place in informal settings to learning within existing formal school settings. According to Demir (2021), traditional training and education methodologies in which the instructor explains the subject in the classroom and the students complete the exercises at home, are has significantly been replaced by new learning approaches such as distant learning, mobile learning (m-learning), personalized learning, flipped learning, game-based learning (gamification), blended learning, ubiquitous learning (u-learning), and social collaborative learning, among others. Smart classroom technologies offer the most convincing and constructive ways to incorporate pedagogies that support the use of educational technology to ensure the enhancement and exchange of experiences of professors, which opens the opportunity to provide higher-order knowledge acquisition. Hence, the smart classroom is a reorienting of the traditional educational structures and teaching and learning processes that focuses on students and their learning needs.

Benefits of Smart Classroom

Smart education is not just about digitalization of the classroom only, but also about new teaching and learning approaches that fosters collaborative learning, interactive learning and greater academic achievements. In essence, modern and digital information and communication devices, including smart systems, and smart technologies are creating unique and unprecedented opportunities for school and training organizations in terms of new approaches to education, learning and teaching strategies, on-campus and online students services, setting-up of digital classrooms and laboratories. (Shen et al., 2023). Ikechukwu and Amos (2023) maintained that the smart classroom has been designed to promote intelligent environments by using smart technologies and suitable pedagogies approaches so as to provide personalized learning services and empower learners to develop talents of problem solving, higher thinking quality, higher value orientation and strong conduct ability. The use of smart technology will enable students to study with divergent learning materials based on their interests, aptitudes and intellectual levels (Hussain, et al. 2018).

They have identified the benefits of smart classroom to include: a transformation to teaching and learning process, increase access to education, effective and efficient students-teachers interactions, creating opportunity for collaborative learning, easy and valid information sharing among learners, developing creativity and imagination spirit in the learners as well as anywhere any time learning opportunities. Additionally, a smart classroom makes learning more interesting, motivating, stimulating and meaningful for students. Modern smart technologies offer digitally best access to educational information, which paved the way for digital collaborative learning and content exchange via web and software systems. Smart classrooms are the new drivers of a knowledge-

based economy that is built on creativity, suitability and sustainability. Zeeshan et al. (2022) maintained that smart education plays a vital role in enhancing quality of learning experiences and the performance of the learners, supporting teachers' daily work, school building management, school transport systems, and distanced learning provision.

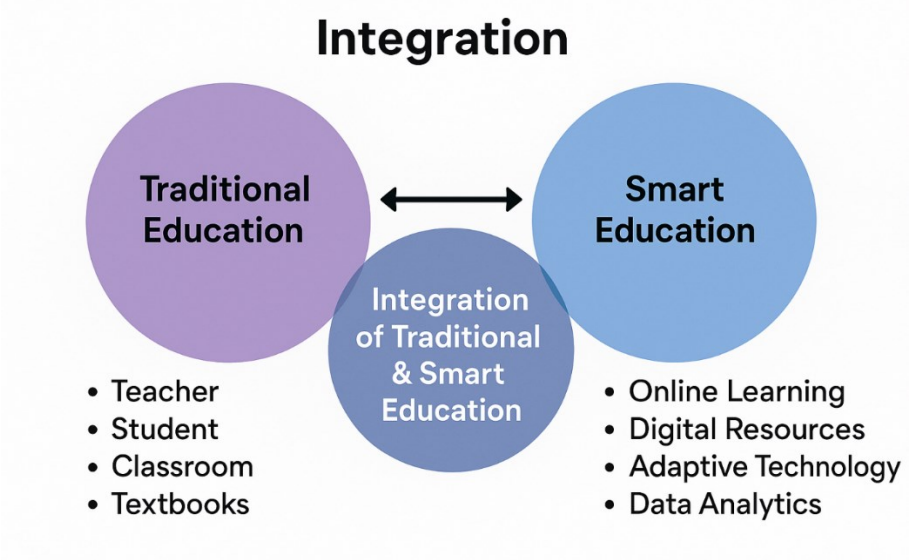

Fig. 1. *Strategic Integration of Traditional and Smart Education for Enhanced Learning Delivery*

The transition from traditional to smart education, as depicted in the diagram, can be effectively understood through the lens of several foundational educational theories. First, Vygotsky's Social Constructivist Theory (1978) emphasizes that learning is a deeply social process, built through interaction between teachers and learners. In traditional settings, this is evident in classroom engagement and face-to-face discussions. However, as education shifts toward smart models, these interactions are sustained and even enriched through digital tools such as virtual classrooms, discussion forums, and collaborative learning platforms, thus preserving the essence of Vygotsky's theory in a modernized form. Complementing this is the Technological Pedagogical Content Knowledge (TPACK) Framework introduced by Mishra and Koehler in 2006, which provides a clear structure for integrating technology into teaching. TPACK highlights the importance of blending content knowledge, teaching methods, and digital tools effectively. This framework directly supports the integration shown in the diagram, where traditional resources like textbooks and classroom instruction are combined with smart tools such as online learning, adaptive technologies, and digital content to create a cohesive and effective educational environment.

Additionally, George Siemens' Connectivism Theory (2005) offers a modern perspective that aligns perfectly with the principles of smart education. Connectivism argues that learning is no longer confined to individuals or institutions but is distributed across networks and digital platforms. It emphasizes the importance of accessing, connecting, and applying information in real time. This is clearly reflected in the smart

education elements shown in the diagram such as online learning, digital resources, and data analytics which enable students to learn beyond the classroom, engage with global content, and receive personalized feedback. Together, these three theories Social Constructivism, TPACK, and Connectivism provide a solid theoretical foundation for understanding the integration of traditional and smart education. They explain how this transformation not only preserves key elements of traditional learning but also enhances them through the thoughtful use of technology, creating a more dynamic, inclusive, and future-ready educational system.

Challenges to Integration

Despite its promise, the adoption of smart education in Nigeria faces systemic barriers:

1. **Infrastructure Gaps**: Only 22% of rural schools have reliable electricity (NITDA, 2023), and internet penetration remains low at 40% (Pew Research, 2022). There is also the fluctuating transmission signals which makes the use of internet-based technology frustrating to both teachers and learners. Without foundational infrastructure, even the most advanced tools are rendered ineffective.
2. **Teacher Capacity**: Over 70% of Nigerian educators lack training in digital pedagogies (Aregbesola & Ojelade, 2023). Many teachers, accustomed to traditional methods, resist or misinterpret technology integration, using devices merely as "digital chalkboards" rather than tools for active learning. Teachers' ineffective use of contemporary technologies in Nigerian education is caused by their lack of digital literacy, which is a result of inadequate teacher preparation (Chukwuemeka & Garba, 2024).
3. **Policy and Funding Fragmentation**: While initiatives like NITDA's smart classroom pilot in Karshi show promise, scaling them nationally is hampered by bureaucratic inefficiencies and competing priorities among federal and state agencies.
4. **Cultural Resistance**: Parents and policymakers often prioritize exam performance over competency-based learning, perpetuating reliance on rote memorization.

Pathways to Integration: A Blended Approach

A phased, context-sensitive strategy can mitigate these challenges:

1. **Hybrid Learning Models**: Traditional instruction with AI tools can be combined to ease the transition. For example Akanbi (2025) use of artificial intelligence in analyzing sikiru ayinde barrister's current affairs and democracy. Akintunde et al. (2025) explored the transformative impact of Artificial Intelligence (AI)-driven assessment tools in English as a Second Language (ESL) classrooms. Their research showcases how technologies such as automated essay scoring (AES) which employs techniques like Latent Semantic Analysis (LSA) and part-of-speech tagging and automated spoken language evaluation based on acoustic, linguistic, and scoring models are redefining assessment practices. These AI innovations not only streamline evaluation processes but also offer timely, data-informed feedback to learners. By

integrating such smart systems into traditional Nigerian classrooms, the study illustrates the promising role of AI in advancing ESL instruction and assessment. The TPACK framework (Mishra & Koehler, 2006) underscores the need to balance technological, pedagogical, and content knowledge, an approach that could guide teacher training programs.

2. **Public-Private Partnerships (PPPs)**: Government can collaborate with tech firms Google and Microsoft to deploy low-cost solutions (e.g., offline digital libraries, solar-powered devices). (Ohiare-Udebu & Chukwuemeka, 2024).
3. **Curriculum Reform**: Integrate digital literacy and computational thinking into the national curriculum, as seen in Rwanda's successful ICT integration (Chukwuemeka et al., 2021; UNESCO, 2022).
4. **Community Engagement**: Cultural resistance issues can be addressed by demonstrating smart education's benefits through pilot projects e.g., a Lagos school using gamification raised math scores by 30%. (Shen et al., 2023).

Conclusion

The transformation from traditional to smart education in Nigeria is essential to meet the demands of the rapidly changing global economy. The current educational system, characterized by outdated methodologies, limited infrastructure, and a rigid curriculum, inhibits the development of critical 21st-century skills such as creativity, problem-solving, and digital literacy. The adoption of smart education, driven by technologies such as artificial intelligence, cloud computing, and interactive multimedia, offers significant opportunities to enhance learning outcomes, create more engaging environments, and better prepare students for the digital age. However, the successful implementation of smart education in Nigeria requires addressing critical challenges such as inadequate infrastructure, teacher training, and curriculum reform. Without these efforts, the gap between Nigeria and other countries in terms of educational and economic development will continue to widen.

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