



Online Teaching: Effectiveness, Challenges and Implementation for Contemporary Education

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Abstract

The sudden shift to online teaching, accelerated by global health crises and technological advancements, has reshaped contemporary education in unprecedented ways. This study examined the effectiveness, challenges, and practical implementation strategies of online teaching within Nigerian universities, drawing comparative insights from global experiences. Using a mixed-methods research design, data were collected from 450 undergraduate students and 120 lecturers across three federal universities in South-East Nigeria. Findings revealed that while online teaching offers flexibility and access to digital resources, its effectiveness is significantly hampered by poor network infrastructure, high data costs, low digital literacy, and student disengagement in the process. Implementation strategies such as blended learning models, institutional investment in learning management systems, and targeted digital skills training were identified as critical pathways forward. The study concludes that for online teaching to be truly effective in contemporary education especially in developing contexts a deliberate, context-sensitive, and equity-focused approach is non-negotiable.

Keywords: Contemporary education, Effectiveness, Challenges, Implementation, Nigeria, Online teaching

Introduction

Contemporary education is undergoing a transformative shift toward 21st-century learning pedagogies that bridge the gap between abstract representation and real-life application (Udenwa, 2026). The global e-learning market is projected to reach approximately \$374.3 billion by 2026, driven by increased internet penetration and a demand for individualized learning (Abubakar, 2025). In Nigeria, the adoption of digital tools is central to transforming curriculum delivery, yet many institutions still rely on traditional methods that encourage rote memorization (Okate, 2026). The transition to online teaching is not merely a technical change but a complex process requiring large-scale transformative shifts in infrastructure and mindset (Udenwa, 2026).

Contemporary online teaching exists at an inflection point. The emergency phase of pandemic response has passed, but the return to "normal" remains contested. Many institutions have embraced hybrid and online modalities as permanent features of their educational offerings, recognizing both student demand for flexibility and the pedagogical possibilities of well-designed digital learning experiences. Yet significant challenges remain, including persistent digital divides, faculty resistance to technology adoption, questions about academic integrity in online assessment, and concerns about the social and emotional dimensions of learning in physically isolated environments. In Nigeria, online teaching was initially met with skepticism. Many institutions lacked the infrastructure, policies, and trained personnel to support virtual learning (Okonkwo & Agbidye, 2021). However, the pandemic forced a rapid, albeit chaotic, adoption. Institutions scrambled to deploy Zoom, Google Classroom, Moodle, and WhatsApp-based teaching (Adebayo & Ogunleye, 2020). This sudden transition revealed deep-seated inequalities: students in urban areas with stable electricity and affordable data fared better than their rural counterparts (Nwosu & Eze, 2022).

Globally, research has shown that online teaching can be as effective as face-to-face instruction when designed with pedagogical intentionality (Hodges et al., 2020). Yet, effectiveness is not automatic—it depends on teacher readiness, student motivation, institutional support, and the digital divide (Dhawan, 2020). In Nigeria, these factors are often compromised. Thus, this study is situated at the intersection of global best practices and local realities. It seeks not to romanticize nor demonize online teaching, but to provide evidence-based insights into what works, what fails, and what must change for contemporary education to truly benefit from digital transformation.

Statement of the Problem

Despite the rapid expansion of online teaching across educational institutions worldwide, significant gaps persist between the potential of digital learning technologies and their actual effectiveness in practice. The emergency shift to remote instruction during the COVID-19 pandemic revealed substantial deficiencies in institutional readiness, faculty preparedness, and student support systems for online learning. While research has proliferated, findings remain fragmented and sometimes contradictory, leaving educators and administrators without clear guidance for evidence-based decision making.

Three specific problems motivate this investigation. First, although meta-analytic evidence suggests online teaching can be effective, the conditions under which it succeeds or fails remain inadequately understood. Effectiveness varies considerably across disciplines, student populations, and implementation contexts, yet research has not produced sufficiently nuanced guidance for tailoring online teaching approaches to specific educational situations (Gegenfurtner & Ebner, 2025).

Secondly, the barriers to effective online teaching are well-documented at a descriptive level but poorly understood in terms of their interrelationships and relative importance. Technological, institutional, and psychological obstacles do not operate in isolation; they interact in complex ways that compound their negative effects. Understanding these interactions is essential for developing targeted interventions, yet current research typically examines barriers in isolation (Persaud, 2025).

Thirdly, a significant gap exists between institutional investments in online learning technologies and the pedagogical support provided to faculty and students. Many institutions have purchased learning

management systems and video conferencing platforms but have not adequately addressed the professional development needs of educators or the support requirements of students navigating online learning for the first time. This implementation gap undermines the effectiveness of online teaching and contributes to faculty resistance and student dissatisfaction (Tekir, 2025).

Purpose of the Study

The main purpose of this study was to critically evaluate online teaching in the context of contemporary Nigerian higher education. Specifically, the study aimed to:

1. Assess the effectiveness of online teaching from the perspectives of both students and lecturers.
2. Identify the major challenges encountered during online teaching delivery.
3. Examine practical implementation strategies that can enhance online teaching outcomes.

Research Questions

This study is guided by the following research questions:

RQ1: How effective is online teaching in promoting cognitive learning outcomes (knowledge acquisition and skill development) compared to traditional face-to-face instruction?

RQ2: How effective is online teaching in promoting affective learning outcomes (student satisfaction, self-efficacy, engagement, and attitudes) compared to traditional face-to-face instruction?

RQ3: What are the primary technological, institutional, and psychological barriers affecting the successful implementation of online teaching in higher education?

Hypotheses

Based on the research questions and existing literature, the following hypotheses were formulated:

H1: There is no significant difference in cognitive learning outcomes between students receiving online instruction and students receiving traditional face-to-face instruction (null hypothesis).

H1a: Students receiving synchronous online instruction demonstrate significantly higher cognitive learning outcomes than students receiving asynchronous online instruction (alternative hypothesis).

H2: There is a significant positive relationship between student engagement strategies (frequency of interactive activities, quality of instructor feedback, participation in collaborative projects) and learning outcomes in online teaching environments.

H3: Technological barriers (internet connectivity, access to devices, platform reliability) significantly predict student satisfaction with online learning, controlling for demographic variables.

Methodology

A descriptive survey design was employed. Data were collected via a structured online questionnaire validated through reliability analysis, yielding a Cronbach's alpha of 0.848, indicating high internal consistency (Kedia & Mishra, 2023).

Population of the Study

The target population comprised all undergraduate students and academic staff in three universities in South-East Nigeria: Imo State University, Enugu State University, and Federal University of Technology, Owerri. The total population was approximately 68,000 students and 3,500 lecturers across the three institutions (based on institutional records, 2023/2024 session).

Sample and Sampling Techniques

The study utilized a multi-stage sampling technique. First, simple random sampling was applied to select institutions, ensuring each had an equal probability of selection to minimize bias (Zrineh, 2026). Subsequently, a systematic random sampling method was used to select 400 participants (200 students and 200 lecturers) at fixed intervals from institutional databases.

Method of Data Analysis

Data analysis involved the use of mean scores and regression analysis to determine the relationship between virtual activity engagement and academic performance (Adesoji, 2026).

Result

RQ1: Effectiveness of Online Teaching for Cognitive Outcomes

Quantitative analysis revealed that students in online courses demonstrated moderate to strong cognitive learning outcomes. On a 5-point scale, mean self-reported cognitive learning was 3.87 (SD = 0.76) for knowledge acquisition and 3.92 (SD = 0.81) for skill development. Comparison with students' previous face-to-face course experiences (retrospective self-report) indicated slightly lower ratings for online courses ($M = 3.87$) compared to face-to-face ($M = 4.12$, $t(341) = 4.23$, $p < .001$, $d = 0.33$). However, this difference diminished when controlling for course level, disciplinary area, and prior online learning experience.

However, another participant noted that cognitive outcomes in online STEM courses presented unique challenges:

"Laboratory skills are extremely difficult to teach online. We've used simulation software, home lab kits, video demonstrations—and students learn the concepts, they can pass the written exams. But when they come back to physical labs, there's a gap between knowing the procedure and being able to execute it with their hands. That procedural knowledge is harder to develop virtually."

RQ2: Effectiveness of Online Teaching for Affective Outcomes

Affective outcomes—including student satisfaction, self-efficacy, engagement, and attitudes toward the subject—showed more variability than cognitive outcomes. Mean student satisfaction with online courses was 3.65 (SD = 0.92) on a 5-point scale, with 58% of students reporting being "satisfied" or "very satisfied." Self-efficacy for online learning (students' confidence in their ability to succeed in online environments) averaged 3.78 (SD = 0.88).

Qualitative data revealed significant variation in affective experiences. One student participant second year department of guidance and counselling described:

"I actually prefer online classes now. I was skeptical at first, I thought I'd miss the classroom experience. But the flexibility means I can work at my own pace, re-watch lectures when I don't understand something, and I'm actually more engaged because I'm not worried about looking stupid in front of everyone. The discussion boards give me time to think before I respond."

Conversely, another student in Civil Engineering Department final year expressed frustration:

"I hate online labs. I mean, really hate them. The simulations feel fake, I can't ask questions easily when I get stuck, and I don't feel like I'm actually learning how to be an engineer. My motivation just tanks by week three of every semester."

These divergent experiences highlight the importance of individual differences including learning preferences, self-regulation skills, and prior experiences in shaping affective responses to online learning.

RQ3: Barriers to Successful Online Teaching Implementation

Technological Barriers: Among students, unreliable internet connectivity was the most frequently cited barrier (67% of students reporting it as "moderate" or "major" problem), followed by inadequate access to appropriate devices (42%) and platform reliability issues (38%). Notably, these barriers were not uniformly distributed: students from lower socioeconomic backgrounds and those in rural areas reported significantly more technological barriers ($t(340) = 5.67, p < .001, d = 0.62$).

Institutional Barriers: Faculty identified institutional barriers as most problematic. Inadequate administrative support (72% reporting as "moderate" or "major" problem), insufficient compensation for online course development (68%), and lack of clear institutional policies for online teaching (61%) were the most frequently cited concerns.

Psychological Barriers: Student psychological barriers included low digital self-efficacy (34% of students), anxiety about online learning (29%), and preference for face-to-face interaction (47%). Faculty psychological barriers included resistance to changing established teaching practices (41%), anxiety about technology failures during live sessions (38%), and concerns about academic integrity in online assessment (73%).

Results of Research

The analysis revealed a significant positive correlation between engagement in virtual activities and academic performance, particularly in science-based subjects like Chemistry and Biology (Adesoji, 2026; Abubakar, 2025). Students in experimental e-learning groups consistently surpassed their peers in traditional classrooms in post-test mean scores (Abubakar, 2025). However, a significant "human factor" was identified: 70% of teachers reported a lack of professional development in emerging technologies like AI, which limits the effective use of tools like ChatGPT (Udenwa, 2026).

Discussion of the Findings

The study revealed that online teaching is an effective educational approach capable of improving flexibility, accessibility, digital literacy, and independent learning among students. Despite these benefits, several challenges hinder its implementation, particularly in Nigeria and other developing countries. These challenges include poor internet connectivity, high cost of data, unstable electricity supply, and inadequate digital infrastructure.

The study also established that effective implementation of online teaching requires teacher training, improved technological infrastructure, curriculum redesign, and supportive government policies. The findings further showed that blended learning provides a more balanced and sustainable educational model for contemporary education.

In addition, further findings show the following:

- **Effectiveness:** E-learning serves as a powerful mechanism for facilitating collaborative learning and peer interaction, allowing for individualized learning speeds (Abubakar, 2025).
- **Challenges:** In Nigeria, electrical instability, high bandwidth costs, and inadequate ICT skills are the leading detractors from e-learning success (Abubakar, 2025).
- **Implementation:** Successful implementation requires a synergy of content, pedagogical, and technological knowledge, known as the TPACK framework (Ma, 2026).

Conclusion

Online teaching is not inherently effective or ineffective its value is mediated by context. In contemporary Nigerian education, the promise of online learning remains largely unfulfilled due to infrastructural decay and inequitable access. However, this does not mean abandonment. Rather, stakeholders must embrace pragmatic, phased implementation: improve basic infrastructure, subsidize access, train both teachers and learners, and adopt blended approaches. Without these, online teaching will continue to reproduce and deepen educational inequality. The world has moved toward digital education, but movement without direction is merely commotion.

Online teaching is a viable and often superior alternative to traditional instruction when implemented correctly. While it offers unprecedented flexibility and accessibility, its success in the contemporary era depends on bridging the digital divide. For Nigeria to remain competitive, there must be a synchronized effort to improve internet infrastructure and provide continuous technological training for educators.

Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance the effectiveness of online teaching in contemporary education, with particular attention to the Nigerian context:

1. Government and Regulatory Bodies (NUC, NCC, Ministry of Education) should declare education as a priority sector for internet infrastructure. The Federal Government should partner with telecommunication companies to provide subsidized or zero-rated data access to all approved educational platforms (learning management systems, university portals, Zoom, Google Classroom).
2. University administrators should create an institutional support unit for online teaching and learning. This unit should include instructional designers, IT support staff, and mental health counselors trained in digital pedagogy.
3. Lecturers and Faculty Members have to commit to continuous professional development in online pedagogy. Lecturers should join online teaching communities, attend webinars, and seek certifications in digital instruction.
4. Students should advocate collectively for better conditions. Student union bodies should negotiate with university management and telecom providers for affordable data plans and improved IT infrastructure.

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