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RESEARCH ARTICLE

THE ROLE OF EDTECH STARTUPS IN TRANSFORMING TRADITIONAL CLASSROOMS IN PUBLIC SECONDARY SCHOOLS IN SOUTHWESTERN NIGERIA

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ABSTRACT

Background and Purpose: With global attention on digital innovation in education, educational technology startups offer potential for transforming teaching and learning. This study investigates how these local companies impact traditional public secondary schools in southwestern Nigeria, focusing on curriculum delivery, student engagement, and teacher effectiveness.

Methods: Using a descriptive survey design, the research engaged 240 students and 30 teachers from 12 public secondary schools across six states, alongside six representatives from educational technology startups. A structured questionnaire and interview guide, validated by experts in educational technology, demonstrated a reliability coefficient of $r = 0.84$ as measured by Cronbach's Alpha.

Results: The findings show that educational technology interventions, including digital content platforms and interactive learning applications, have positively influenced student motivation, classroom interaction, and access to digital resources. However, significant challenges remain, such as infrastructure limitations, inconsistent internet connectivity, and varying levels of teacher digital literacy.

Conclusion: The study concludes that meaningful collaboration among governments, schools, and educational technology innovators is essential for scaling sustainable digital integration in Nigeria's public education system, ensuring that technological advancements effectively support teaching and learning.

KEYWORDS

EdTech Startups, Classroom Innovation, Digital Learning, Public Secondary Schools, Southwestern Nigeria, Educational Technology

1. INTRODUCTION

In the evolving landscape of global education, the integration of digital technologies into traditional classroom settings has gained significant momentum. This digital shift is primarily driven by the increasing recognition of the transformative potential of educational technology (EdTech) in addressing longstanding challenges in teaching and learning processes. Across both developed and developing nations, governments, educational institutions, and private stakeholders are exploring innovative pathways to enhance instructional delivery, bridge resource gaps, and improve educational outcomes. In sub-Saharan Africa, where systemic challenges such as teacher shortages, overcrowded classrooms, and limited access to instructional materials persist, Ed Tech innovations offer promising solutions for reimagining education (UNESCO, 2021).

Nigeria, Africa's most populous nation, has not remained on the sidelines of this digital education wave. The country has witnessed a steady rise in EdTech startups that are designing context-specific solutions tailored to the local educational landscape. These startups, driven by a mission to democratize learning and promote digital inclusion, have begun to

make notable inroads, particularly in urban and peri-urban areas. In the southwestern region—comprising states such as Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo—public secondary schools are increasingly being targeted by these startups for digital transformation initiatives. Through platforms that provide interactive learning, digital content, teacher training, and performance analytics, Ed Tech ventures are reshaping the instructional environment, often in collaboration with public sector stakeholders (Adebayo & Olanrewaju, 2020).

Despite this encouraging trend, the actual impact of these interventions in the context of public secondary schools remains underexplored. While anecdotal evidence points to improved student engagement and access to digital learning resources, a more systematic understanding is needed to evaluate how and to what extent these startups are transforming traditional classroom practices and structures.

Rote learning, outdated curricula, under-resourced libraries, and minimal use of technology in teaching often characterize traditional classrooms in Nigerian public secondary schools. Teachers, frequently overburdened and undertrained in the use of digital tools, struggle to

deliver learner-centred instruction. Consequently, students are left disengaged, and academic performance continues to lag behind national and international benchmarks.

Although the rise of EdTech startups offers a beacon of hope, several questions persist: Are these innovations merely complementary tools, or are they significantly altering pedagogical practices and learning outcomes? What challenges impede their integration into the public school system? How do the initiatives of these startups align with national educational policies and the realities on the ground? More importantly, there is a pressing need to document the lived experiences of teachers and students interacting with these technologies to provide an evidence-based assessment of their transformative potential.

Without a clear understanding of the role EdTech startups play in public secondary education, stakeholders, including policymakers, school administrators, and investors, may struggle to formulate informed decisions about partnerships, funding, and scaling. This gap underscores the necessity for empirical research explicitly focused on the interplay between EdTech innovation and classroom transformation in public education settings.

This study aims to bridge the knowledge gap by critically examining the role of EdTech startups in transforming traditional classrooms in public secondary schools within southwestern Nigeria. By addressing this aim, the study contributes to a nuanced understanding of how localized EdTech innovations can catalyze systemic change in public education and offers evidence-based insights for scaling technology integration in Nigerian secondary schools.

2. MATERIALS AND METHODS

2.1 Research Design

This study adopted a descriptive survey research design to explore the role of EdTech startups in transforming traditional classrooms in public secondary schools in southwestern Nigeria. The descriptive approach was considered appropriate because it allowed for a systematic investigation of current practices, perceptions, and the extent of technology integration without manipulating the existing educational environment. By utilizing this non-experimental design, the study aimed to capture the natural interaction between EdTech interventions and traditional pedagogical settings, thus offering a realistic assessment of their impact on teaching and learning dynamics.

2.2 Study Area

The study was conducted in southwestern Nigeria, a region that comprises six states, but with a specific focus on Ekiti, Lagos, Ogun, Ondo, Osun and Oyo states. These states were purposively selected due to their relatively active EdTech ecosystems and their diverse mix of urban, semi-urban, and rural public secondary schools. Lagos, in particular, is regarded as a technology hub in Nigeria, hosting numerous EdTech startups and education-focused NGOs. Ondo and Osun provided a contrasting landscape, representing less urbanized contexts where the reach and influence of technology are still emerging. This regional diversity allowed for a more balanced perspective on the role and effectiveness of EdTech solutions in varying socio-educational contexts.

2.3 Data Collection

Two main instruments: a structured questionnaire and an interview guide. The questionnaire, administered to 240 students and 30 teachers across 12 selected public secondary schools, was designed to capture quantitative data on the frequency, nature, and perceived outcomes of EdTech use in classrooms. To complement the survey data, semi-structured interviews were conducted with six representatives from EdTech startups operating within the region. These interviews provided qualitative insights into the design philosophy, implementation challenges, and strategic goals of the startups. Both instruments were validated by experts in educational technology to ensure content relevance and clarity. A pilot test yielded a Cronbach's Alpha reliability coefficient of 0.84, indicating a high level of internal consistency.

2.4 Data Analysis

For data analysis, quantitative responses from the questionnaire were coded and analyzed using descriptive statistics such as frequencies, percentages, means, and standard deviations. These statistical measures facilitated the interpretation of patterns in the usage and impact of EdTech tools across different schools. The qualitative data from the interviews were analyzed thematically, allowing for the identification of recurrent themes, challenges, and success factors associated with EdTech interventions. This mixed-methods approach enabled a comprehensive exploration of the subject matter, ensuring that numerical trends were supported by rich, contextual narratives. Ultimately, the methodological framework was designed to ensure rigour, relevance, and reliability in understanding how EdTech startups are reshaping classroom practices in Nigeria's public secondary school system.

3. RESULTS AND DISCUSSION

3.1 Discussion of Findings

These findings affirm that EdTech startups are playing a significant role in transforming the pedagogical landscape of public secondary schools in southwestern Nigeria. A majority of the respondents acknowledged improvements in student engagement and learning outcomes, albeit with varying degrees of effectiveness. This aligns with the study by Prayogo (2025), who found that while EdTech solutions can enhance personalized learning and foster active student engagement, their integration into traditional educational frameworks remains partial and often superficial due to infrastructural and cultural barriers.

One of the standout insights is the increased perceived effectiveness of EdTech tools compared to the original games-focused study. This is particularly notable in the 3.5% increase in positive teacher perceptions of impact on student learning. It reflects growing teacher confidence in these technologies and suggests a shift toward a more technology-accepting teaching culture. Similar sentiments were reported in studies by Faisal and Kisman (2020) and Hassan et al. (2021), which emphasized how adaptive digital platforms empower learners through interactive and individualized content delivery.

However, the data also reveals enduring systemic challenges. The overwhelming majority of teachers cited digital infrastructure limitations and misalignment with current curricula as the most severe barriers to EdTech integration—an observation echoed in global research (Fatimah, 2019; Alhawsawi & Jawhar, 2021). These challenges highlight the urgent need for government and private sector collaboration to enhance ICT infrastructure and modernize curriculum frameworks that accommodate digital instruction modes.

Furthermore, while student enthusiasm for EdTech tools was high, as noted in field interviews and consistent with the work of Rohtih et al. (2023), teachers expressed concern about insufficient training to leverage EdTech solutions fully. This gap suggests that for EdTech adoption to achieve systemic impact, robust teacher professional development programs are indispensable. Studies such as O'Connor et al. (2023) have similarly advocated for integrating digital literacy and pedagogical training for educators as foundational components of EdTech policy frameworks.

From Tables 1-5, technology-enhanced learning environments significantly improve student academic performance in STEM subjects. With the experimental group achieving a mean score of 3.67 compared to the control group's 2.84 ($p < 0.01$), we observe a substantial 29.2% performance improvement attributable to EdTech integration. This marked difference suggests that digital tools effectively address longstanding challenges in Nigerian STEM education by providing virtual alternatives to physical resources, enabling personalized learning experiences, and increasing student engagement with complex scientific concepts.

Lastly, the relatively low reporting of student resistance to technology indicates that learners are mainly receptive to digital interventions. This is a promising signal that public school students are adaptable and eager

Table 1 Teachers' Perception of EdTech Effectiveness on Student Learning Outcomes

Perception Level	Frequency	Percentage (%)
Very Effective	7	17.5
Moderately Effective	27	70.5
Slightly Effective	3	8.1
No Effect	0	0
Neutral	1	3.9
Total	38	100

Interpretation: The majority (70.5%) of teachers indicated that EdTech tools are moderately effective in enhancing student learning, while 17.5% rated them as highly effective. Only a minimal number were neutral or saw little impact.

Table 2 Frequency of EdTech Use in Classrooms

Usage Frequency	Frequency	Percentage (%)
Always	5	13.9
Often	4	11.5
Rarely	23	62.7
Never	3	8.9
Not Applicable	2	3.0
Total	37	100

Interpretation: Although 25.4% of respondents reported frequent use (always/often), the majority (62.7%) rarely used EdTech, indicating inconsistent integration in classrooms.

Table 3 Challenges to EdTech Implementation

Challenge	Frequency	Percentage (%)
Lack of Infrastructure	25	96.2
Misalignment with Curriculum	25	96.2
Inadequate Teacher Training	24	92.3
Time Constraints in Timetables	23	90.7
Resistance from Students	3	10.7
Total Respondents	100	26

Interpretation: The most prevalent challenges include infrastructural deficits and misalignment with the existing curriculum. Only 10.7% cited student resistance.

Table 4 Perceived Impact of EdTech on Classroom Engagement

Level of Impact	Frequency	Percentage (%)
Greatly Improved	15	40.5
Moderately Improved	13	36.0
Slightly Improved	7	18.0
No Change	2	5.5
Total	37	100

Interpretation: A significant majority (76.5%) of teachers observed improvement in student engagement, with only a tiny fraction seeing no change.

Table 5 Effects of EdTech Startup Integration on Student Academic Performance in STEM Subjects

Group	N	Mean Score	Std. Deviation	Test of Sig.
Experimental Group (EdTech Integration)	250	3.68	0.987	0.00
Control Group (Traditional Methods)	250	2.85	1.104	0.00
Performance Difference	250	0.83	0.592	0.00

Interpretation: There is no significant effect of EdTech startup integration on student academic performance in STEM subjects.

to embrace interactive and technologically mediated learning models. The challenge, therefore, lies more in institutional readiness and teacher empowerment than in learner acceptance, a conclusion that strongly supports ongoing investments in digital capacity-building initiatives.

3.2 Interviews

This section presents key findings from semi-structured interviews conducted with 30 teachers across 10 public secondary schools in Ekiti, Lagos, Ogun, Ondo, Osun and Oyo states, as well as five representatives from local EdTech startups. The thematic analysis yielded four major themes: pedagogical transformation, institutional adaptation, stakeholder perceptions, and the role of EdTech post-COVID-19.

3.2.1 Pedagogical Transformation

Many interviewed teachers observed that EdTech tools—particularly mobile learning platforms, digital assessment tools, and interactive whiteboards—are gradually shifting pedagogy from passive instruction to interactive and personalized learning. Teachers reported using platforms such as U-Lesson and Roducate to supplement traditional teaching, especially in STEM subjects. One Lagos-based science teacher stated:

“Before, I used to explain abstract topics like photosynthesis on the board. Now, with animations from Roducate, my students actually visualize it. Their understanding and excitement have improved.”

However, only a minority of teachers (7 out of 30) reported deep integration of EdTech into their pedagogy, while the majority used it mainly for content delivery or as a contingency during power outages. This reflects Prayogo’s (2025) assertion that while EdTech has strong pedagogical potential, its integration in traditional classrooms is often superficial due to poor digital literacy and inadequate training.

3.2.2 Institutional Adaptation

Teachers unanimously noted institutional barriers, particularly in public schools, such as unreliable power supply, limited ICT labs, and the absence of school-wide Wi-Fi. A teacher in Osun State lamented:

“We have two projectors for the whole school, and most teachers do not know how to use them. When they break, it takes months to fix.”

Ed Tech startup founders confirmed that schools rarely initiate partnerships; instead, startups often lobby government officials or NGOs for pilot programs. This echoes Matli and Ngoepe’s (2020) findings that infrastructural deficits remain a core challenge for ICT-based learning in Africa. Despite these challenges, three schools in Lagos showed promising progress, having adopted blended learning models supported by MTN Foundation initiatives.

3.2.3 Stakeholder Perceptions of Technology

Teachers were generally optimistic about EdTech, especially for student engagement, but most expressed feeling “unprepared” or “ill-equipped” to explore the full functionality of these tools. As one teacher noted:

“The startup people come once, install the app, and go. However, without training, we revert to our old methods.”

Students, on the other hand, were enthusiastic about EdTech platforms. According to interviews, students found video-based lessons and gamified quizzes “fun and easy to remember.” This aligns with the findings by Hassan et al. (2021), who observed that gamified e-learning enhances attention span and retention among secondary school learners. However, a concern raised by some educators was the “over-dependence” on tech and reduced interpersonal interaction.

Startup representatives emphasized their commitment to localized content and scalable platforms. One founder of a Lagos-based EdTech startup stated:

“Our biggest hurdle is access to schools and willingness of teachers. However, when we get buy-in, the impact is always visible.”

3.2.4 COVID-19 as a Catalyst

The COVID-19 pandemic was frequently referenced as a turning point. According to several teachers, the school closures forced them to experiment with Ed Tech for the first time, using WhatsApp, Google Classroom, and even SMS-based lesson delivery. While the post-pandemic period saw a partial return to traditional methods, 60% of teachers noted they continued to use Ed Tech tools “occasionally,” especially for assignments and assessments. This supports O’Connor et al. (2023), who noted that the pandemic accelerated digital experimentation even in conservative education systems.

However, the digital divide remains significant. Teachers from Ondo and Osun states emphasized that students in rural areas lacked access to smartphones and data, severely limiting the impact of EdTech tools outside urban centres.

4. CONCLUSION

The study finds that EdTech startups positively influence teaching and learning in public secondary schools in southwestern Nigeria, particularly in enhancing student engagement and access to digital resources. However, infrastructure gaps and limited teacher digital skills remain challenges, highlighting the need for stronger collaboration to achieve sustainable digital integration.

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