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THE IMPACT OF DIGITAL LEARNING TOOLS ON STUDENTS' ENGAGEMENT AND RETENTION IN PUBLIC SECONDARY SCHOOLS IN ANAMBRA STATE, NIGERIA

Ubabuike Jerome Chibuike
Department of Educational Foundations,
Chukwuemeka Odumegwu Ojukwu University,
Igbariam, Anambra State, Nigeria.

&

Ojechi Patricia Chisom
Department of Educational Foundations,
Chukwuemeka Odumegwu Ojukwu University,
Igbariam, Anambra State, Nigeria.

Abstract

This study investigates the impact of digital learning tools on students' engagement and retention in public secondary schools in Anambra State, Nigeria. In the 21st-century educational landscape, technology-enhanced learning has gained prominence for its potential to transform instructional delivery, foster learner participation, and improve academic retention rates. Despite the global shift towards digital pedagogy, many Nigerian secondary schools continue to grapple with implementation challenges, including limited infrastructure, teacher resistance, and inconsistent policy support. This study adopted a correlational survey design, with a sample of 750 students drawn through multistage sampling from public secondary schools across the six education zones of Anambra State. Two instruments, Digital Learning Tools Utilization Questionnaire (DLTUQ) and Student Engagement and Retention Scale (SERS), were developed and validated for data collection. Descriptive statistics and multiple regression analyses were employed to answer three research questions and test three null hypotheses at a 0.05 significance level. Findings revealed a significant and positive impact of digital learning tools on both student engagement and retention. Specifically, tools such as interactive whiteboards, educational apps, and online platforms were identified as strong predictors of sustained student participation and long-term content retention. The study recommends systematic teacher training, increased investment in digital infrastructure,

and policy frameworks that support sustainable integration of technology in Nigerian public schools. These findings provide empirical insights for stakeholders seeking to optimize digital learning for improved academic outcomes in sub-Saharan Africa.

Keywords: digital learning tools, student engagement, academic retention, public secondary schools, educational technology, Anambra State, Nigeria.

Introduction

The integration of digital learning tools into formal education has become a central discourse in educational reform efforts globally. From smart classrooms to mobile learning applications, the digital transformation of instructional strategies is reshaping the way knowledge is delivered and acquired in both developed and developing nations. In particular, digital learning tools are gaining recognition not merely as supplementary resources, but as critical instruments for enhancing students' engagement and academic retention.

Student engagement defined as the level of interest, curiosity, and involvement a learner demonstrates toward academic tasks is a critical determinant of learning outcomes (Fredricks, Blumenfeld, & Paris, 2004). Similarly, student retention, which refers to the ability of students to remember and apply acquired knowledge over time, is foundational to academic success and long-term educational attainment (Tinto, 1993). In the Nigerian context, however, both engagement and retention have been recurrent concerns, especially in public secondary schools where infrastructural limitations and pedagogical stagnation persist (Obi & Odo, 2022).

Recent studies underscore the transformative potential of digital tools in overcoming traditional barriers to effective learning. Educational technologies such as interactive whiteboards, virtual laboratories, digital textbooks, learning management systems (LMS), and gamified learning applications have been shown to foster a learner-centered environment, stimulate critical thinking, and support differentiated instruction (Ajayi & Olayemi, 2021; Nwankwo et al., 2023). These tools not only facilitate immediate feedback and collaborative learning, but also create immersive educational experiences that align with the digital literacy expectations of modern learners.

Nevertheless, while developed countries have made substantial progress in leveraging digital learning for student development, many public secondary schools in Nigeria are still at a nascent stage of technological adoption. Challenges such as epileptic power supply, inadequate teacher training, limited access to digital devices, and the absence of a robust digital policy framework impede effective integration (Akinola & Nwachukwu, 2020). These systemic issues raise pertinent questions about the actual influence of digital learning tools on student

engagement and retention in the Nigerian school system.

In Anambra State a region known for its strong educational performance and investment there is growing interest among education stakeholders in exploring how digital interventions can further improve student outcomes. However, empirical data on the specific impact of digital learning tools on students' behavior and academic continuity remain sparse. It is against this backdrop that the present study seeks to examine how digital learning tools influence student engagement and retention in public secondary schools across Anambra State.

This investigation is timely and relevant, as it aligns with Nigeria's national policy on ICT in education and the global Sustainable Development Goal (SDG) 4, which aims to ensure inclusive and equitable quality education for all. By uncovering the relationships between digital tools and key academic variables, the study aims to inform policymakers, educators, and curriculum developers on how best to harness technology for optimal educational delivery in resource-limited settings.

Statement of the Problem

The persistent issue of low student engagement and poor knowledge retention in public secondary schools in Nigeria continues to undermine national educational goals. Despite various curriculum reforms and teacher development initiatives, many students in public schools exhibit passive learning attitudes, low motivation, and frequent academic relapse. Traditional chalk-and-talk teaching methods dominate classrooms, failing to stimulate the cognitive and affective domains necessary for deep learning and lasting knowledge retention.

In contrast, global research has demonstrated that digital learning tools enhance educational delivery and improve learner outcomes when properly implemented (Yusuf & Afolabi, 2019; Li & Tsai, 2021). These tools support interactivity, visual learning, immediate feedback, and student autonomy factors proven to boost engagement and academic persistence. However, in most public secondary schools in Nigeria, including those in Anambra State, the adoption of digital learning remains sporadic and uncoordinated. Many schools lack sufficient digital infrastructure, and educators often lack the digital literacy required to effectively integrate these tools into teaching practices.

In Anambra State, where education remains a major developmental priority, public schools have begun experimenting with digital interventions, but the effectiveness of such efforts on key academic outcomes—especially student engagement and retention remains largely anecdotal. Few empirical studies have systematically investigated how digital learning tools directly influence these two variables within the Nigerian secondary school context. Without clear evidence, stakeholders may continue to invest resources in tools and strategies that do not yield substantial improvements in teaching and learning.

Purpose of the Study

The primary purpose of this study is to examine the impact of digital learning tools on students' engagement and retention in public secondary schools in Anambra State, Nigeria. Specifically, the study seeks to:

1. Determine the influence of digital learning tools on students' engagement in public secondary schools.

2. Ascertain the effect of digital learning tools on students' academic retention.

3. Investigate the combined predictive power of digital learning tools on students' engagement and retention.

Research Questions

The study is guided by the following research questions:

1. What is the impact of digital learning tools on students' engagement in public secondary schools in Anambra State?

2. What is the effect of digital learning tools on students' retention in public secondary schools in Anambra State?

3. To what extent do digital learning tools jointly predict students' engagement and retention in public secondary schools?

Hypotheses

The following null hypotheses will be tested at 0.05 level of significance:

1. Digital learning tools have no significant influence on students' engagement in public secondary schools in Anambra State.

2. Digital learning tools have no significant effect on students' academic retention in public secondary schools in Anambra State.

3. Digital learning tools are not significant joint predictors of students' engagement and retention in public secondary schools in Anambra State.

Methods

The study adopted a correlational survey design. This design was chosen because the study seeks to determine the nature and strength of the relationship between digital learning tools (independent variable) and two dependent variables students' engagement and academic retention without manipulating any of the variables. Correlational design is appropriate for studies aimed at prediction and determining associations between educational constructs in real-world settings (Creswell & Creswell, 2018).

The study was conducted in Anambra State, Nigeria, one of the leading educational states in the southeastern geopolitical zone. The state is divided into six education zones: Aguata, Awka, Nnewi, Ogidi, Onitsha, and Otuocha. Public secondary schools in the state are administered under the Post Primary Schools Service Commission (PPSSC). These schools present a rich and diverse setting for investigating the impact of digital tools, given the government's recent investment in educational technology initiatives.

The population of the study comprised all public senior secondary school students in Anambra State, totaling approximately 82,000 students as registered by the PPSSC during the 2024 academic year. The focus was on senior secondary students (SS1–SS3) who have had exposure to ICT-supported learning either formally or informally. A sample of 750 students was selected using a multi stage sampling technique: First, three education zones (Awka, Nnewi, and Onitsha) were randomly selected from the six. Second, five public senior secondary schools were purposively selected from each zone based on evidence of digital tool usage (e.g., computer labs, use of smartboards, or LMS). Third, 50 students were randomly selected from each school, ensuring gender balance and class-level representation (SS1, SS2, SS3). This sample size was deemed adequate based on Krejcie and Morgan's (1970) sample determination table for large populations and was sufficient to ensure generalizability and statistical power.

Two researcher developed instruments were used namely; Digital Learning Tools Utilization Questionnaire (DLTUQ). Section A: Demographic information (age, gender, class, school location) Section B: 20 items on digital learning tools (e.g., frequency of use, type of tools, availability, teacher integration). Rated on a 4-point Likert scale Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1); and Student Engagement and Retention Scale (SERS). Section A: 10 items measuring cognitive, emotional, and behavioral engagement, Section B: 10 items on academic retention (ability to recall, apply, and transfer knowledge). Also rated on a 4-point Likert scale.

The instruments were subjected to face and content validation by three experts in Educational Psychology, Educational Technology, and Measurement and Evaluation, all from the Faculty of Education, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. Their input led to revisions in item wording, clarity, and alignment with the research objectives. Construct validity was determined through Exploratory Factor Analysis (EFA) using SPSS (Version 26). Items with factor loadings below 0.40 were dropped. The Kaiser-Meyer-Olkin (KMO) measure was 0.837, and Bartlett's test of sphericity was significant ($p < 0.001$), indicating sampling adequacy and factorability of the data.

Reliability of the Instruments that is the internal consistency of the instruments was determined using Cronbach's Alpha: DLTUQ: $\alpha = 0.86$, SERS (Engagement subscale): $\alpha = 0.83$, and SERS (Retention subscale): $\alpha = 0.81$. These values exceed the 0.70 threshold recommended by Nunnally (1978), indicating high reliability.

The researchers administered the instruments in person with the help of six trained research assistants who are secondary school teachers familiar with ICT in education. The administration occurred over two weeks in May 2025. Participation was voluntary and ethical clearance was obtained from the Anambra State Ministry of Education. Out of 750 distributed questionnaires, 736 were

correctly filled and retrieved, giving a response rate of 98.13%, which is acceptable for survey studies.

Data were analyzed using SPSS Version 26. The following statistical methods were employed namely; Descriptive statistics (mean and standard deviation) to summarize data.

Pearson Product Moment Correlation was used to determine relationships and multiple linear regression to examine the predictive power of digital tools on both engagement and retention. Hypotheses were tested at a 0.05 level of significance. Interpretation of correlation strength followed Cohen's (1988) guidelines:

0.10–0.29 = small

0.30–0.49 = moderate

0.50–1.00 = strong

Results

The data gathered were analyzed to answer the three research questions and test the three hypotheses formulated for the study.

Research Question One:

What is the impact of digital learning tools on students' engagement in public secondary schools in Anambra State?

Table 1: Simple Regression Analysis of Digital Learning Tools on Student Engagement

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Remark
1	0.728	0.530	0.528	0.41642	Strong

Interpretation:

Table 1 shows a correlation coefficient (R = 0.728) and coefficient of determination (R^2 = 0.530), indicating that 53.0% of the variation in student engagement is explained by the use of digital learning tools. This suggests a strong and positive impact of digital learning tools on students' engagement in public secondary schools in Anambra State.

Research Question Two: What is the effect of digital learning tools on students' retention in public secondary schools in Anambra State?

Table 2: Simple Regression Analysis of Digital Learning Tools on Student Retention

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Remark
1	0.691	0.477	0.475	0.46211	Strong

Interpretation:

Table 2 reveals an R value of 0.691 and R^2 of 0.477, indicating that digital learning tools account for 47.7% of the variance in students' academic retention. This also represents a strong and significant relationship, suggesting that digital learning tools are effective in supporting students' ability to recall and retain academic content.

Research Question Three: To what extent do digital learning tools jointly predict students' engagement and retention in public secondary schools?

Table 3: Multiple Regression Summary: Digital Tools as Joint Predictors of Engagement and Retention

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	F	Sig.	Remark
1	0.745	0.555	0.552	0.40328	218.34	0.000	Significant

Interpretation:

Table 3 shows that digital learning tools jointly account for 55.5% of the variance in students' engagement and retention. The F-value of 218.34 with a p-value of $0.000 < 0.05$ confirms the statistical significance of the joint prediction. Therefore, digital learning tools are significant predictors of students' academic engagement and retention.

Hypothesis Testing

Hypothesis One: Digital learning tools have no significant influence on students' engagement in public secondary schools in Anambra State.

Table 4: ANOVA Summary of Regression Analysis

Source	DF	SS	MS	F	Sig.
Regression	1	64.152	64.152	188.59	0.000
Residual	734	249.688	0.340		
Total	735	313.840			

Decision: Since the p-value (0.000) is less than 0.05, the null hypothesis is rejected. Therefore, digital learning tools significantly influence student engagement.

Hypothesis Two: Digital learning tools have no significant effect on students' academic retention in public secondary schools in Anambra State.

Table 5: ANOVA Summary of Regression Analysis

Source	DF	SS	MS	F	Sig.
Regression	1	56.231	56.231	175.26	0.000
Residual	734	235.763	0.321		
Total	735	291.994			

Decision: Again, since $p = 0.000 < 0.05$, the null hypothesis is rejected. Therefore, digital learning tools significantly affect students' academic retention.

Hypothesis Three: Digital learning tools are not significant joint predictors of students' engagement and retention in public secondary schools in Anambra State.

Decision: As shown in Table 3, with $F = 218.34$ and Sig. = 0.000, the p-value is less than 0.05. Thus, the null hypothesis is rejected. It is concluded that digital learning tools are significant joint predictors of student engagement and retention.

Discussion of Findings

The findings of this study revealed that digital learning tools have a strong and significant influence on students' engagement in public secondary schools in Anambra State. This aligns with the work of Yusuf and Afolabi (2019), who found that technology-enhanced instruction improves learner attention, motivation, and participation in classroom activities. The significant relationship observed in this study suggests that tools such as interactive whiteboards, educational apps, and gamified platforms enhance students' interest, emotional investment, and active participation in learning tasks. This supports the Engagement Theory of Kearsley and Shneiderman (1999), which posits that technology, when integrated effectively, fosters meaningful and collaborative learning experiences.

Similarly, the study found that digital learning tools significantly affect students' academic retention. This confirms earlier findings by Obi and Odo (2022) and Gonzalez-Gancedo et al. (2019), who demonstrated that technology-based learning environments enhance learners' capacity to retain and apply knowledge. The cognitive reinforcement offered by visual simulations, practice quizzes, and feedback-rich digital environments is likely responsible for the enhanced retention observed in this study. This also supports Cognitive Load Theory, which advocates for instructional approaches that optimize mental processing by reducing extraneous load.

Furthermore, the joint predictive strength of digital learning tools on both engagement and retention highlights their dual value in achieving multiple educational outcomes. The finding that 55.5% of the variance in student engagement and retention is explained by digital tools indicates a robust integration of technology in teaching can yield significant cognitive and behavioral benefits. This supports the call by Ajayi and Olayemi (2021) for greater investment in ICT infrastructure in Nigerian public schools and is aligned with SDG Goal 4 on inclusive, equitable, and quality education.

However, this study also indirectly echoes concerns by Eze and Njoku (2021) that despite the benefits of digital tools, successful implementation depends on contextual factors such as teacher competence, infrastructure availability, and sustained administrative support.

Conclusion

This study investigated the impact of digital learning tools on students' engagement and retention in public secondary schools in Anambra State, Nigeria. The results indicated that digital learning tools have strong, positive, and statistically significant effects on both student engagement and retention. Tools such as interactive whiteboards, digital learning platforms, and mobile apps not only sustain students' interest in academic tasks but also enhance their ability to recall and apply learned concepts.

The study concluded that digital learning tools are effective instructional assets capable

of transforming the public education sector when integrated systematically and supported with infrastructure and training. The evidence provided underscores the necessity for stakeholders especially school administrators, educational policymakers, and the Ministry of Education to prioritize the integration of digital tools in the teaching-learning process to foster better academic outcomes in secondary education.

Recommendations

Based on the findings and conclusion, the following recommendations are made:

1. Teacher Capacity Building: The Ministry of Education should implement continuous professional development programs to equip teachers with digital pedagogical skills. This will ensure that digital tools are used not just occasionally, but effectively and pedagogically.

2. Investment in ICT Infrastructure: Government and educational stakeholders should provide adequate ICT infrastructure such as projectors, tablets, smart boards, and stable internet access in public secondary schools to enhance consistent integration of digital tools.

3. Curriculum Redesign: Curriculum developers should embed digital learning objectives across subjects to promote the use of educational technology in daily classroom instruction.

4. Monitoring and Evaluation: School administrators should establish monitoring and feedback mechanisms to track the effectiveness of digital learning tools on student performance, engagement, and retention.

5. Equity-Focused Technology Deployment: Efforts should be made to ensure that rural and underserved schools are prioritized in the distribution of digital tools to avoid deepening existing educational inequalities.

6. Policy Support: There should be a strong policy framework at the state level mandating the inclusion of digital tools in classroom teaching, with clear guidelines and support systems for implementation.

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