DIGITAL LEARNING ENVIRONMENTS ON STUDENTS' ACADEMIC ACHIEVEMENT IN NASARAWA LOCAL GOVERNMENT AREA OF NASARAWA STATE

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Abstract

This study examined the impact of **digital learning environments**, using **technological infrastructure** and **digital content and learning resources** as proxies, on students' **academicachievement**in **Nasarawa Local Government Area of Nasarawa State**. A **descriptive survey research design** was employed, targeting secondary school students. A **sample of 200 students** was selected through **multistage and stratified random sampling.** Data were collected using a **structured questionnaire** and students' academic records, and analyzed using **descriptive statistics** (mean and standard deviation) and **correlation analysis**. Findings revealed that technological infrastructure had a **moderate positive effect** on students' academic achievement, while digital content and learning resources had a **strong positive relationship** with academic performance. The study also found a positive correlation between technological infrastructure and digital content, indicating that schools with better technological facilities were more likely to provide effective digital learning materials. The study concluded that enhancing digital learning environments could significantly improve students' academic outcomes. It was recommended that schools and policymakers provide **adequate technological infrastructure, quality digital content,** and**teacher training in digital pedagogy** to maximize the benefits of digital learning environments.

Keywords: Digital Learning Environments, Technological Infrastructure, Digital Content, Learning Resources, Academic Achievement, Secondary Education, Nasarawa State

Introduction

Academic achievement is a central concept in educational psychology and is commonly used as an indicator of students' success within formal educational settings. It generally refers to the extent to which learners attain educational goals, often measured through examinations, grades, standardized test scores, or other assessments of knowledge and skills (Steinmayr et al., 2014). Academic achievement is not only a reflection of students' cognitive abilities but also an outcome influenced by a wide range of psychological, social, and environmental factors.

Research in educational psychology emphasizes that academic achievement is shaped by both individual characteristics and contextual conditions. Individual factors such as intelligence, motivation, self-efficacy, learning strategies, and emotional regulation play a crucial role in determining how effectively students engage with learning tasks (Zimmerman, 2002). At the same time, environmental factors including the quality of instruction, classroom climate, peer interactions, and the broader learning environment significantly influence students' academic outcomes (Eccles & Roeser, 2011).

The learning environment, in particular, has received increasing attention as a key determinant of academic achievement. A supportive and well-structured learning environment can enhance students' motivation, engagement, and persistence, thereby promoting higher levels of academic performance (Fraser, 2012). Conversely, negative learning environments characterized by poor teacher–student relationships, lack of emotional safety, or inadequate resources may hinder academic progress and contribute to lower achievement levels.

Digital learning environments have become an integral part of contemporary education due to rapid advancements in information and communication technologies. A digital learning environment refers to the use of electronic platforms, tools, and resources such as learning management systems, online classrooms, educational software, and virtual collaboration tools to support teaching and learning processes (Dillenbourg, 2000). These environments have transformed traditional educational practices by offering flexible, interactive, and learner-centered approaches to education.

From a psychological perspective, digital learning environments influence how students process information, regulate their learning, and remain motivated. Educational psychology research suggests that digital environments can enhance academic engagement by promoting active learning, immediate feedback, and opportunities for self-paced instruction (Mayer, 2009). Additionally, features such as multimedia content and interactive tasks can support deeper cognitive processing when appropriately designed, in line with principles of cognitive load theory.

Digital learning environments also play a significant role in fostering self-regulated learning skills. Students in digital contexts are often required to manage their time, set learning goals, monitor their progress, and seek support independently, which can positively affect academic achievement (Zimmerman, 2002). However, the effectiveness of digital learning environments depends largely on learners' motivation, digital competence, and the level of instructional support provided.

Despite their potential benefits, digital learning environments also present challenges. Issues such as reduced social interaction, distractions, unequal access to technology, and lack of emotional support may negatively affect students' learning experiences and outcomes (Selwyn, 2016). Therefore, understanding digital learning environments through the lens of educational psychology is essential for designing effective instructional strategies that maximize learning while addressing learners' cognitive, emotional, and social needs.

Despite increasing investment in digital learning technologies, students in Nasarawa Local Government Area of Nasarawa State continue to show varying levels of academic achievement. While educational institutions have integrated components of digital learning environments particularly technological infrastructure and digital content resources into

teaching and learning processes, the extent to which these elements contribute to improved academic outcomes remains unclear. In many schools, challenges such as inadequate technological infrastructure, limited access to quality digital learning resources, and uneven implementation of digital tools may hinder students' engagement, self-regulated learning, and overall academic performance.

Moreover, existing studies suggest that the mere availability of technology does not automatically translate into higher academic achievement; rather, it is how effectively these tools are used to support meaningful learning that matters. However, in the context of Nasarawa Local Government Area, empirical evidence on the relationship between key components of digital learning environments specifically technological infrastructure and digital content and students' academic achievement is scarce. This gap makes it difficult for educators, policymakers, and stakeholders to identify specific barriers and leverage points for enhancing educational outcomes. Therefore, there is a critical need to investigate how technological infrastructure and digital content within digital learning environments impact students' academic achievement in this region.

Methodology

The study adopted a **descriptive survey research design**. This design was considered appropriate because it enabled the researcher to examine the impact of digital learning environments—using technological infrastructure and digital content and learning resources as proxies—on students' academic achievement without manipulating any variables. The study was carried out in **Nasarawa Local Government Area of Nasarawa State, Nigeria**. The area was selected due to the increasing integration of digital technologies in schools and the observed variations in students' academic achievement. The population of the study consisted of **all secondary school students** in public secondary schools within Nasarawa Local Government Area. This population was considered relevant because these students were directly exposed to digital learning environments in their schools. A sample of students was selected from the population using a **multistage sampling technique**. First, a simple random sampling method was used to select secondary schools within the Local Government Area. Thereafter, students were selected from the chosen schools using a stratified random sampling technique to ensure fair representation across different class levels. The final sample size was considered adequate for generalizing the findings of the study. Data for the study were collected using a **structured questionnaire** and students' **academic records**. The research instrument was subjected to **face and content validity**. Copies of the questionnaire were given to experts in educational psychology and measurement and evaluation, who examined the items for clarity, relevance, and adequacy. Their suggestions were incorporated into the final version of the instrument. The reliability of the questionnaire was determined using the **test–retest method**. The instrument was administered to a group of students outside the study sample, and the scores obtained were correlated using the Pearson Product Moment Correlation Coefficient (0.67). The result indicated that the instrument was reliable for the study.

The researcher personally administered the questionnaires to the selected students with the assistance of class teachers. The questionnaires were collected immediately after completion to ensure a high response rate. Academic achievement data were obtained from

school examination records with permission from school authorities. Data collected were analyzed using **descriptive and inferential statistics**. Descriptive statistics such as mean and standard deviation were used to answer the research questions, while inferential statistics of correlation analysis was used to test the hypotheses at a **0.05 level of significance**.

Summary Table of Descriptive Statistics on the Impact of Digital Learning Environments on Students' Academic Achievement

Variables	**N**	**Mean ($\bar{X}$)**	**Std. Deviation**
Technological Infrastructure	200	3.42	0.68
Digital Content and Learning Resources	200	3.58	0.72
Digital Learning Environment (Overall)	200	3.50	0.65
Students' Academic Achievement	200	3.46	0.70

The descriptive statistics revealed that **technological infrastructure** had a mean score of **3.42,** indicating a **moderate level of availability** of digital facilities such as computers, internet access, and electricity in secondary schools within Nasarawa Local Government Area. This suggests that while some technological resources were available, they were not fully adequate across all schools. The mean score for **digital content and learning resources** was **3.58,** which indicates a **high level of access**to digital materials such as e-books, online platforms, and multimedia instructional resources. This implies that students had relatively good exposure to digital learning materials that could support their learning processes. The overall **digital learning environment** recorded a mean score of **3.50**, suggesting that digital learning environments in the study area were generally **favorable.** This indicates that the combined effect of technological infrastructure and digital content provided a supportive environment for learning. Students' **academic achievement** had a mean score of **3.46**, reflecting a **moderate to high level of academic performance.** This result suggests that students were performing reasonably well academically, which may be associated with the level of digital learning resources available to them. Overall, the findings suggest that digital learning environments particularly technological infrastructure and digital content had a **positive influence** on students' academic achievement in Nasarawa Local Government Area of Nasarawa State.

Summary Table of Correlation Statistics on the Impact of Digital Learning Environments on Students' Academic Achievement

Variables	**1**	**2**	**3**
1. Technological Infrastructure	1		
2. Digital Content & Learning Resources	.54**	1	
3. Students' Academic Achievement	.48**	.62**	1

N=200
**** Correlation is significant at the 0.01 level (2-tailed)**

The correlation analysis revealed a **moderate positive relationship** between **technological infrastructure**and**students' academic achievement***(r = .48, p < 0.01)*. This indicated that improved availability and use of technological infrastructure, such as computers, internet connectivity, and power supply, were associated with higher levels of academic achievement among students in Nasarawa Local Government Area of Nasarawa State. A **strong positive relationship** was observed between **digital content and learning resources**and **students' academic achievement***(r = .62, p < 0.01)*. This suggested that increased access to digital learning materials, including e-books, online platforms, and multimedia resources, significantly enhanced students' academic performance. Additionally, a **moderate positive relationship** existed between **technological infrastructure** and **digital content and learning resources***(r = .54, p < 0.01)*. This implied that schools with better technological infrastructure were more likely to provide and utilize digital learning resources effectively. Overall, the findings indicated that **digital learning environments**, as represented by technological infrastructure and digital content and learning resources, had a **significant positive relationship** with students' academic achievement. This suggested that strengthening digital learning components in schools could contribute to improved academic outcomes for students in Nasarawa Local Government Area of Nasarawa State.

Discussion of Findings

The findings of this study revealed that **digital learning environments**, measured through **technological infrastructure** and **digital content and learning resources**, had a significant impact on students' academic achievement in Nasarawa Local Government Area of Nasarawa State. The results demonstrated that the availability and effective utilization of digital learning components contributed positively to students' learning outcomes.

The study found that **technological infrastructure** had a moderate positive relationship with students' academic achievement. This finding suggested that access to functional computers, internet connectivity, and reliable power supply supported students' learning processes and enhanced their academic performance. However, the moderate strength of the relationship implied that technological infrastructure alone was not sufficient to guarantee high academic achievement. This finding was consistent with earlier studies which reported that while technological facilities are essential, their effectiveness depends on how well they are integrated into instructional practices.

Furthermore, the findings revealed a strong positive relationship between **digital content and learning resources** and students' academic achievement. This indicated that students who had greater access to digital textbooks, online learning platforms, and multimedia instructional materials performed better academically. The strong correlation suggested that digital content played a more direct role in facilitating understanding, engagement, and retention of learning materials. This supported existing educational psychology literature which emphasizes that interactive and well-designed digital content enhances cognitive processing and motivation among learners.

The study also revealed a positive relationship between technological infrastructure and digital content and learning resources. This implied that schools with better technological facilities were more capable of providing and utilizing digital learning materials effectively. This finding highlighted the interdependent nature of digital learning environment components, suggesting that the absence of adequate infrastructure could limit the effective use of digital content.

Overall, the findings demonstrated that digital learning environments had a meaningful influence on students' academic achievement in the study area. The results suggested that improvements in technological infrastructure, coupled with increased access to quality digital content and learning resources, could significantly enhance students' academic performance. These findings underscored the importance of investing not only in educational technologies but also in relevant digital learning materials to maximize the benefits of digital learning environments in secondary schools within Nasarawa Local Government Area of Nasarawa State.

Conclusion/ Recommendations

The study examined the impact of digital learning environments—using technological infrastructure and digital content and learning resources as proxies—on students' academic achievement in Nasarawa Local Government Area of Nasarawa State. Findings from the study indicated that digital learning environments had a significant influence on students' academic achievement. The availability of technological infrastructure such as computers, internet facilities, and electricity was found to support students' learning, although its impact was moderate. This suggested that while technological infrastructure was necessary, it was not sufficient on its own to guarantee high academic achievement.

The study further revealed that digital content and learning resources had a strong positive relationship with students' academic achievement. This indicated that access to quality digital learning materials such as e-books, online platforms, and multimedia instructional resources enhanced students' understanding, engagement, and overall academic performance. The combined effect of technological infrastructure and digital content contributed to the creation of a supportive digital learning environment that promoted better academic outcomes.

Overall, the study concluded that improving digital learning environments in secondary schools would enhance students' academic achievement. However, for digital learning initiatives to be effective, adequate infrastructure must be complemented by relevant and accessible digital learning resources. Government and educational stakeholders should ensure the provision of adequate technological infrastructure in secondary schools, including functional computers, stable internet connectivity, and reliable power supply, to support effective digital learning.
Schools should invest in quality digital learning resources such as e-textbooks, educational software, and online learning platforms that align with the school curriculum and students' learning needs.

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