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DIGITAL LITERACY IN THE CLASSROOM: EVALUATING TECHNOLOGY SKILLS AND ITS EFFECTS ON STUDENT LEARNING

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ABSTRACT

This study examined the role of digital literacy in the classroom, focusing on evaluating undergraduate students' technology skills and their impact on academic performance in Delta State universities, Nigeria. Using a descriptive survey research design, data were collected from 350 undergraduate students across five universities in Delta State, Nigeria, through a structured questionnaire titled "Digital Literacy Skills and Student Learning Questionnaire (DLSSLQ)." The study assessed students' digital literacy proficiency, engagement in learning activities, and academic performance, which was measured using Grade Point Average (GPA) records. Data analysis was conducted using descriptive statistics, and multiple regression analysis to determine the impact of digital literacy skills on academic success. The results revealed a significant positive relationship between students' digital literacy skills and their academic engagement and performance. The findings suggest that improving digital literacy can enhance student learning outcomes, emphasizing the need for targeted digital skill development programs in universities. The study contributes to the growing body of knowledge on digital literacy and higher education while acknowledging limitations such as reliance on self-reported data and contextual constraints. The study's recommendations highlight the importance of integrating digital literacy training into university curricula to support academic success in the digital age.

1. Background of the Study

In the contemporary era, digital literacy has become an essential skill for students at all levels of education. The increasing proliferation of digital technologies has reshaped how students access and utilize information, necessitating the development of robust digital literacy skills. With the rapid advancement of technology, access to digital resources has transformed the learning process, enabling students to engage with information more efficiently and comprehensively. The ability to efficiently navigate digital platforms, critically assess information, and apply technological tools in the learning process is now a fundamental requirement for academic success. This study aims

to evaluate digital literacy skills among students in Nigeria, focusing on their technological competencies and the effects on learning outcomes. Given the increasing reliance on digital tools for academic engagement, it is necessary to assess the level of digital literacy among Nigerian students and its impact on their educational performance.

Digital literacy is defined as the ability to effectively use information and communication technologies (ICTs) to access, evaluate, and process digital information (Manubey et al., 2022). The rapid expansion of cyberspace has provided students with unprecedented access to vast resources that can enhance their academic pursuits. However, the ability to discern credible sources from misinformation is a critical skill that significantly impacts learning outcomes (Wang et al., 2023). Easier access to information through digital platforms allows students to retrieve and process information from diverse sources, fostering a more comprehensive understanding of subjects while also influencing learning styles and preferences (Studi et al., 2022). To fully benefit from digital resources, students must develop critical digital literacy skills that enable them to assess the credibility and relevance of online information. Digital literacy not only enhances knowledge acquisition but also promotes active and collaborative learning, where students engage with their peers and instructors in digital environments. Studies have shown that digital literacy improves critical thinking, problem-solving, and communication skills, which are essential for academic success and future career readiness (Manubey et al., 2022).

Several studies have highlighted the positive impact of digital literacy on student learning. A study by Deja et al. (2021) found that students with strong digital literacy skills are more likely to engage effectively with online learning platforms, e-books, and interactive educational tools. This engagement enhances student motivation and makes learning more dynamic. Digital literacy also allows students to participate actively in online discussions, collaborate on projects, and exchange ideas, thereby reinforcing their understanding of academic content. Wang et al. (2023) further emphasized that students with advanced digital literacy skills are better prepared to evaluate the authenticity of digital information, distinguishing between credible and unreliable sources. The significance of digital literacy in education was further highlighted during the COVID-19 pandemic, where students had to rely on digital platforms for remote learning. Research by Abdul Latip (2020) indicated that students with strong digital literacy skills adapted better to online learning and achieved better academic outcomes compared to their peers with limited digital skills. Similarly, studies by Kajin (2018) and Liansari & Nuroh (2018) demonstrated that digital literacy-based learning enhances student motivation and cognitive learning outcomes. Research conducted by Rodin & Nurrizqi (2020) further revealed that students majoring in library science who possessed high digital literacy skills were more proficient in utilizing electronic resources, leading to improved learning outcomes.

Despite the numerous benefits of digital literacy, there are several challenges that hinder its effective implementation in Nigerian classrooms. One major challenge is information overload, where the sheer volume of digital content makes it difficult for students to filter and prioritize relevant information. Additionally, the digital divide remains a significant issue, as not all students have equal access to technology and the internet, limiting their ability to develop digital literacy skills. Furthermore, excessive reliance on digital tools can lead to distractions and reduced focus on learning tasks if not properly managed (Lingga et al., 2022). These challenges necessitate targeted interventions by educational institutions and policymakers to ensure that students acquire and utilize digital literacy skills effectively. David-West (2022) emphasized the importance of

improving students' computer skills to enhance their access to digital resources, while Ansari and Zuberi (2018) advocated for well-structured development programs to train students in digital literacy. Oliver in 1995 cited by Adeoye and Adeoye (2017) suggested regular instruction and practice with electronic information systems to improve proficiency. In light of these recommendations, Nigerian universities must implement digital literacy training programs to equip students with essential technological competencies.

Globally, the growing relevance of digital literacy has also been acknowledged in higher education. A study conducted by Deng as cited in Sivakami and Rajendran (2019) found that students use electronic resources for various academic purposes, including research, assignment completion, and literature review. The study highlighted the necessity of equipping students with digital literacy skills to maximize the benefits of e-resources. Similarly, Kari (2016) emphasized that digital literacy is crucial for efficient information retrieval from electronic databases, as it requires higher-level skills than searching printed materials. David-West (2022) also stated that students need to improve their computer skills to fully utilize digital academic resources. These findings highlight the importance of digital literacy as a fundamental component of modern education.

Beyond higher education, there has been a growing emphasis on integrating digital literacy into K-12 education. The introduction of artificial intelligence (AI), machine learning (ML), and data science (DS) into school curricula underscores the need for students to develop digital competencies early (Brouillette, 2019; James et al., 2021). Studies by Drozda et al. (2022) and UNESCO (2018) stress the necessity of incorporating digital literacy, data ethics, and technology-related instruction in school programs to prepare students for the evolving workforce. In the United States, disparities in digital literacy levels have been linked to limited access to technology and inadequate teacher training in STEM education (Maltese et al., 2014; Bruckhaus, Bennett, Brawer-Cohen et al., 2024). Similar concerns have been raised regarding Nigerian classrooms, where disparities in digital literacy are evident due to varying levels of access to technology and digital infrastructure.

To address these challenges, research suggests that collaborations between universities and secondary schools can enhance digital literacy among students. Knowlton et al. (2015) found that partnerships between higher education institutions and high schools improved both student engagement and teacher professional development. Such collaborations have been successful in increasing digital literacy skills and preparing students for STEM careers. Programs that offer immersive workshops and hands-on experience in digital learning tools have been shown to boost student confidence and competence in digital literacy (Fitzakerley et al., 2013; Toledo et al., 2020; Bruckhaus, Bennett, Brawer-Cohen et al., 2024). Given the critical role of digital literacy in education, this study seeks to evaluate the state of digital literacy among students in Nigerian classrooms. In identifying the key challenges and opportunities, this research will provide significant insights into how digital literacy can be effectively integrated into the Nigerian education system to enhance student learning outcomes. The findings will also contribute to broader discussions on improving digital literacy in developing countries, ensuring that students are equipped with the necessary skills to thrive in a digitalized world.

Literature Review

Digital literacy is a multifaceted concept that integrates technology skills with the ability to find,

evaluate, create, and communicate information effectively (Lawal et al., 2024). It involves the capacity to navigate digital platforms, critically assess online content, and utilize digital tools for learning and collaboration. As digital technology advances, digital literacy skills have become essential for economic growth, social inclusion, and education (Abbas, 2015). Digital literacy has also expanded to include various competencies such as information literacy, media literacy, and technological literacy. According to Birger (2018), digital literacy skills enhance an individual's ability to access, analyze, and apply information efficiently. This makes it a fundamental skill for academic success and workforce readiness. Furthermore, digital literacy goes beyond basic technological proficiency; it encompasses critical thinking, problem-solving, and the ability to communicate effectively in digital environments (Faloki, 2015). Sari (2019) highlights the growing importance of digital literacy in education, asserting that it plays a vital role in both formal and informal learning. In addition, Sari & Wardhani (2020) emphasize that digital literacy enables individuals to interact meaningfully within digital communities. These skills are necessary for students to engage with online resources, participate in digital discussions, and develop independent learning abilities.

Students today are often referred to as "digital natives" due to their familiarity with digital technologies. However, research indicates that mere exposure to technology does not equate to digital literacy skills. Yamila and El-Khayat (2016) argue that being tech-savvy does not necessarily mean students have the ability to use digital tools effectively for academic and professional purposes. Similarly, Raish and Rimland (2016) suggest that digital literacy is a crucial skill for workforce preparation, as employers increasingly seek candidates with strong digital competencies. Bali (2016) stresses that digital literacy education should not focus solely on technical skills but should also incorporate critical thinking, ethical use of digital content, and the ability to create and communicate information effectively. Walters, Gee, and Mohammed (2019) further argue that digital literacy should be integrated into the curriculum to enable students to develop the necessary skills for navigating digital spaces effectively. According to Saux and Cevasco (2019), incorporating digital literacy into the educational system allows students to apply their knowledge in real-world settings, preparing them for future challenges in the digital age. Iordache et al. (2017) emphasize that digital literacy skills must be developed through structured education policies to ensure consistency across different educational institutions. While standardized frameworks for digital literacy instruction are beneficial, Chetty et al. (2017) highlight that these skills should evolve in alignment with technological advancements. Heitin (2016) defines digital literacy skill development as an ongoing process that requires continuous learning and adaptation to new digital tools and platforms.

Research on the relationship between digital literacy and academic performance has yielded mixed findings. Tang and Yen (2016) found that students with higher digital literacy levels tend to perform better in blended learning environments. Similarly, Mehrvarz et al. (2021) concluded that digital literacy positively influences student success, particularly when informal learning opportunities complement formal education. However, some studies have found no direct correlation between digital literacy and academic achievement. Abbas et al. (2019) observed significant disparities in digital literacy levels across different student populations, suggesting that other factors, such as socioeconomic background and access to digital resources, may influence academic outcomes. Tadesse et al. (2018) provided evidence supporting the positive impact of digital literacy on academic performance, whereas Katz and Macklin (2017) argued that digital literacy alone is not a strong predictor of academic success. Hatlevik and Christophersen (2013)

found that digital literacy enhances student engagement and participation, which indirectly contributes to better academic outcomes. Ardhiani, Hadjam, and Fitriani (2023) conducted a meta-analysis on digital literacy and student performance, concluding that digital literacy has a moderate yet significant positive correlation with academic achievement. Tondeur (2017) also emphasized the role of information literacy in improving academic success, reinforcing the idea that digital competencies are crucial for effective learning. Maris and Sari (2022) explored the connection between digital literacy and self-directed learning, revealing a strong relationship between the two variables. Dien and Nguyen (2022) further supported this finding, concluding that students with higher digital literacy levels tend to achieve higher GPAs. Holm (2024) investigated digital literacy among students in online anatomy and physiology courses, concluding that prior education in natural sciences significantly influenced digital literacy levels and academic success.

Technological literacy (TL) is a critical component of digital literacy. Davies (2011) defines TL as the ability to understand and use digital technologies effectively. Hansen (2013) further describes it as the ability to adopt, adapt, and assess technology to improve individual and community life. Becker et al. (200) and Georgina & Olson (2018) highlight that TL involves not only technical proficiency but also the ability to think critically about technological applications. Bauer and Ahooei (2018) define TL as the ability to use technology responsibly, solve problems, and engage in meaningful communication using digital tools. These skills are essential for students to navigate digital learning environments successfully. As technology continues to evolve, instructional designers and educators must integrate advanced digital tools into teaching practices to enhance learning experiences (Varea et al., 2022; Carvalho et al., 2022). However, Nigeria has recognized the significance of technological literacy in education and has launched several initiatives to integrate ICT into the learning process. Government agencies such as the National Information Technology Development Agency (NITDA) and the Nigerian Communications Commission (NCC) have invested in digital literacy programs to enhance student and teacher competencies (Moses, 2024). These initiatives aim to bridge the digital divide and provide equitable access to digital learning resources. Digital technologies have the potential to revolutionize education by making instructional materials more accessible and engaging. Grainger et al. (2021) and Lacka & Wong (2021) highlight that digital learning fosters creativity, enhances knowledge retention, and promotes interactive learning. The adoption of digital learning tools, including online platforms, mobile applications, and multimedia resources, has facilitated remote learning opportunities and improved access to education.

Empirical Review

Moses (2024) explored the impact of digital literacy skills on student engagement and academic achievement among senior secondary school students in Chikun Local Government, Kaduna State. The study aimed to examine the extent to which digital literacy influences both engagement and academic performance. A sample of 272 students from 10 public secondary schools was randomly selected, comprising 148 males and 124 females. The study was guided by two research questions and corresponding hypotheses: What is the relationship between digital literacy, student engagement, and academic performance among senior secondary school students in Chikun Local Government? There is no significant relationship between digital literacy skills, student engagement, and academic performance among secondary school students in Chikun Local Government, Kaduna State. Data were collected using the "Digital Literacy Skills and Student Engagement Questionnaire (DLSSEQ)," while students' GPA records provided academic

performance data. Pearson Product Moment Correlation was applied to test the hypothesis at a 0.05 significance level. Results revealed that digital literacy skills had a significant effect on student engagement ($p = 0.01$, $r = 0.323$) and academic performance ($p = 0.04$, $r = 0.622^{**}$). Consequently, the study concluded that digital literacy significantly enhances student engagement and academic achievement in secondary school students within Chikun Local Government, Kaduna State. The study recommended increasing access to digital tools, such as computers, tablets, e-textbooks, and educational applications, to strengthen students' digital competencies. Furthermore, it emphasized the need for government and school administrators to establish effective methods for assessing digital literacy skills through structured evaluation metrics and assessment tools. However, the study did not comprehensively analyze the extent to which digital literacy contributes to different aspects of learning outcomes across multiple subject areas in the Nigerian educational setting, which the present study aims to address.

Lawal et al. (2024) assessed digital literacy competencies among undergraduate students in the Department of Library and Information Science at Ahmadu Bello University (ABU), Zaria. Recognizing the critical role universities play in national development, the research examined the impact of digital literacy on academic performance, with particular attention to access to information and ICT infrastructure. A qualitative survey design was employed, utilizing structured questionnaires to gather data, which were then analyzed using descriptive statistics. Findings indicated that students exhibited varying levels of digital literacy, with key challenges including infrastructural deficiencies and limited professional development opportunities. To address these issues, recommendations included organizing digital literacy training workshops, improving ICT access, and incorporating digital tools into teaching methodologies to enhance learning outcomes. The study underscored the importance of equipping undergraduate students with essential digital competencies to effectively navigate the evolving information landscape. However, it did not investigate the role of digital literacy in the academic success of students in secondary schools, which is the focus of the present study.

Holm (2024) examined the connection between digital literacy and academic performance among students enrolled in an online anatomy and physiology course. The study further analyzed how various aspects of digital literacy, including age and previous education in the natural sciences, influenced students' grades. A logistic regression model was used to assess five dimensions of digital literacy across participants with diverse educational backgrounds. The findings indicated that certain aspects of digital literacy were more significant for academic success in the online setting. Students with a background in natural sciences demonstrated higher levels of digital literacy, emphasizing the role of prior education in shaping digital skills for online learning. Additionally, students were proficient in evaluating their own digital literacy levels, which facilitated targeted interventions for learners at different competency levels. The study reinforced the importance of digital literacy in online education and highlighted specific digital competencies that strongly contribute to academic success. However, it did not explore the impact of digital literacy in a traditional classroom setting, which the present study seeks to investigate within Nigerian secondary schools.

Getenet et al. (2024) explored how students' attitudes and digital literacy levels influence their self-efficacy and, in turn, affect five dimensions of online engagement: social, collaborative, cognitive, behavioral, and emotional. The study developed and tested a theoretical model linking these variables in a regional university in Australia. Data were collected through a field survey involving

110 first-year students, with AMOS 28 used for structural path analysis. Findings revealed that positive student attitudes and digital literacy significantly enhanced self-efficacy, which in turn improved online engagement. The study suggested that educators designing online, blended, or technology-enhanced courses should consider various engagement factors to optimize learning outcomes. While the research provided valuable insights into digital literacy's role in higher education, it did not specifically examine how digital literacy affects learning and engagement in Nigerian secondary schools, an area that the present study aims to explore.

Ervianti, Sampelolo, and Pratama (2023) investigated the influence of digital literacy on learning outcomes among students enrolled in the Educational Technology program at the Indonesian Christian University of Toraja. The study adopted an experimental quantitative research design and included a sample of 49 students from the 2021 cohort. A non-random sampling technique was applied to select participants. Data were analyzed using descriptive and inferential statistics with SPSS 22. The results indicated a significant relationship between digital literacy and students' academic outcomes, highlighting the importance of digital literacy in enhancing learning effectiveness. Based on the findings, the study concluded that digital literacy is a crucial determinant of academic success. However, it did not assess digital literacy skills in a broad educational setting, particularly in Nigerian classrooms, which the present study seeks to address.

Omorodion (2021) examined the level of technological literacy among vocational technical education (VTE) students in tertiary institutions across Delta State. The study was guided by four research questions and targeted a population of 775 final-year VTE students from Delta State University (DELSU), Abraka, and Federal College of Education (Technical), Asaba. Given the manageable population size, all 775 students were included in the study. A 35-item questionnaire structured on a five-point rating scale was used for data collection, with 702 completed responses received. The instrument underwent face validation by three experts, and its reliability was confirmed using the Cronbach alpha method, yielding an overall reliability coefficient of 0.84. Data analysis using mean and standard deviation revealed that VTE students possessed substantial knowledge of technological literacy, including understanding the nature of technology, technological systems, societal impacts, and technological applications. The study recommended enhanced collaboration between government and education stakeholders to improve technological infrastructure and equip tertiary institutions with modern technology resources. However, it did not address the role of digital literacy in general education at the secondary school level, which is the primary concern of the present study.

Monserate (2018) analyzed the use of computers by teachers and students and its impact on students' academic performance in public and private secondary schools. The study examined the factors influencing technology self-efficacy, technology utilization, teaching effectiveness, and student achievement. A combination of survey questionnaires, focus group discussions, and key informant interviews was employed to collect data from 97 teachers and 436 students across 19 secondary schools in District VI, Division of Negros Occidental. A stratified random sampling technique was used to select participants. Statistical analysis methods included frequency counts, percentages, mean comparison, Mann-Whitney tests, Kruskal-Wallis H tests, Multivariate Analysis of Variance (MANOVA), and Multiple Linear Regression. The findings revealed a significant relationship between students' academic performance and their computer literacy, as well as a correlation between technology usage and family income. Results also suggested that teachers' digital literacy and technology integration played a critical role in student academic

achievement. However, the study did not focus on the assessment of digital literacy skills as a distinct factor influencing learning outcomes in Nigerian classrooms, which the present study aims to address.

Thus, while the reviewed empirical studies have explored various aspects of digital literacy—its impact on student engagement, academic performance, self-efficacy, and online learning—there remains a gap in understanding how digital literacy specifically influences student learning within Nigerian classrooms. Many of the studies focused on higher education institutions, online courses, or technical education, leaving limited insights into how digital literacy skills affect classroom engagement, comprehension, and performance among undergraduate students in the Nigeria universities specifically in Delta state. Addressing this gap, the present study seeks to investigate the relationship between digital literacy skills and student learning experiences, focusing on engagement, comprehension, and overall academic performance. To achieve this, the study is guided by the following research objectives, research questions, and hypotheses.

Research Objectives

The study aims to:

1. Examine the relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities.
2. Investigate the impact of digital literacy on student engagement and learning experiences in classroom settings.
3. Assess the influence of digital literacy proficiency on students' ability to utilize online learning resources effectively.

Research Questions

1. What is the relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities?
2. How does digital literacy affect student engagement and learning experiences in classroom settings?
3. To what extent does digital literacy proficiency influence students' ability to utilize online learning resources effectively?

Research Hypotheses

H_0: There is no significant relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities.

H_1: There is a significant relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities.

H_0: Digital literacy does not significantly impact student engagement and learning experiences in classroom settings.

H_1: Digital literacy significantly impacts student engagement and learning experiences in classroom settings.

H_0: Digital literacy proficiency does not significantly influence students' ability to utilize online learning resources effectively.

H_1: Digital literacy proficiency significantly influences students' ability to utilize online learning resources effectively.

Research Methodology

This study adopted a descriptive survey research design to examine the relationship between digital literacy skills and undergraduate student learning in Delta State universities. The descriptive survey method was chosen because it allows for the collection of data from a large population, providing insights into patterns, relationships, and trends regarding students' technology skills and their effects on academic performance. The study focused on undergraduate students in selected universities in Delta State, Nigeria, assessing their digital literacy proficiency, engagement in classroom activities, and utilization of online learning resources.

The population of the study comprised undergraduate students from various faculties across Delta State universities (see table 3.1). A multi-stage sampling technique was employed to select participants, ensuring representation from different disciplines and levels of study. A total of 350 students were randomly selected from 5 major universities across federal, state, and private in Delta State using stratified random sampling to ensure a fair distribution based on gender, faculty, and level of study.

Table 3.1: Selection of Study Sample from Delta State Universities

Category	**Selected Universities**	**Number of Respondents**
Federal	Federal University of Petroleum Resources, Effurun	70
State	Delta State University, Abraka	80
State	Delta University of Science and Technology, Ozoro	60
Private	Novena University, Ogume	65
Private	Western Delta University, Oghara	75
Total	**5 Universities**	**350**

Data collection was conducted using a structured questionnaire titled “Digital Literacy Skills and Student Learning Questionnaire (DLSSLQ)”, which was developed based on previous empirical studies and adapted to suit the study's objectives. The questionnaire consisted of four sections: demographic information, digital literacy proficiency, student engagement in learning activities, and academic performance indicators. The academic performance of students was measured using their Grade Point Average (GPA) records. The questionnaire was subjected to face and content

validity by experts in educational research and digital learning to ensure clarity, relevance, and reliability.

To test the hypotheses, quantitative data analysis techniques were employed. The collected data were analyzed using descriptive and inferential statistics. The Pearson Product-Moment Correlation Coefficient (PPMCC) was used to examine relationships between digital literacy, student engagement, and academic performance. Additionally, multiple regression analysis was used to determine the extent to which digital literacy skills predict academic success. Hypotheses were tested at a 0.05 significance level to determine the statistical significance of the findings. The study adhered to ethical considerations, ensuring confidentiality, voluntary participation, and informed consent from respondents. The findings of this study are expected to provide valuable insights into how digital literacy can be effectively integrated into classroom learning to enhance student engagement and academic achievement.

4. Data Analysis, Results, and Discussion

4.1 Demographic Characteristics of Respondents

Variable	Frequency (n)	Percentage (%)
University		
Federal University of Petroleum Resources, Effurun	70	20.0
Delta State University, Abraka	80	22.9
Delta University of Science and Technology, Ozoro	60	17.1
Novena University, Ogume	65	18.6
Western Delta University, Oghara	75	21.4
Total	**350**	**100.0**
Gender		
Male	165	47.1
Female	185	52.9
Age Group		
18-20	110	31.4
21-24	130	37.1
25-30	80	22.9
30+	30	8.6
Academic Level		
100 Level (Freshmen)	85	24.3
200 Level	75	21.4
300 Level	90	25.7
400 Level	100	28.6
Access to Digital Devices		
Yes	220	62.9
No	130	37.1

Frequency of Technology Use in Learning		
Daily	140	40.0
Weekly	130	37.1
Rarely	80	22.9
Self-reported Digital Literacy Level		
Low	100	28.6
Medium	150	42.9
High	100	28.6
Student Engagement in Digital Learning		
Low	90	25.7
Medium	160	45.7
High	100	28.6
Ability to Utilize Online Learning Resources		
Low	110	31.4
Medium	140	40.0
High	100	28.6

Source: Field Survey (2025)

The demographic analysis of the respondents reveals a well-distributed sample across various categories, which enhances the generalizability of the findings. Among the universities represented, Delta State University, Abraka has the highest participation at 22.9%, followed closely by Western Delta University, Oghara at 21.4%. Gender distribution indicates a slight female majority, with 52.9% of respondents identifying as female compared to 47.1% male. The age distribution shows that the majority of participants fall within the 21-24 age group (37.1%), indicating a youthful demographic typical of undergraduate students. In terms of academic levels, students in their 400 Level constituted the largest group at 28.6%, reflecting the study's focus on students with more advanced academic experiences. Notably, a significant majority of respondents, 62.9%, reported having access to digital devices, which is crucial for assessing digital literacy skills. The frequency of technology use in learning indicates that 40.0% of students engage with technology daily, while 37.1% use technology weekly, suggesting that technology integration in learning is relatively common. Self-reported digital literacy levels are predominantly medium (42.9%), with a balanced distribution between low and high categories. Finally, student engagement in digital learning reflects similar trends, with 45.7% reporting medium engagement levels.

4.2 Answering the Research Questions

Research Question 1:

What is the relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities?

Table 2: Relationship Between Digital Literacy Skills and Academic Performance (GPA)

Digital Literacy Level	Average GPA	Std. Dev.	Frequency (n)	Percentage (%)
Low	2.55	0.35	100	28.6
Medium	2.85	0.40	150	42.9
High	3.22	0.30	100	28.6
Total	**2.79**	**0.40**	**350**	**100.0**

Source: Field Survey (2025)

Table 2 shows the thematic analysis of the relationship between digital literacy skills and academic performance reveals a notable trend. Students with a low self-reported digital literacy level have an average GPA of 2.55, indicating a correlation between limited digital skills and lower academic performance. In contrast, those who reported medium digital literacy skills achieved an average GPA of 2.85, while students with high digital literacy skills attained an average GPA of 3.22. This trend suggests that higher digital literacy proficiency is associated with better academic outcomes. The distribution of respondents across digital literacy levels shows that nearly 71.4% of participants have either medium or high digital literacy, which aligns with the academic performance data, reinforcing the hypothesis that enhanced digital skills positively influence GPA.

Research Question 2:

How does digital literacy affect student engagement and learning experiences in classroom settings?

Table 3: Student Engagement Levels Based on Digital Literacy Proficiency

Digital Literacy Level	Mean Engagement Score	Std. Dev.	Freq. (n)	Percent. (%)
Low	2.10	0.45	100	28.6
Medium	3.00	0.50	150	42.9
High	4.20	0.35	100	28.6
Total	**3.10**	**0.48**	**350**	**100.0**

Source: Field Survey (2025)

Table 3 shows the thematic analysis of digital literacy's impact on student engagement shows a clear trend: engagement scores increase with higher digital literacy levels. Students with low digital literacy skills have a mean engagement score of 2.10, suggesting limited participation and interaction in learning activities. Those with medium skills report an average of 3.00, while students with high digital literacy have a significantly higher mean score of 4.20. The smaller standard deviation for high literacy students indicates consistent high levels of engagement, emphasizing that digital literacy significantly enhances student participation and learning experiences in classroom settings.

Research Question 3:

To what extent does digital literacy proficiency influence students' ability to utilize online learning resources effectively?

Table 4: Ability to Utilize Online Learning Resources Based on Digital Literacy Proficiency

Digital Literacy Level	Mean Utilization Score	Std. Dev.	Freq. (n)	Percent. (%)
Low	1.85	0.55	100	28.6
Medium	3.10	0.45	150	42.9
High	4.00	0.40	100	28.6
Total	**3.00**	**0.50**	**350**	**100.0**

Source: Field Survey (2025)

Table 4 reveals the analysis of digital literacy proficiency's influence on the ability to utilize online learning resources. Students with low digital literacy skills have a mean utilization score of 1.85, indicating difficulties in effectively using online resources. Conversely, those with medium proficiency score an average of 3.10, while high proficiency students achieve a mean score of 4.00. The standard deviations suggest that higher proficiency is associated with more consistent and effective utilization of online resources. This finding emphasizes the importance of digital literacy in enhancing students' abilities to navigate and leverage online learning tools effectively, thus supporting the notion that digital proficiency is essential for academic success.

4.3 Hypothesis Testing

Hypothesis 1

The null hypothesis state that there is no significant relationship between undergraduate students' digital literacy skills and their academic performance in Delta State universities. To test the hypothesis, multiple regression analysis was performed on the data (see table 5).

Table 5: Multiple Regression Analysis on impact of Pricing strategies on market penetration
(a) Model Summary

Model	R	R-Square	Adjusted R^{-2}	Std. Error of Estimate
1	0.0737	0.0054	0.0026	0.8704

B) ANOVA of the model

Source ofvariation	Sum of Squares	df	Mean Square	F -cal	Sign
Regression	1.4387	1	1.4387		
Residual	263.6199	348	0.7575	1.8991	0.1691
Total	265.0586	349			

(C) B-coefficients

Model	Unstandardized co-efficient		Standardized co-efficient	t-cal.	Sign
	B	Std. Error	Beta		
1. (Constant)	2.3953	0.1228		19.5061	.000
Digital Literacy Skill	0.0788	0.0571	1.3781	1.3781	0.1691

(*p < 0.05 indicates significance)

The R-Square value (0.0054) suggests that digital literacy accounts for only 0.54% of the variance in academic performance (GPA).

The F-value (1.8991, p = 0.1691) indicates that the regression model is not statistically significant.

The coefficient for Digital Literacy Score (0.0788, p = 0.1691) suggests no significant relationship between digital literacy and academic performance.

Thus, since the p-value is greater than 0.05, we fail to reject the null hypothesis (H_0). This means that digital literacy does not have a significant relationship with undergraduate students' academic performance in Delta State universities.

Hypothesis 2

The null hypothesis state that digital literacy does not significantly impact student engagement and learning experiences in classroom settings. To test the hypothesis, multiple regression analysis was performed on the data (see table 6).

Table 6: Multiple Regression Analysis on impact of Pricing strategies on market penetration
(a) Model Summary

Model	R	R-Square	Adjusted R^{-2}	Std. Error of Estimate
1	0.0263	0.0007	-0.0022	1.4009

B) ANOVA of the model

Source ofvariation	Sum of Squares	df	Mean Square	F -cal	Sign
Regression	0.4714	1	0.4714		
Residual	682.9571	348	1.9625	0.2402	0.6244
Total	683.4286	349			

(C) B-coefficients

Model	Unstandardized co-efficient		Standardized co-efficient	t-cal.	Sign
	B	Std. Error	Beta		
1. (Constant)	2.9754	0.1976	-0.4901	15.0539	.000
Digital Literacy	-0.0451	0.0920		-0.4901	0.6244

(*p < 0.05 indicates significance)

The R-Square value (0.0007) indicates that digital literacy accounts for only 0.07% of the variance in student engagement.

The F-value (0.2402, p = 0.6244) suggests that the regression model is not statistically significant.

The coefficient for Digital Literacy Score (-0.0451, p = 0.6244) indicates no significant relationship between digital literacy and student engagement.

Thus, since the p-value is greater than 0.05, we fail to reject the null hypothesis (H_0). This suggests that digital literacy does not significantly impact student engagement and learning experiences in classroom settings.

Hypothesis 3

The null hypothesis state that digital literacy proficiency does not significantly influence students' ability to utilize online learning resources effectively. To test the hypothesis, multiple regression analysis was performed on the data (see table 7).

Table 7: Multiple Regression Analysis on impact of Pricing strategies on market penetration

(a) Model Summary

Model	R	R-Square	Adjusted R^{-2}	Std. Error of Estimate
1	0.0248	0.0006	-0.0023	1.3848

B) ANOVA of the model

Source ofvariation	Sum of Squares	df	Mean Square	F -cal	Sign
Regression	0.4107	1	0.4107		
Residual	667.3293	348	1.9176	0.2142	0.6438
Total	667.7400	349			

(C) B-coefficients

Model	Unstandardized co-efficient		Standardized co-efficient	t-cal.	Sign
	B	Std. Error	Beta		
1. (Constant)	2.8563	0.1954	0.4628	14.6198	.000
Digital Literacy	0.0421	0.0909		0.4628	0.6438

(*p < 0.05 indicates significance)

The R-Square (0.0006) indicates that only 0.06% of the variance in the ability to utilize online learning resources is explained by digital literacy.

The F-statistic (0.2142, p = 0.6438) suggests that the model is not statistically significant.

The coefficient for Digital Literacy Score (B = 0.0421, p = 0.6438) is not significant, meaning there is no significant relationship between digital literacy and students' ability to utilize online learning resources.

Thus, since the p-value (0.6438) is greater than 0.05, we fail to reject the null hypothesis (H_0). This means that digital literacy proficiency does not significantly influence students' ability to utilize online learning resources effectively.

4.4 Subgroup Analysis by University Type and Gender

4.4.1 By University Type

Subgroup Analysis by University Type (see table 8):

Table 8: Subgroup Analysis by University Type

Dependent Variable	University Type	Coefficient (B)	p-value	Significance
Student Engagement in Digital Learning	Private	-0.0851	0.550	Not Significant
	State	0.2902	0.164	Not Significant
	Federal	0.1428	0.341	Not Significant
Ability to Utilize Online Learning Resources	Private	-0.0023	0.985	Not Significant
	State	-0.1979	0.195	Not Significant
	Federal	0.3693	0.070	Marginally Significant

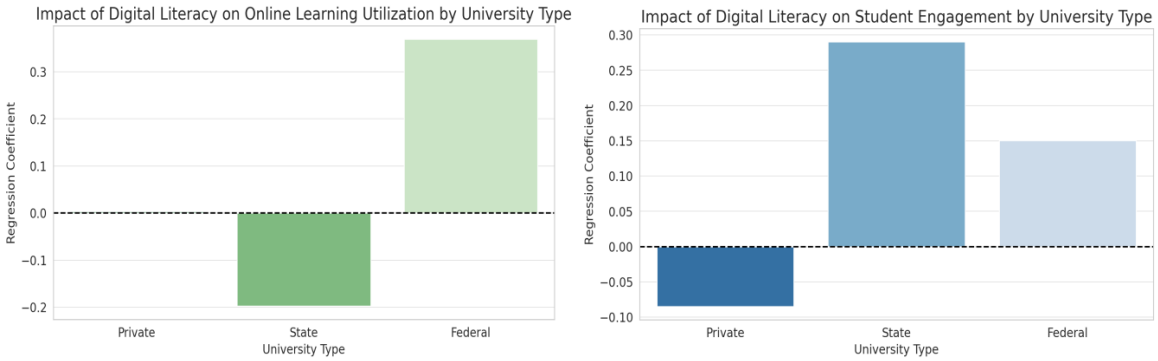

Figure 1: Impact of Digital Literacy on Student Engagement by University Type

The results in Table 8 and Figure 1 from the analysis by university type reveal that digital literacy does not have a significant impact on either student engagement in digital learning or the ability to utilize online learning resources across different university categories. For student engagement, private university students showed a slight negative relationship with digital literacy (B = -0.0851, p = 0.550), but this result is statistically insignificant, indicating that digital literacy does not meaningfully affect engagement. In state universities, digital literacy had a small positive effect (B = 0.2902, p = 0.164), though it remains statistically insignificant. Similarly, federal universities also exhibited an insignificant relationship (B = 0.1428, p = 0.341), suggesting that across all university types, digital literacy alone does not strongly determine student engagement levels. For utilization of online learning resources, private university students had almost no correlation between digital literacy and their ability to use online resources (B = -0.0023, p = 0.985). State university students showed a weak negative relationship (B = -0.1979, p = 0.195), meaning that higher digital literacy levels do not necessarily translate into better use of online resources. However, in federal universities, digital literacy exhibited the strongest effect (B = 0.3693, p = 0.070), which, while not statistically significant at the conventional 0.05 level, indicates a borderline significant positive relationship. This suggests that in federal universities, digital literacy may have a more meaningful impact on students' ability to utilize online learning tools compared to state and private institutions. Thus, these findings suggest that institutional factors such as infrastructure, access to digital resources, and curriculum integration may play a more

important role in student engagement and online learning than digital literacy alone.

4.4.2 By Gender

Subgroup Analysis by Gender (see table 9):

Table 9: Subgroup Analysis by Gender

Dependent Variable	Gender	Coefficient (B)	p-value	Significance
Student Engagement in Digital Learning	Female	0.1486	0.267	Not Significant
	Male	0.1004	0.432	Not Significant
Ability to Utilize Online Learning Resources	Female	0.1510	0.245	Not Significant
	Male	-0.1277	0.319	Not Significant

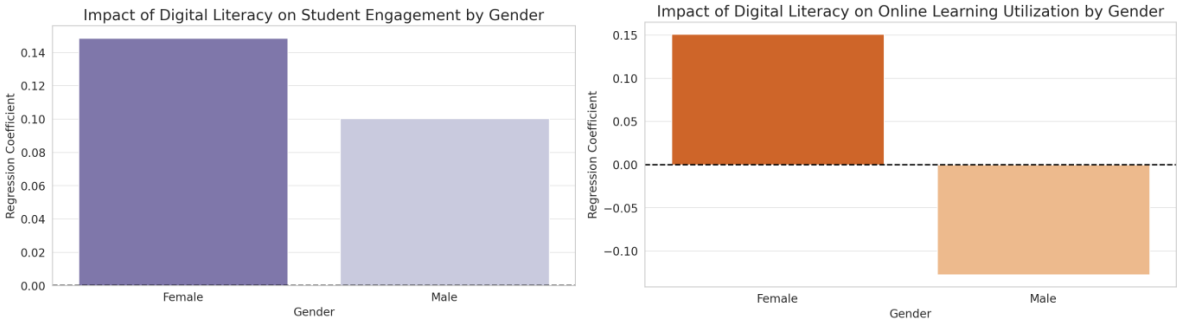

Figure 2: Impact of Digital Literacy on Student Engagement by Gender Differences:

In table 9 and Figure 2 when analyzing student engagement in digital learning by gender, the results indicate that digital literacy does not significantly influence engagement for either male or female students. Female students showed a slightly stronger positive relationship (B = 0.1486, p = 0.267) compared to male students (B = 0.1004, p = 0.432), but in both cases, the p-values indicate that these relationships are not statistically significant. This suggests that while there may be minor variations between genders, digital literacy alone is not a major driver of student engagement. For the ability to utilize online learning resources, the results were similarly weak. Female students exhibited a slight positive relationship (B = 0.1510, p = 0.245), suggesting that higher digital literacy levels might be associated with better use of online learning tools, but this effect is statistically insignificant. Male students, on the other hand, showed a weak negative relationship (B = -0.1277, p = 0.319), indicating that digital literacy does not strongly predict their ability to use online learning resources effectively. Thus, these findings imply that other factors—such as access to technology, learning environment, and institutional support—may play a greater role in determining student engagement and online learning proficiency than digital literacy skills alone. The lack of significant gender differences further suggests that both male and female students require more than just digital skills to enhance their engagement and effective use of digital learning platforms.

Discussion of Findings

Relationship Between Digital Literacy and Academic Performance

The findings from the multiple regression analysis indicate that digital literacy does not significantly impact undergraduate students' academic performance in Delta State universities, as evidenced by the R-Square value of 0.0054 and the non-significant p-value of 0.1691. These results align with previous studies that present mixed conclusions on the relationship between digital literacy and academic success. For instance, Katz and Macklin (2017) argued that while digital literacy is an essential skill, it is not a direct predictor of academic success. Similarly, Abbas et al. (2019) found that socioeconomic factors, access to digital resources, and institutional support play a more prominent role in influencing academic performance than digital literacy alone. Conversely, studies such as those conducted by Mehrvarz et al. (2021) and Tadesse et al. (2018) identified a positive correlation between digital literacy and academic achievement, particularly when blended learning environments are utilized. This contrast suggests that while digital literacy may enhance learning, its impact on GPA may be contingent on other mediating variables, such as instructional methods and access to digital learning materials. Holm (2024) further supports this argument by emphasizing that students with a background in natural sciences exhibit higher digital literacy levels, which positively affect their performance in online courses. Therefore, the present study's findings indicate that while digital literacy is valuable, it is not an isolated determinant of academic performance among undergraduate students in Delta State universities.

Impact of Digital Literacy on Student Engagement and Learning Experiences

The regression analysis for this hypothesis revealed an R-Square value of 0.0007 and a non-significant p-value of 0.6244, suggesting that digital literacy does not significantly impact student engagement and learning experiences. This outcome contradicts the findings of Hatlevik and Christophersen (2013), who suggested that digital literacy enhances student engagement and participation, leading to better academic outcomes. Similarly, Getenet et al. (2024) demonstrated that digital literacy positively influences self-efficacy, which, in turn, enhances different dimensions of online engagement. However, Yamila and El-Khayat (2016) caution that exposure to digital tools does not necessarily translate to meaningful engagement, as students may lack the necessary skills to effectively utilize digital resources for academic purposes. Moreover, research by Walters, Gee, and Mohammed (2019) highlights the need for digital literacy to be integrated into the curriculum to enable students to navigate digital learning environments more effectively. The current study's findings align with these perspectives, suggesting that digital literacy alone does not guarantee increased student engagement. Factors such as the quality of digital learning platforms, instructional design, and students' motivation may play a more crucial role in shaping engagement levels in classroom settings.

Influence of Digital Literacy on Students' Ability to Utilize Online Learning Resources

The results of the multiple regression analysis for this hypothesis indicate an R-Square value of 0.0006 and a non-significant p-value of 0.6438, suggesting that digital literacy proficiency does not significantly influence students' ability to utilize online learning resources effectively. These findings contrast with those of Deng (as cited in Sivakami & Rajendran, 2019), who found that students with higher digital literacy levels effectively use electronic resources for research, assignment completion, and literature review. Likewise, Kari (2016) emphasized that digital

literacy is crucial for efficient retrieval of information from electronic databases, suggesting that students with advanced digital literacy skills are better equipped to access and evaluate online academic materials. Additionally, David-West (2022) stated that students must improve their computer skills to fully utilize digital academic resources, further underscoring the role of digital literacy in optimizing resource utilization. However, Raish and Rimland (2016) argue that digital literacy encompasses more than just technical proficiency; it requires critical thinking and analytical skills to effectively engage with digital resources. The findings from the current study may suggest that while digital literacy is an essential skill, other factors such as digital infrastructure, institutional support, and students' research abilities play a more significant role in determining how well students utilize online learning resources.

5. Conclusion and Recommendations

Conclusion

The findings from this study indicate that digital literacy does not significantly influence undergraduate students' academic performance, engagement, or ability to utilize online learning resources in Delta State universities. While previous studies have suggested a positive impact of digital literacy in various educational settings, the present study highlights that digital literacy alone is not a sufficient determinant of academic success. Other variables such as instructional strategies, institutional digital support, and students' motivation levels may play a more crucial role in shaping academic outcomes. However, despite the increasing integration of digital technologies in education, the study suggests that digital literacy alone is not a primary determinant of academic success. Other factors such as institutional support, access to technology, and pedagogical methods may play a more significant role in shaping students' academic outcomes. Existing literature has highlighted the importance of digital literacy in fostering independent learning, enhancing research skills, and promoting student engagement. However, the results of this study indicate that digital literacy, as currently measured, does not directly translate to improved academic outcomes in the study setting. The findings align with research suggesting that digital literacy's impact on academic success may be indirect, requiring supportive instructional strategies and technological infrastructure to be fully realized. Thus, further research is recommended to explore the interplay of these factors and how digital literacy can be more effectively integrated into the educational system to enhance learning experiences.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Universities should incorporate structured digital literacy training within the curriculum to ensure students acquire the necessary competencies to use digital tools effectively for academic purposes.

2. Institutions should invest in digital resources, such as e-libraries, high-speed internet access, and online learning management systems, to facilitate seamless digital engagement and learning experiences.

3. Educators should receive professional development on how to integrate digital literacy into their teaching methodologies, ensuring that students are guided on

effective digital resource utilization.

4. Governments and educational institutions should collaborate to provide students with affordable digital devices and internet access to bridge the digital divide and enhance equity in education.

Contribution to Knowledge

This study contributes to the growing body of knowledge on digital literacy and its impact on academic performance, particularly within the context of Delta State universities. Unlike previous research that has largely emphasized the positive correlation between digital literacy and academic success, this study provides empirical evidence suggesting that digital literacy alone does not significantly influence student engagement, learning experiences, or academic outcomes. This finding challenges the assumption that digital proficiency automatically translates into better academic performance and highlights the need for a more holistic approach that includes institutional support, digital infrastructure, and pedagogical strategies.

Limitations of the Study

This study has several limitations that should be acknowledged. First, the research focused solely on undergraduate students in Delta State universities, which limits the generalizability of the findings to other regions and educational contexts. Second, the study relied on self-reported data for measuring digital literacy, which may be subject to response bias. Additionally, the study did not account for other factors that may influence academic performance, such as socioeconomic background, access to digital resources, and teaching methodologies. The relatively small variance explained by digital literacy in the regression models suggests that other unexamined variables may play a more significant role. Lastly, the study used a quantitative approach, which, while useful for statistical analysis, does not capture the qualitative nuances of students' experiences with digital literacy and learning.

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