

Adoption And Implementation of State-Of-The-Art Digital Technologies for Student Communication in Nigerian Universities: Trends and Barriers

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Abstract- *The study investigated adoption and implementation of state-of-the-art digital technologies for student communication in Nigerian universities, with specific focus on trends and barriers. Guided by the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), a descriptive survey design was adopted. A structured questionnaire was administered to 400 undergraduate students across four universities in Southwest Nigeria, selected through stratified random sampling. Data were analyzed using descriptive statistics, Pearson correlation, and multiple regression at 0.05 level of significance. Results revealed that instant messaging platforms, Learning Management Systems (LMS), and video conferencing tools (Zoom, Google Meet) are the most adopted state-of-the-art technologies for student communication. Key trends include mobile-first communication, AI-assisted tools, and asynchronous learning support. Major barriers identified were poor internet connectivity, high cost of data, inadequate digital literacy, and epileptic power supply. Statistical analysis showed a significant positive relationship between digital literacy and adoption ($r = .672, p < .05$), and that institutional support significantly predicts implementation ($\beta = .514, p < .05$). The study concluded that while adoption is high, implementation for effective communication is hindered by infrastructural and skill-related barriers. It is recommended that universities invest in campus-wide Wi-Fi, subsidized data, digital literacy training, and policy frameworks to support seamless implementation.*

Keywords: *State-of-the-Art Technology, Digital Technologies, Higher Education, Student Communication, Technology Adoption, Nigeria*

I. INTRODUCTION

Digital technologies have become central to teaching, learning, and communication in higher education globally, yet their adoption and implementation in Nigerian universities remain uneven. The Fourth Industrial Revolution has redefined communication patterns across all sectors, with higher education being one of the most impacted domains (OECD, 2023).

State-of-the-art digital technologies refer to the most advanced, current, and innovative tools that leverage artificial intelligence, cloud computing, mobile applications, and immersive platforms to facilitate interaction.

In the context of universities, these include Learning Management Systems (LMS) such as Moodle and Blackboard, instant messaging applications like WhatsApp and Telegram, video conferencing tools such as Zoom and Microsoft Teams, and emerging AI-powered platforms like ChatGPT and Grammarly (Ally & Samaka, 2022; Schwab, 2017)

In Nigerian universities, the COVID-19 pandemic accelerated the shift from traditional face-to-face communication to digital and hybrid modes (Adeyemi & Adeyinka, 2021). Prior to 2020, many institutions relied heavily on physical notice boards, departmental meetings, and manual memos for student communication (Ogunode et al., 2022).

However, the closure of campuses between 2020 and 2021 exposed the fragility of this system and necessitated rapid adoption of digital alternatives (UNESCO, 2022)

Recent evidence suggests a growing trend toward mobile-first communication among Nigerian undergraduates (Ifeanyichukwu et al., 2023). With over 98% mobile penetration and a youth population that is digitally native, students now prefer WhatsApp groups, Telegram channels, and Instagram pages for academic and social communication (NCC, 2024).

Similarly, universities are increasingly adopting LMS platforms to disseminate course materials, announcements, and feedback. Video conferencing has also become mainstream for virtual lectures, seminars, and student union meetings (Bello & Yusuf, 2022; Adewale, 2023)

Despite this progress, implementation remains problematic. The “state-of-the-art” is not merely about availability, but about effective, equitable, and sustained use for communication (Venkatesh et al., 2012).

Several studies have documented barriers such as poor internet infrastructure, erratic power supply, digital divide, and low digital competence among both students and staff (Olatunbosun & Olayemi, 2021; Oghenetega et al., 2023). The high cost of data and limited campus Wi-Fi coverage further constrain seamless adoption (Nwosu & Onwu, 2022).

Southwest Nigeria, which hosts some of the oldest and most populated universities in the country, presents a unique context. Institutions like University of Lagos, Obafemi Awolowo University, University of Ibadan, and Babcock University have made varying degrees of investment in digital infrastructure (NUC, 2023).

However, there is a paucity of empirical data on the specific trends, level of adoption, barriers, and implementation strategies for student communication using state-of-the-art technologies in this region (Adeyemi & Adeyinka, 2021)

Theoretically, this study is anchored on TAM and UTAUT (Venkatesh et al., 2003). Technology Acceptance Model (TAM) Davis, (1989) posits that perceived ease of use and perceived usefulness determine technology adoption, while Unified Theory of Acceptance and Use of Technology (UTAUT) Al-Emran et al., (2020) extends this by incorporating social influence, facilitating conditions, and effort expectancy.

These frameworks are relevant because student communication via digital tools is voluntary yet influenced by institutional support and infrastructure.

II. STATEMENT OF THE PROBLEM

Nigerian universities have invested substantially in digital platforms since the COVID-19 pandemic. However, anecdotal reports and preliminary studies indicate a mismatch between technology availability and effective implementation for student communication (Ogunode et al., 2022).

Many students report reliance on WhatsApp for official communication because university portals and emails are inactive or poorly monitored (Ifeanyichukwu et al., 2023)]. This raises questions about the true state of adoption and the barriers preventing institutional platforms from being the primary channel.

Furthermore, while global literature highlights AI tools and immersive learning as emerging trends (Ally & Samaka, 2022), there is limited evidence on whether Nigerian students are aware of or using these tools for communication. The persistence of infrastructural challenges such as poor connectivity and power outages suggests that adoption may be superficial rather than integrated (Oghenetega et al., 2023).

Purpose of the Study

The main purpose of this study is to examine the adoption and implementation of state-of-the-art digital technologies for student communication in Nigerian universities, with emphasis on trends and barriers. Specifically, the study seeks to:

1. identify the state-of-the-art digital technologies currently used for student communication.

2. examine the trends in the adoption of these technologies among students.
3. investigate the barriers hindering effective implementation.
4. determine the relationship between digital literacy and adoption, and the effect of institutional support on implementation.

Research Questions

The following research questions were raised to guide the study.

1. What are the state-of-the-art digital technologies currently used for student communication in Nigerian universities?
2. What are the trends in the adoption of these technologies among university students?
3. What are the barriers hindering the implementation of state-of-the-art digital technologies for student communication?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant relationship between students' digital literacy and the adoption of state-of-the-art digital technologies for communication.
2. Institutional support does not significantly predict the implementation of state-of-the-art digital technologies for student communication.

III. RESEARCH METHOD

A descriptive survey research design was adopted. The population of the study comprised 120,000 undergraduate students in public and private universities in SouthWest Nigeria (NUC, 2023). The Sample for this study consists 400 students using Taro Yamane's formula.

The multistage sampling procedure was used to select the sample. Four universities were selected through stratified random sampling to ensure representation of federal, state, and private institutions. The instrument used for this study was a self-developed instrument tagged "State-of-the-Art Digital Technologies Questionnaire (SADTEQ)".

The instrument was divided into four sections. Section A was on Demographics variables, while

Section B elicit information on Types and frequency of use with 4-point Likert.

Section C also elicit information on Trends and barriers with 4-point Likert, while Section D is on Digital literacy and institutional support with 4-point Likert. Face and content validity of the instrument were ensured by experts in Educational Technology.

The reliability of the instrument was ascertained. Reliability coefficient of 0.84 was obtained which was considered high enough to be used. The researcher administered the instrument with the help of trained research assistants. All the questionnaires administered were retrieved from the respondents immediately.

Descriptive and inferential statistics were used to analyse the data collected in the study. Descriptive statistics such as Mean and Standard Deviation were used to answer the research question raised while inferential statistics of Pearson's Product Moment Correlation Analysis and Multiple Regression Analysis were used to test the hypotheses. All the hypotheses were tested at 0.05 level of significance.

IV. RESULTS

Research Question 1: What are the state-of-the-art digital technologies currently used for student communication in Nigerian universities?

Table 1: showing the Mean and SD on State-of-the-Art Digital Technologies Used for Student Communication

S/N	Digital Technology	Mean	SD	Decision
1	WhatsApp/Telegram for class groups	3.62	0.54	Adopted
2	Zoom/Google Meet for virtual meetings	3.41	0.68	Adopted
3	University LMS	3.18	0.79	Adopted
4	Email/University Portal	2.76	0.91	Adopted
5	AI Tools for communication	2.68	0.88	Adopted
Grand Mean		3.13		Adopted

Table 1 above showed that WhatsApp/Telegram with the Mean = 3.62 and Zoom with the mean =3.41 are most adopted, followed by University LMS with the mean = 3.18, Email/University portal with the mean

=2.76 and AI Tools for communication with the mean = 2.68. The cutoff mean score of 2.50 is less than the grand mean score of 3.13. This implies that the State-of-the-Art Digital Technologies used for Student Communication in Nigerian Universities were all adopted.

Research Question 2: What are the trends in the adoption of these technologies among university students?

Table 2: showing the Mean and SD on Trends in Adoption

S/N	Trend	Mean	SD	Decision
1	Mobile-first communication via smartphones	3.58	0.61	Agreed
2	Use of asynchronous tools for flexibility	3.42	0.70	Agreed
3	Increased use of AI-assisted communication	3.11	0.83	Agreed
4	Integration of social media for academic purposes	3.05	0.77	Agreed
Grand Mean		3.29		Agreed

Table 2 above showed that mobile-first communication via smartphones with the mean = 3.58, use of asynchronous tools for flexibility with the mean = 3.42, increased use of AI-assisted communication with the mean = 3.11 and integrated of social media for academic purposes with the mean = 3.05. The cutoff mean of 2.50 is less than grand mean of 3.29, this implies that there are trends in the adoption of these technologies among university students.

Research Question 3: What are the barriers hindering the implementation of state-of-the-art digital technologies for student communication?

Table 3: showing Mean and SD on Barriers to Implementation

S/N	Barrier	Mean	SD	Decision
1	Poor internet connectivity	3.71	0.49	Agreed
2	High cost of data	3.65	0.58	Agreed
3	Erratic power supply	3.59	0.63	Agreed
4	Inadequate digital literacy skills	3.32	0.71	Agreed
5	Lack of institutional technical support	3.14	0.80	Agreed
Grand Mean		3.48		Agreed

Table 3 above showed that poor internet connectivity with the mean =3.71, high cost of data with the mean =3.65, erratic power supply with the mean = 3.59,

inadequate digital literacy skills with the mean = 3.32 and lack of institutional technical support with the mean = 3.14.

The mean cutoff score of 2.50 which is less than grand mean score of 3.48 This implies that there are barriers hindering the implementation of state-of-the-art digital technologies for student communication

Hypotheses Testing

Hypothesis 1: There is no significant relationship between students' digital literacy and the adoption of state-of-the-art digital technologies for communication.

Table 4: showing Pearson Correlation on Digital Literacy and Adoption

Variables	N	Mean	SD	r	p-value	Decision
Digital Literacy	400	3.21	0.66	.672	.000	Sig.
Adoption of Technologies	400	3.13	0.58			Reject

*p < .05

Table 4 above showed that p-value of 0.000 is less than 0.05 at 0.05 level of significance. The hypothesis is therefore rejected. This implies that there is significant relationship between students' digital literacy and the adoption of state-of-the-art digital technologies for communication

Research Hypothesis 2: Institutional support does not significantly predict the implementation of state-of-the-art digital technologies for student communication.

Table 5: showing Regression Analysis on Institutional Support and Implementation

Model	B	Std. Error	Beta (β)	t	p-value	Decision
constant	1.240	0.210		5.905	.000	
Institutional Support	0.514	0.062	.514	8.290	.000	Sig.
R = .514, R ² = .264, F = 68.72, p = .000						Reject

Table 4 above, showed F-value is 68.72 and the significant value is 0.000 with degree of freedom of

5/294 at a critical level of significance of 0.05. Since the significant value is less than the critical value of 0.05, the hypothesis formulated is therefore rejected. This implies that Institutional support significantly predicts the implementation of state-of-the-art digital technologies for student communication.

V. DISCUSSION

The findings of the study revealed that that the State-of-the-Art Digital Technologies Used for Student Communication in Nigerian Universities were all adopted. This was aligning with Ifeanyichukwu et al. (2023) who noted the dominance of mobile messaging in Nigerian campuses and also with the submission of Ogunode et al. (2022) that students bypass official channels.

The findings of the study showed that there are trends in the adoption of these technologies among university students confirms NCC (2024) that with over 98% mobile penetration and a youth population that is digitally native, students now prefer WhatsApp groups, Telegram channels, and Instagram pages for academic and social communication data on high mobile penetration.

Also, the work of Ally & Samaka, (2022) is in line with this finding that Learning Management Systems (LMS) such as Moodle and Blackboard, instant messaging applications like WhatsApp and Telegram, video conferencing tools such as Zoom and Microsoft Teams, and emerging AI-powered platforms like ChatGPT and Grammarly to facilitate interaction.

The finding of the study revealed that there are barriers hindering the implementation of state-of-the-art digital technologies for student communication.

This is line with the submission of Oghenetega et al. (2023) and Nwosu & Onwu (2022) that without addressing infrastructure, digital transformation will be incomplete.

The study also revealed that there is significant relationship between students' digital literacy and the adoption of state-of-the-art digital technologies for communication. This is in conjunction with

Technology Acceptance Model (TAM) Davis, (1989) that students with higher digital literacy are more likely to adopt technologies, implying that training is critical.

The study further revealed that Institutional support significantly predicts the implementation of state-of-the-art digital technologies for student communication. This aligns with Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh et al., (2003) facilitating conditions construct. Where universities provide Wi-Fi, training, and responsive help desks, implementation improves.

VI. CONCLUSION

The study concludes that state-of-the-art digital technologies are widely adopted for student communication in Nigerian universities, driven largely by mobile and social platforms. However, implementation for formal, institutional communication is hindered by infrastructural deficits and low digital competence.

Digital literacy and institutional support are critical enablers. Therefore, adoption without enabling infrastructure and skills will not translate to effective communication.

RECOMMENDATIONS

1. Universities should provide stable campus-wide Wi-Fi and standby power solutions to reduce connectivity and power barriers.
2. Mandatory digital skills workshops for freshers and staff to improve competence and confidence in using state-of-the-art tools.
3. Develop a digital communication policy and establish a 24/7 ICT helpdesk to strengthen institutional support.
4. University management should partner with telecom providers to offer subsidized data bundles for students on academic platforms.

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