frontiers | Frontiers in Education

TYPE Original Research
PUBLISHED 16 April 2025
DOI 10.3389/feduc.2025.1581514

OPEN ACCESS

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RECEIVED 22 February 2025
ACCEPTED 31 March 2025
PUBLISHED 16 April 2025

CITATION
Elom CO, Ayerakwa HM, Ibrahim-Olesin S, Deffor EW, Uwaleke CC and Onyeneke RU (2025) Determinants of WhatsApp and Telegram usage for learning support in Nigerian universities: a quantitative study.
Front. Educ. 10:1581514.
doi: 10.3389/feduc.2025.1581514

Determinants of WhatsApp and Telegram usage for learning support in Nigerian universities: a quantitative study

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Evidence on the use of social media platforms such as WhatsApp and Telegram as learning support to enhance students' performance is scarce in sub-Saharan Africa, where there is limited application of such platforms for learning. Much rarer are studies analyzing the determinants of using WhatsApp and Telegram as learning support to enhance students' performance in the region. We used cross-sectional data from 206 students from public universities in Nigeria and applied econometric frameworks (such as Pearson's correlation and multivariate regression analysis) to analyze the determinants of social media platforms such as WhatsApp and Telegram as learning support among university students in Nigeria. We identified six constructs of using WhatsApp and Telegram as learning support in Nigerian public universities, which include performance expectancy, effort expectancy, social influence, institutional and political influence, guidance and counseling achievements, and facilitating conditions. These constructs were acceptable/accepted by the students. The determinants of the use of WhatsApp and Telegram to enhance learning among students include age, gender, wealth status of parents/guardians, student's faculty/program, location of school, and level of student in school. The constraints to students' usage of WhatsApp and Telegram for learning support include high cost of Internet, poor connectivity and epileptic/poor power supply to charge phones, mistrust, lack of structure and coherence, and irresponsible use of social media. The results have significant implications for educational institutions, policymakers, and stakeholders seeking to promote the effective use of mobile learning technologies.

KEYWORDS

WhatsApp and Telegram use, learning support, public universities, determinants, Nigeria, constructs, cross-sectional data, multivariate regression

Introduction

The impact of digital transformations on education is significant across different countries. As a result, social media has increasingly emerged not just as a social networking tool but as the chief cornerstone for enhancing educational support at higher levels of education (Alshammari et al., 2024; Fauzi et al., 2024). Notably, the plethora of corollaries that accompanied the onset of the COVID-19 pandemic and its aftermath made a paradigm shift in teaching and learning approaches inevitable (Sengupta and Vaish, 2024). Correspondingly, this shift has skyrocketed the adoption of social media for the purpose of improving real-time communication, resource sharing, and collaborative learning among university students and educators at an unparalleled rate (Capriotti et al., 2024). The domain of educational technology has witnessed a surge in the popularity of social media instant messaging applications, such as Telegram and WhatsApp. The incorporation of instant messaging platforms, such as Telegram and WhatsApp, within educational contexts has become increasingly pervasive owing to their ubiquitous utilization in everyday routines (Ajani and Khoalenyane, 2023).

Telegram is a user-friendly platform that provides a student-centered teaching and learning engagement using online learning materials to enhance information sharing (Mohammed et al., 2024). It combines self-study with asynchronous interactions to promote learning and is used to enhance learning in traditional learning settings, as well as distance and continuing education (Denysiuk et al., 2018). Telegram has the capacity of sending files (in different formats) up to two gigabytes in size and allows users to create groups of up to 200,000 members and channels for transmission to infinite audiences (Mohammed et al., 2024). Comparable to Telegram in the areas of online discussion and interaction is the WhatsApp application that is used by approximately three billion active users worldwide (Ceci, 2024). WhatsApp is a user-friendly instant messaging platform that enables the exchange of text, voice, and video messages, in addition to supporting voice and video communication. WhatsApp works on various platforms such as iPhone and android systems and sends multimedia contents and other instant messages in the form of text (Mohammed et al., 2024). It has the capacity of sending files (in different formats) up to two gigabytes in size and allows users to create groups of up to 1,024 members and channels for transmission to many audiences. Therefore, WhatsApp has the capacity to enable online learning, thereby augmenting the flexibility and accessibility of educational prospects for students. WhatsApp and Telegram can therefore be used for teaching and learning through the creation of online groups aimed at fostering communication with students, creating dialogue and encourage students to exchange ideas and information among themselves (Sonia and Rawekar, 2017; Mohammed et al., 2024).

WhatsApp and Telegram are array of communication tools and applications in the ubiquitous smartphone. WhatsApp and Telegram have become an integral part of daily communication for individuals across the globe. WhatsApp and Telegram are easy to use with instant messaging capabilities and multimedia sharing features. They have transcended personal communication and extended into the realm of education. Within the realm of distance education, the choice of technology tools is diverse, reflecting the dynamic nature of digital education. Students and instructors have the option to use a multitude of applications, websites, and platforms to support their educational goals. Among these, WhatsApp and Telegram have emerged as prominent tools for educational communication and collaboration (Kushwaha and Jhawar, 2018; Nuuyoma et al., 2020).

WhatsApp and Telegram have rapidly evolved into a versatile platform capable of accommodating educational needs. As a result, an increasing number of teachers and students have adopted WhatsApp and Telegram as a supplementary tool for learning, creating chat groups, sharing resources, and facilitating discussions (Yeboah et al., 2025; Jordan, 2023; Estrada Molina, 2022; Owusu-Mensah et al., 2020; Almogheerah, 2020; Baguma et al., 2019). The platforms' ability to bridge geographical distances, offer real-time interaction, and support various forms of media have made them attractive choices for enhancing the distance education experience (Yeboah et al., 2025; Owusu-Mensah et al., 2020).

WhatsApp and Telegram usage has increased significantly in universities post-pandemic (Pasha, 2024). The integration of WhatsApp and Telegram into university learning settings has proven to be a highly significant development in education (Estrada Molina, 2022). However, their effectiveness hinges primarily on how well existing core individual and external interlinked factors influencing their adoption align with the needs and expectations of its users (Amran et al., 2024). Students' and teachers' use of social media is greatly influenced by elements such as its distinctive characteristics that make it simple to navigate (Waqar and Shaheen, 2025). WhatsApp and Telegram are therefore preferred as ultimate educational tools in universities owing to their user-friendly interfaces, real-time communication capabilities, extensive file-sharing options, and support for large group collaborations (Mabaso et al., 2023).

Not only are they popular for their ability to introduce new variants, but their higher accessibility, ease of use, and multimedia-sharing capabilities make them ideal for students and educators at the universities (Rafique et al., 2023). Maximizing the educational benefits of these platforms also depends on institutional policies, improving digital infrastructure, enhancing faculty and student digital literacy, and guaranteeing data security, among other factors of this nature (Sevnarayan, 2023; Rosak-Szyrocka, 2024).

Universities that have successfully integrated WhatsApp and Telegram while simultaneously addressing these relevant multiple determinant factors and their influence on users have reaped innumerable benefits (Zulkifli and Noor, 2023). By placing weight on these enabling conditions, universities have increased usage and patronage among both learners and teachers (Shabani and Keshavarz, 2022).

Universities have leveraged this epic rise in platforms to facilitate academic discussions, foster peer collaboration, and enhance information dissemination (Aladsani, 2021). An inclusive and secure virtual learning setting where WhatsApp and Telegram support flawless knowledge sharing and improve academic interactions has also been achieved by some universities (Oteyola et al., 2021). In the same way, these platforms have proven effective in facilitating instant feedback, bridging geographical gaps for remote learning, and enhancing student engagement through interactive discussions and group activities (Alamer et al., 2023). The active engagement and interaction of students in Telegram and WhatsApp group discussion encourages high collaboration among students and their tutors (Mohammed et al., 2024).

In Nigeria, the National Universities Commission (NUC), in recognition of the need to integrate online learning in the Nigerian

University System, developed guidelines for e-learning in university programs (National Universities Commission, 2023). The guidelines serve as a framework for orderly learning using technologies and adherence to standards laid out in the new Core Curriculum Minimum Academic Standards (CCMAS) (National Universities Commission, 2023). In addition, the Federal Ministry of Education (2023) has developed a policy to coordinate digital learning in Nigeria. The policy is the National Digital Learning Policy. The policy has five objectives which include improving access to digital learning for all learners in the country; improving the quality and relevance of digital learning; mitigating the impact of natural and man-made disruptions to learning systems; enhancing the global competitiveness of the graduates of our educational systems; and leveraging digital learning and technological innovations to facilitate data-driven, evidence-based education management, research, and development across all levels (Federal Ministry of Education, 2023). The policy and guidelines show the commitment of regulators of education in Nigeria to provide clear guidelines on online/digital learning in the country.

In addition, universities have also adopted social media to enhance teaching and learning (Egielewa et al., 2022). In Nigeria, universities are already working to improve teaching and learning outcomes by utilizing Telegram and WhatsApp (Egielewa et al., 2022; Adebanjo et al., 2024). These strategic efforts have yielded some success, though not without their fair share of hurdles (Adedotun et al., 2024). Even though these two platforms are steadily being used for academic discussions, knowledge sharing, and collaboration among students and faculty across universities in Nigeria (Vitalis et al., 2025), their adoption is still inconsistent and remains uneven among schools (Aregbesola and Van der Walt, 2024). Beyond this, there are still some students and educators that are also missing the boat when it comes to tapping into the full potential of WhatsApp and Telegram in education (Adebanjo et al., 2024).

The unstructured and inconsistent adoption of WhatsApp and Telegram among students and faculty in Nigerian universities highlights that their usage is not universal but rather shaped by contextual factors such as institutional policies, Internet access, digital literacy, individual preferences, pedagogical needs, socio-demographic features, and others (Ogundele et al., 2023). Consequently, without a clear understanding of these key determinant factors influencing sustained usage, universities risk underutilizing these platforms, leading to fragmented and ineffective digital learning experiences (Onun et al., 2023). For all the obvious importance of these determinant factors, much of the existing literature has overlooked them, leaving a gap in understanding how they shape the sustained adoption of WhatsApp and Telegram for structured learning support (Ojo et al., 2024). The literature presents an extensive body of work on general usage of social media and how it affects students' academic activities, time management, and their overall academic performance (Wordu et al., 2020; Zubairu, 2021; Ezeonwumelu et al., 2021; Udem et al., 2020). Other studies have examined how either WhatsApp or Telegram, in isolation, aids students in acquiring learning resources, modernizes teaching methodologies, and influences political participation, voting patterns, and gendered outcomes (Imoke et al., 2021; Bakare et al., 2022; Daramola and Aladesusi, 2022; Sulyman and Abdulkareem, 2021; Omipidan and Sanusi, 2024).

Against this backdrop, this study intends to fill this gaping gap in literature by examining the determinants of social media (WhatsApp and Telegram) use for learning support in universities. Unlike earlier research works that ignore the multiple determinant factors essential for sustained adoption, this research offers empirical evidence and practical recommendations for structured adoption of WhatsApp and Telegram for educational support. Given that only 6 years remain until the 2030 deadline for achieving the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), the study is both timely and significant. By proposing structured policies for social media integration, it aims to enhance accessibility, inclusivity, and the quality of higher education institutions in Nigeria. This research is particularly significant for universities, policymakers, educators, students, and other stakeholders as it provides novel insights into scalable, structured, and sustainable approaches for leveraging WhatsApp and Telegram to support higher education institutions. The specific objectives of the study include to ascertain the adoption of WhatsApp and Telegram for learning support among Nigerian university students; determine the relationship among the constructs of use of WhatsApp and Telegram for learning support among Nigerian university students; analyze the determinants of the adoption of WhatsApp and Telegram for learning support among Nigerian university students; and ascertain the challenges of associated with WhatsApp and Telegram for learning support among Nigerian university students.

Theoretical framework

Unified theory of acceptance and use of technology (UTAUT) model

The Unified Theory of Acceptance and Use of Technology (UTAUT) which serves as a comprehensive model relevant for explaining user intentions to adopt technology and subsequent usage behavior was originally propounded by Viswanath Venkatesh, Michael Morris, Gordon Davis, and Fred Davis in the year 2003 (Venkatesh et al., 2003). The model is basically anchored on four prime determinants of technology acceptance which include performance expectancy (the extent to which an individual believes that using the technology will improve performance), effort expectancy (the perceived ease of usage), social influence (the degree to which individuals perceive that significant others believe they should utilize the technology), and facilitating conditions (the perceived availability of organizational and technical infrastructure to support usage). These constructs are further moderated by four cardinal variables: gender, age, experience, and voluntariness of use, which affect the strength of the relationships that exist between the core constructs and behavioral intention or actual usage (Venkatesh et al., 2016). The UTAUT model is applicable to this current study since it offers a robust theoretical framework to understand and analyze the factors influencing the adoption and use of WhatsApp and Telegram for academic purposes. By doing a staid examination of performance expectancy, effort expectancy, social influence, and facilitating conditions, a better assessment of the behavioral intentions of users and the myriads of barriers or enablers that affect the adoption of these social media platforms can be unveiled. Similarly, considering the moderating factors such as gender and experience offer bottomless insights into the differential patterns of usage across diverse student populations within Nigerian universities. The behavioral intentions of students and real utilization of these social media platforms are meaningfully

shaped by how useful they perceive the platforms to be in enhancing their academic performance, how easy they find them to use, the extent of peer or institutional influence, and the availability of necessary infrastructure to support usage.

Methodology

Research design and data collection

We adopted a survey design approach for the study. We designed a questionnaire for this study. The questions asked were guided by the UTUAT model. The questions for the different constructs of social media use in learning support are largely Likert-type questions with four scales—strongly disagree, disagree, agree, and strongly agree. The scales ranged from strongly disagree = 1 to strongly agree = 4. We subjected the questionnaire to reliability and validity tests. The questionnaire was sent to professionals in educational technology to carry out content validity of the items. The experts advised the researchers to add students' demographic characteristics to the questionnaire. The research team added the students' demographic characteristics in the final draft questionnaire, which was administered the questionnaire to students selected from public universities in Nigeria. The questionnaire was loaded on google form and distributed to students across public universities in Nigeria. Reminders were sent to the lecturers in the universities to remind students to complete the questionnaire. Overall, we received approximately 216 responses across six universities in Nigeria. Of the 216 responses received, 206 were found to be well-completed and used in the final analysis.

In addition, we subjected the instrument to reliability test to determine its internal consistency and how well the respondents understood the questions. The Cronbach's alpha was used for this test (Cronbach, 1951). The reliability coefficient was 0.98 confirming that the questionnaire was reliable and internally consistent.

TABLE 1 Demographic characteristics of respondents.

Gender	Frequency	Percentage
Female	86	41.7
Male	120	58.3
Total	206	100.0
Parents/guardians socioeconomic status		
Low socioeconomic status	136	66.0
High socioeconomic status	70	34.0
Total	206	100.0
Faculty of students		
Science-based	48	23.3
Arts/Social science-based	158	76.7
Total	206	100.0
Type of public university		
State	60	29.1
Federal	146	70.9
Total	206	100.0
Location of school		
Rural	99	48.1
Urban	107	51.9
Total	206	100.0
	Mean	Standard Deviation
Age	22.67	2.26
Year in school	3.06	1.45

Data analysis

The demographic characteristics of the students were subjected to descriptive statistics and means and percentages were calculated. The results were summarized and presented in a table (See Table 1). The constructs were subjected to further analysis by calculating the cutoff point of the responses for each item in each construct. The weights were added, and the sum was 10, that is, 4 + 3 + 2 + 1 = 10. The sum was divided by the number of scales (4), and this gave 2.5. We used 2.5 as the cutoff point, any item in each construct with a mean score of $\geq$ 2.5 was considered as acceptable/accepted, and any item with a mean score of $<$ 2.5 was considered not acceptable/accepted. Correlation coefficient was used to determine pairwise relationships among the constructs in using social media as learning support. Multivariate regression analysis was used to establish the determinants of the choices of the constructs in using social media as learning support. The correlation coefficient (R) measures the degree of a linear relationship between two variables. It ranges from −1 to +1, with 0 indicating no linear relationship, +1 indicating a perfect positive linear relationship, and −1 indicating a perfect negative linear relationship. Correlation coefficient (R) ranging from 0.00 to 0.199 is considered a very weak positive relationship, R-value ranging from 0.20 to 0.399 is considered a weak positive relationship, R-value ranging from 0.40 to 0.599 is considered a moderate positive relationship, R-value ranging from 0.60 to 0.799 is considered a strong positive relationship, while R-value ranging from 0.80 and 1.00 is considered a very strong positive relationship. Correlation coefficient (R) ranging from 0.00 to −0.199 is considered a very weak negative relationship, R-value ranging from −0.20 to −0.399 is considered a weak negative relationship, R-value ranging from −0.40 to −0.599 is considered a moderate negative relationship, R-value ranging from −0.60 to −0.799 is considered a strong negative relationship, while R-value ranging from −0.80 and −1.00 is considered a very strong negative relationship. To determine whether a correlation coefficient is statistically significant, the calculated *p*-value is compared to a chosen significance level (0.10). If the p-value is less than the significance level, you reject the null hypothesis (that there is no correlation) and conclude that a significant relationship exists, otherwise you accept the null hypothesis. To decide about the statistical significance of regression coefficients in multivariate regression, compare the p-value of the coefficient's *t*-test with your chosen significance level (0.10). If the p-value is less than the chosen significance level, reject the null hypothesis and conclude the coefficient is statistically significant. If the sign of the regression coefficient is positive, it implies that the independent variable has a direct/positive effect on the dependent variable and the two variables are moving in the same direction. If the

sign of the regression coefficient is negative, it implies that the independent variable has an inverse/negative effect on the dependent variable and the two variables are moving in opposite direction.

The implicit model of the multivariate regression model is stated thus as follows:

$$Y_i = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e).$$

where:

Y = Construct in using WhatsApp and Telegram as learning support.

$$i = 1, 2, 3, 4, 5, 6.$$

1 = Performance expectancy.

2 = Effort expectancy.

3 = Social influence.

4 = Institutional and political influence.

5 = Guidance and counseling achievements.

6 = Facilitating conditions.

$$X_1 = \text{Gender}\,(\text{Male} = 1, \text{Female} = 0).$$

$$X_2 = \text{Age}\,(\text{years}).$$

$$X_3 = \text{Wealth status of parents / guardian}\,(\text{Poor} = 0, \text{Rich} = 1).$$

$$X_4 = \text{Student's faculty / program}\,(\text{Science} - \text{based} = 0, \text{Art} - \text{based} = 1).$$

X_5 = School ownership type (Federal government = 1, State government = 0).

$$X_6 = \text{Location of school}\,(\text{Rural} = 0, \text{Urban} = 1).$$

X_7 = Year / Level in school.

e = Error term.

Results

Characteristics of respondents

From Table 1, we found that the majority (58.3%) of the respondent were males, while 41.7% of them were females. The majority (66.0%) of them came from parents/guardians with low economic status, while 34.0% came from rich parent/guardian background. It was also found that the majority (76.7%) were Arts/Social Science-based students, and Science-based students were few (23.3%). The majority (70.9%) of the students came from public universities, while only 29.1% came from state universities. Most of the students (51.9%) have their universities located in the urban areas, while 48.1% have their schools located in the rural areas. The average age of the students was found to be 22.67 years, and their average year in school was 3, implying the majority were in their third year.

Adoption of WhatsApp and Telegram for learning support

Performance expectancy

From Table 2, we found that using WhatsApp and Telegram messages to discuss course contents with students and lecturers was acceptable by the students as being helpful in learning ($\bar{X}$ = 3.13, SD = 0.74). In addition, using WhatsApp and Telegram to discuss course content with other students and lecturers was acceptable and it increases the student chances of mastering the courses discussed ($\bar{X}$ = 3.01, SD = 0.78). The usage of WhatsApp and Telegram messages to discuss course content with other students to increase the student chances of learning the modules and units quickly was also accepted with a mean of 3.00 and standard deviation of 0.74. Another accepted statement was using WhatsApp and Telegram messages to discuss course contents with other students and lecturers to increase students' performance in the courses discussed ($\bar{X}$ = 3.07, SD = 0.70). In addition, we found using WhatsApp and Telegram messages to discuss course contents with other students and lecturers to aid the student in their assignment as accepted ($\bar{X}$ = 3.07, SD = 0.78). The standard deviations of all items under performance expectancy showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under performance expectancy were high, showing greater acceptance of the listed items by the students.

Effort expectancy

The study also measures the effort expectancy construct in relation to the importance and use of WhatsApp and Telegram from learning. The results presented in Table 3 show that out of the six (6) items scale, the average score was 3.22 with SD of 0.63. Overall, the average score for effort expectancy for WhatsApp and Telegram among the respondents was high. From Table 3, all the statements were accepted. Most of the respondents perceived the use of WhatsApp and Telegram to be easy ($\bar{X}$ = 3.27, SD = 0.65). Communicating with WhatsApp and Telegram with clarity was acceptable by the students ($\bar{X}$ = 3.23, SD = 0.64). The ease of learning to discuss course materials on Telegram and WhatsApp was also

TABLE 2 Performance expectancy of using WhatsApp and Telegram for learning support.

Code	Item	$\bar{X}$	SD	Remark
PE1	Using WhatsApp and Telegram messages to discuss course content with other students and lecturers would be helpful in my learning	3.13	0.74	Accepted
PE2	Using WhatsApp and Telegram to discuss course contents with other students and lecturers would increase my chances of mastering the courses discussed	3.01	0.78	Accepted
PE3	Using WhatsApp and Telegram messages to discuss course contents with other students and lecturers would increase my chances of learning the modules and units quickly	3.00	0.74	Accepted
PE4	Using WhatsApp and Telegram messages to discuss course content with other students and lecturers would increase my performance in courses discussed	3.07	0.70	Accepted
PE5	Using WhatsApp and Telegram messages to discuss course content with other students and lecturers would help me in doing my assignments	3.07	0.78	Accepted
	Average	3.06	0.65	Accepted

TABLE 3 Effort expectancy of using WhatsApp and Telegram for learning.

Code	Item	$\bar{X}$	SD	Remark
EE1	I find using WhatsApp and Telegram easy	3.27	0.65	Accepted
EE2	Communicating with WhatsApp and Telegram is clear and okay	3.23	0.64	Accepted
EE3	Learning to discuss course materials on Telegram and WhatsApp is easy for me	3.19	0.63	Accepted
EE4	My experience and skill in communicating with Telegram and WhatsApp have improved significantly	3.20	0.65	Accepted
EE5	I consider myself an expert in using WhatsApp and Telegram	3.10	0.60	Accepted
EE6	I send and receive WhatsApp and Telegram messages easily and efficiently	3.31	0.61	Accepted
	Average	**3.22**	**0.63**	**Accepted**

accepted ($\bar{X}$ = 3.19, SD = 0.63). We also found significant improvement in students' experience and skill in communicating with Telegram and WhatsApp, and this was accepted by the students ($\bar{X}$ = 3.20, SD = 0.65). Students considered themselves as experts in the use of WhatsApp and Telegram ($\bar{X}$ = 3.10, SD = 0.60). Finally, students sending and receiving WhatsApp and Telegram messages easily and efficiently was accepted too ($\bar{X}$ = 3.31, SD = 0.61). With a score of 3.31, the students agree it is easy and efficient to send and receive WhatsApp and Telegram. This mean score shows that the students perceived their experience, and skills have improved with the continuous use of the two platforms. The standard deviations of all items under effort expectancy showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under effort expectancy were high, showing greater acceptance of the outlined items by the students.

Social influence

Using a two-item scale, the study measured the social influence construct. The result presented in Table 4 indicates the mean score for the two items was accepted ($\bar{X}$ = 2.96, SD = 0.63). From Table 4, we found that the belief of the students' family and friends that WhatsApp and Telegram are being used by students to discuss lecture materials with lecturers and fellow students ($\bar{X}$ = 2.92, SD = 0.71). In addition, students' role models believe that they use WhatsApp and Telegram to discuss lecture materials with lecturers and fellow students ($\bar{X}$ = 3.00, SD = 0.65). This indicates that the students perceived that their families and friends believe they use the platforms to discuss lecture materials with lecturers and fellow students. Social influence in relation to the use of WhatsApp and Telegram for academic purposes is relatively high among the respondents. The standard deviations of all items under social influence showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under social influence were high, showing greater acceptance of the stated items by the students.

Institutional and political influence

The result of the institutional and political influence construct is presented in Table 5. Out of the three-item scale, the first item (my institution supports the use of WhatsApp and Telegram to discuss lecture materials and share ideas with fellow students and lecturers) had the highest mean score ($\bar{X}$ = 3.10, SD = 0.67), followed by the second item (I think the government would support the use of WhatsApp and Telegram by students to interact and discuss course materials with fellow students and lecturers) ($\bar{X}$ = 3.07, SD = 0.71). Furthermore, expectation of a policy/legislation from the government in supporting the use of WhatsApp and Telegram for learning was accepted by the students ($\bar{X}$ = 2.89, SD = 0.72). The average score of the three-items representing institutional and political influence was accepted by the students ($\bar{X}$ = 3.02, SD = 0.59). Overall, there is

TABLE 4 Social influence of using WhatsApp and Telegram for learning.

Code	Item	$\bar{X}$	SD	Remark
SI-1	My family and friends believe I use WhatsApp and Telegram to discuss lecture materials with lecturers and fellow students	2.92	0.71	Accepted
SI-2	My role model believes I use WhatsApp and Telegram to discuss lecture materials with lecturers and fellow students	3.00	0.65	Accepted
	Average	2.96	0.63	Accepted

TABLE 5 Institutional and political influence of using WhatsApp and Telegram for learning.

Code	Item	$\bar{X}$	SD	Remark
IP-1	My institution supports the use of WhatsApp and Telegram to discuss lecture materials and share ideas with fellow students and lecturers	3.10	0.67	Accepted
IP-2	I think the government would support the use of WhatsApp and Telegram by students to interact and discuss course materials with fellow students and lecturers	3.07	0.71	Accepted
IP-3	I think there is a policy/legislation supporting the use of WhatsApp and Telegram by students to interact and discuss course materials with fellow students and lecturers	2.89	0.72	Accepted
	Average	3.02	0.59	Accepted

TABLE 6 Guidance and counselling received through WhatsApp and Telegram for learning support.

Code	Item	$\bar{X}$	SD	Remark
GC1	I receive more guidance and counselling about life by interacting with other students and lecturers on WhatsApp and Telegram	2.98	0.68	Accepted
GC2	My lecturers and fellow students advise me more on my behavior via WhatsApp and Telegram	2.86	0.74	Accepted
GC3	I have become more confident in my studying and learning by interacting more with my lecturers and fellow students on Telegram and WhatsApp	2.99	0.68	Accepted
	Average	2.94	0.61	Accepted

perceived institutional and political influence on the use of WhatsApp and Telegram for academic purpose among the respondents. This perceived institutional and political influence is strong in students using the platforms to discuss lecture materials and share ideas with fellow students and lecturers. The respondents also believe government would support the use of these platforms to interact and discuss course materials with fellow students and lecturers. The standard deviations of all items under institutional and political influence showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under institutional and political influence were high, showing greater acceptance of the stated items by the students.

Guidance and counseling received

The guidance and counseling received was measured using three items and the result presented in Table 6. From Table 6, item GC3 had the highest mean score ($\bar{X}$ = 2.99, SD = 0.68), followed by GC1 and GC2 in that order. The overall mean score was accepted by the students ($\bar{X}$ = 2.94, SD = 0.61). The students became more confident in their studies and learning by interacting more with their lecturers and fellow students on WhatsApp and Telegram. The findings point to the varied use of WhatsApp and Telegram among the sampled respondents, for example, from item GC1 students indicate they received guidance and counseling about life on the two platforms with students and lecturers. These results show some level of perceived social capital generated from interactions gained from using WhatsApp and Telegram among students. The standard deviations of all items under guidance and counseling received showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under guidance and counseling received were high, showing greater acceptance of the stated items by the students.

Facilitating conditions

The result of the facilitating conditions construct is presented in Table 7. Four items constitute the scale of measurement. The average score of the four items, representing facilitating conditions, was accepted by the students ($\bar{X}$ = 3.17, SD = 0.50). Items FC1 and FC2 had scores close to the overall score. FC3—getting help from colleagues and other people in using WhatsApp and Telegram—was the item with the least average score ($\bar{X}$ = 2.90, SD = 0.82). From Table 7, the ability of the students' phone to receive and send

TABLE 7 Facilitating conditions for using WhatsApp and Telegram for learning support.

Code	Item	$\bar{X}$	SD	Remark
FC1	My phone can send and receive WhatsApp and Telegram messages	3.43	0.57	Accepted
FC2	I have WhatsApp and Telegram accounts	3.36	0.63	Accepted
FC3	I get help to use WhatsApp and Telegram from colleagues and other people	2.90	0.82	Accepted
FC4	I get help to use WhatsApp and Telegram from online	2.97	0.80	Accepted
	Average	**3.17**	**0.50**	**Accepted**

TABLE 8 Correlation coefficients of the relationships among the constructs of use of WhatsApp and Telegram for learning support.

Variables	Performance expectancy	Effort expectancy	Social influence	Institutional and political influence	Guidance and counselling achievements	Facilitating conditions
Performance expectancy	1.000					
Effort expectancy	0.147***	1.000				
Social influence	0.239***	0.472***	1.000			
Institutional and political influence	0.232***	0.476***	0.606***	1.000		
Guidance and counselling achievements	0.277***	0.419***	0.563***	0.598***	1.000	
Facilitating conditions	0.108	0.444***	0.334***	0.460***	0.398***	1.000

***$p < 0.10$.

WhatsApp and Telegram messages was accepted by the students ($\bar{X}$ = 3.43, SD = 0.57). Owning WhatsApp and Telegram accounts by the students was also accepted by the students ($\bar{X}$ = 3.36, SD = 0.63). Online support for the students on the use of WhatsApp and Telegram was accepted by the students too ($\bar{X}$ = 2.97, SD = 0.80). The standard deviations of all items under facilitating conditions showed lower variability, indicating that the data points are clustered around the mean. Overall, the results indicate that the mean scores of all the items under facilitating conditions were high, showing greater acceptance of the stated items by the students.

Relationship among the constructs of use of WhatsApp and Telegram for learning support

As part of the econometric approach, we present the correlation matrix for the selected variables in Table 8. The strength of the relationship among the variables was relatively strong and significant among most of the variables. Social influence and institutional and political influence had a correlation coefficient of 0.606 and significant at 1%. This shows a significant, positive, and strong relationship. The correlation coefficient of 0.598 existed between guidance and counseling and institutional and political influence. In addition, this shows a significant, positive, and strong relationship. From Table 8, we found that the students' effort expectancy was positively correlated with performance expectancy ($p < 0.10$). Social influence was also found to be positively correlated with performance expectancy and effort expectancy ($p < 0.10$). Performance expectancy had a correlation coefficient of 0.147 with effort expectancy, indicating a very weak positive relationship. The correlation coefficient between social influence and effort expectancy was 0.472, indicating a moderate positive relationship. For performance expectancy, the correlation coefficient with social influence was 0.239, indicating a weak positive relationship. Institutional and political influence was positively correlated with performance expectancy, effort expectancy, and social influence ($p < 0.10$). The correlation coefficient between institutional and political influence and effort expectancy was 0.476, indicating a moderate positive relationship. Performance expectancy had a correlation coefficient of 0.232 with institutional and political influence, indicating a weak positive relationship. Guidance and counseling was also found to be positively correlated with performance expectancy, effort expectancy, social influence, and institutional and political influence ($p < 0.10$). The correlation coefficient between guidance and counseling and social influence was 0.563, indicating a moderate positive relationship. The correlation coefficient between guidance and counseling and effort expectancy was 0.419, indicating a moderate positive relationship. Performance expectancy had a correlation coefficient of 0.277 with guidance and counseling, indicating a weak positive relationship. Meanwhile, facilitating conditions was correlated with effort expectancy, social influence, institutional and political influence, and guidance and counseling achievements ($p < 0.10$). The correlation coefficient between facilitating conditions and social influence was 0.334, indicating a weak positive relationship. The correlation coefficient between facilitating conditions and effort expectancy was 0.444, indicating a

10.3389/feduc.2025.1581514

TABLE 9 Multivariate regression estimates of the determinants of constructs of use/adoption of WhatsApp and Telegram for learning support.

Variables	Performance expectancy	Effort expectancy	Social influence	Institutional and political influence	Guidance and counselling achievements	Facilitating conditions
Gender (Male = 1, Female = 0)	−0.02 (−0.23)	−0.01 (−0.12)	0.19*** (1.89)	−0.02 (−0.22)	0.10*** (2.06)	0.05 (0.64)
Age (years)	−0.01 (−1.03)	0.01*** (1.67)	−0.0003 (−0.03)	0.001 (0.13)	0.004 (0.37)	0.02*** (1.79)
Socioeconomic Status of parents/ guardian (Low = 0, High = 1)	−0.09 (−0.86)	0.04*** (2.49)	−0.07 (−0.75)	0.001 (0.01)	−0.08 (−0.82)	0.07*** (1.86)
Faculty (Science-based = 0, Art-based = 1)	0.11 (0.88)	0.20*** (2.20)	0.18*** (1.71)	0.18*** (1.69)	−0.10*** (1.83)	0.18*** (1.83)
School ownership type (Federal = 1, State = 0)	0.09 (0.72)	0.07 (0.73)	0.11 (0.95)	−0.06 (−0.51)	−0.04 (−0.34)	0.007 (0.07)
Location of school (Rural = 0, Urban = 1)	−0.05 (−0.54)	0.09*** (2.26)	0.02 (0.19)	0.15*** (1.74)	−0.07 (−0.74)	0.01*** (2.11)
Year/Level in school	−0.02 (−0.48)	−0.03 (−1.03)	−0.07*** (−1.69)	−0.05 (−1.36)	−0.01*** (−2.35)	−0.02 (−0.50)
Constant	3.305*** (12.00)	2.80*** (13.73)	2.86*** (10.88)	3.14*** (12.71)	2.85*** (10.95)	2.67*** (12.62)
R^2	0.40	0.45	0.65	0.29	0.40	0.37

***$p < 0.10$.

moderate positive relationship. Performance expectancy had a correlation coefficient of 0.108 with facilitating conditions, indicating a very weak positive relationship. The correlation coefficient between facilitating conditions and institutional and political influence was 0.460, indicating a moderate positive relationship. Guidance and counseling had a correlation coefficient of 0.398 with facilitating conditions, indicating a weak positive relationship.

Determinants of the adoption of WhatsApp and Telegram for learning support

The multivariate regression estimates of the determinants of use of WhatsApp and Telegram for learning support are presented in Table 9. The table shows that the coefficient of multiple determination for the determinants of performance expectancy model was 0.40, indicating that the students' sociodemographic characteristics explained 40% of the variation in the model. The table further shows that the coefficient of multiple determination for the determinants of effort expectancy model was 0.45, indicating that the students' sociodemographic characteristics accounted for 45% of the variation in the model. Also, the table shows that the coefficient of multiple determination for the determinants of social influence model was 0.65, indicating that the students' sociodemographic characteristics caused 65% of the variation in the model. The table shows that the coefficient of multiple determination for the determinants of political and institutional influence model was 0.58, indicating that the students' sociodemographic characteristics explained 58% of the variation in the model. The table further shows that the coefficient of multiple determination for the determinants of guidance and counseling model was 0.40, indicating that the students' sociodemographic characteristics accounted for 40% of the variation in the model. The coefficient of multiple determination for the determinants of facilitating conditions model was 0.37, indicating that the students' sociodemographic characteristics caused 37% of the variation in the model.

The result in Table 9 shows that the gender of the students was negatively significant with their effort expectancy ($p < 0.10$). This implies that effort expectancy favored female students more than male students in learning and interacting with WhatsApp and Telegram. In addition, we found that the gender of the students was positively significant with the students' social influence ($p < 0.10$) and guidance and counseling achievements ($p < 0.10$). Male students had better social influence and benefited more from guidance and counseling by communicating and learning using WhatsApp and Telegram.

The socioeconomic status of the parents/guardian of the students had a positive correlation with students' effort expectancy ($p < 0.10$) and facilitating conditions ($p < 0.10$). Students from rich/wealthy homes had better facilitating conditions and effort expectancy in communicating and learning with WhatsApp and Telegram.

The faculty that the students belong was found to be positively correlated with their effort expectancy ($p < 0.10$), social influence ($p < 0.10$), institutional and political influence ($p < 0.10$), and facilitating conditions ($p < 0.10$). These imply that students in the Arts, Humanities, and Social Sciences had better social influence, institutional and political influence, facilitating conditions, and effort expectancy than their counterparts in the Sciences. Faculty, however, was negatively correlated with guidance and counseling achievement

TABLE 10 Challenges of using WhatsApp and Telegram for learning support.

Challenges	$\bar{X}$	SD	Remark
High cost of internet data	3.31	0.70	Accepted
Poor internet network	3.21	0.75	Accepted
Epileptic/poor power supply to charge my phone	3.00	0.84	Accepted
Lack of structure and coherence	2.85	0.78	Accepted
Irresponsible use of social media	2.76	0.79	Accepted
Mistrust	2.89	0.75	Accepted

($p < 0.10$). This implies that Science-based students benefited more from guidance and counseling than their counterparts in the arts and social sciences in learning and communicating using Telegram and WhatsApp.

From the table, location of the students' school had a positive correlation with their effort expectancy ($p < 0.10$), their institutional and political influence ($p < 0.10$), and their facilitating conditions ($p < 0.10$). These imply that students schooling in universities located in urban areas had better effort expectancy, institutional and political influence, and facilitating conditions than their counterparts schooling in rural areas.

Challenges of using WhatsApp and Telegram for learning support

From Table 10, all the identified challenges were accepted by the respondents. Furthermore, we found that high cost of Internet was the most common challenge of using WhatsApp and Telegram in Nigerian public universities ($\bar{X} = 3.31$, SD = 0.70), followed by poor Internet network ($\bar{X} = 3.21$, SD = 0.75), epileptic/poor power supply to charge phones ($\bar{X} = 3.00$, SD = 0.84), mistrust ($\bar{X} = 2.89$, SD = 0.75), and lack of structure and coherence ($\bar{X} = 2.85$, SD = 0.78). The least common challenge of using WhatsApp and Telegram in Nigerian public universities was irresponsible use of social media ($\bar{X} = 2.76$, SD = 0.79). The standard deviations of all the identified challenges showed lower variability, indicating that the data points are clustered around their means. Overall, the results indicate that the mean scores of all the identified challenges were high, showing greater acceptance of the stated challenges by the students.

Discussion

Adoption of WhatsApp and Telegram for learning support

All the variables that measured the performance expectancy of the students on the use of WhatsApp and Telegram were rated above the average score by the students, and this makes these variables accepted and established. What this implies is that the students discussed course content with their colleagues and their lecturers using WhatsApp and Telegram, and they believe this would help in learning. They also believe it would increase their chances of mastering the courses discussed and, as well, increase their chances of quickly learning the modules. In addition, they believe the use of WhatsApp and Telegram would increase their performance and help in doing their assignments. This means that the use of WhatsApp and Telegram has enhanced performance expectancy, and this will necessitate its continuous use, as confirmed by the students. This finding is synonymous with studies such as Kahiga (2019) and Oteyola et al. (2021).

Effort expectancy has to do with how easy it is to use a particular system or technology (Moya et al., 2017; Tannady et al., 2024). It is a key construct in the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The students, however, excelled in the effort expectancy as they affirmed the ease of use of WhatsApp and Telegram with clarity in learning and academic development. Improved experience, communication skills, messaging efficiency, and expertise in the use of WhatsApp and Telegram were also identified with the students. This is synonymous with studies such as Karimov and Kim (2017) and Kahiga (2019). Social influence is another construct in the UTAUT model developed by Venkatesh et al. (2003), and it implies a process through which the thoughts, feelings, or behaviors of individuals based on the presence, actions, or expectations of others are changed (San Martín and Herrero, 2012; Radovan and Kristl, 2017). For this study, social influence constructs were accepted as the feelings and thoughts of the parents, guardians, and role models of the students were that the use of WhatsApp and Telegram by their children enhance their learning and academic performance (Karimov and Kim, 2017; Oteyola et al., 2021).

Institutional and political influence has to do with the ways in which organizations, governments, and other institutions impact the behavior, attitudes, and decisions of individuals and groups. In the context of this study, it has to do with how government policies and programs, different schools, unions/associations within an institution impact the student. The students, however, enjoy the support of their institutions on the use of WhatsApp and Telegram as learning supports. They also expect more government support in the use of WhatsApp and Telegram for learning through policies/legislations and learning environment that would enhance better learning outcome through social media. Government and academic institutions are addressing social media use in schools and digital learning through policies. The policies are framed within an acceptable use framework, outlining the appropriate uses of the media with guidance about expected behaviors and consequences for misuse (Barton and Skiba, 2012; Van Den Beemt et al., 2020; Akanbiemu, 2021; Beckman et al., 2024; Robards et al., 2025). Our findings support an earlier work by Lee et al. (2013), which indicates that institutional dimensions have a strong influence on the adoption of technology, particularly in the context of mobile learning.

Guidance and counseling, in the context of this study, is aimed at helping the students achieve their personal, educational and career

goals. Based on the findings of this study, guidance and counseling constructs were all accepted. This implies that the students received more guidance and counseling about their life and education through their interaction with other students and lecturers through WhatsApp and Telegram. Particularly, they receive advice on their behavioral patterns, and this has enhanced their confidence in learning especially, through their interaction with other students and lecturers via WhatsApp and Telegram. Facilitating conditions are factors or circumstances that make it easier for individuals or organizations to accept and use a new technology, product, or service. Marikyan and Papagiannidis (2023) have observed that facilitating conditions enhances the intention to use new technology. In this study, the students' phones can send and receive WhatsApp and Telegram messages, and the students really have WhatsApp and Telegram accounts. Having useable phones, and WhatsApp and Telegram accounts are preconditions to the use of WhatsApp and Telegram as learning supports. The students also got help with using WhatsApp and Telegram from their colleagues and other people, and they also got help from online sources. When there are facilitating conditions for a particular technology, its usage will not be uneasy. Camilleri and Camilleri (2023) found that facilitating conditions affected students' involvement in mobile learning. However, the acceptability of all these constructs makes the use of WhatsApp and Telegram to be of better impact to the learning outcomes of the students.

Relationship among the constructs of use of WhatsApp and Telegram for learning support

The finding shows that the correlation coefficient between social influence and institutional and political influence is 0.606. This is a strong and positive correlation indicating a strong relationship between institutional and political influence and social influence. This implies that students who are influenced by family and friends to use WhatsApp and Telegram are associated with strong institutional and political factors supporting the use of these technologies. This finding aligns with the social cognitive theory, which posits that social influence is a significant factor in shaping behavior (Bandura, 1986).

Guidance and counseling achievements had a coefficient of correlation of 0.563 with social influence. This is a moderate positive correlation indicating a moderate relationship between guidance and counseling achievements and social influence. By implication, the results provide insight that students who perceive and receive guidance and counseling tend to achieve better learning outcomes when using WhatsApp and Telegram for learning support. This finding can be explained within the context of self-determination theory, which posits that guidance and counseling can enhance intrinsic motivation and promote learning (Zhang et al., 2022).

The coefficient of correlation (0.598) between guidance and counseling achievements and institutional and political influence was moderate, positive, and significant. The strength of the relationship is strong. Guidance and counseling achievements and institutional and political influence are related because lecturers' involvement in guidance and counseling of students is usually supported by institutions' regulations and government policies. Lecturers provide guidance and counseling services to students to support their academic, personal, and career development. David et al. (2021) observed the role of guidance and counseling in the academic and personal growth of the students.

The coefficient of correlation (0.460) between facilitating conditions and institutional and political influence was moderate, positive, and significant. Facilitating conditions and institutional and political influence are positively and moderately related. Facilitating conditions and institutional and political influence are related because individuals' use of a system or technology is influenced by the perceived roles of institutions, rules, and regulations governing the use of the technology, which in turn affects their intention to use it. When individuals meet the necessary conditions to use technology, they tend to seek knowledge of rules, policies, and regulations governing the effective use of such technology. Alshaer and Almarri (2024) found similar result in Dubai when he studied the nexus between facilitating conditions and innovation readiness in the public sector. Peñarroja et al. (2019) observed similar result when he studied the effectiveness of virtual communities.

The coefficient of correlation (0.472) between social influence and effort expectancy was moderate, positive, and significant. Social influence and effort expectancy are positively and moderately related. Social influence (the perception of others' opinions) can positively impact effort expectancy (perceived ease of use), which increases intention to WhatsApp and Telegram for teaching and learning. Fedorko et al. (2021) noted the positive role of social influence on effort expectancy.

The coefficient of correlation (0.444) between facilitating conditions and effort expectancy was moderate, positive, and significant. Facilitating conditions and effort expectancy are positively and moderately related. The presence of facilitating conditions of Telegram and WhatsApp adoption can enhance the ease of use (effort expectancy), which in turn leads to higher intention to use the technologies for teaching and learning. This finding is similar to that of Ghalandari (2012) facilitating conditions, effort expectancy, and moderating roles of age and gender in Iran.

The coefficient of correlation (0.417) between guidance and counseling and effort expectancy was moderate, positive, and significant. Guidance and counseling helps students to develop skills, set goals, and make informed decisions about their academic and career development, which in turn leads to improved academic outcomes and development. Najjuuko and Ngumenawe (2024) reported the important role of guidance and counseling on students' academic development.

Determinants of use of WhatsApp and Telegram for learning support

From Table 9, the determinants of constructs of use/adoption of WhatsApp and Telegram for learning support are presented. The effect of the determinants on each of the constructs, i.e., performance expectancy, effort expectancy, social influence, institutional and political influence, guidance and counseling, and achievements is discussed subsequently. Using these WhatsApp and Telegram can enhance the different approach to learning and improve the learning experience engaging and student-centered (Mohammed et al., 2023). We support this result with the study by Olatokun and Ilevbare (2014) that university students' adoption and utilization of social media in Nigeria had a positive relationship with socio-demographic variables such as age, gender, level of study, and religion. Furthermore, this finding aligns with earlier studies that opine that social media provides a potent platform for teaching and learning and hence its wide

acceptability among the youth (Domahidi, 2018; VanMeter et al., 2015; Zarina, 2009).

Specifically, in terms of performance expectancy, female students have a higher performance expectancy than male students. Older students have a higher performance expectancy than younger students. On the other hand, students from wealthy families have a higher performance expectancy than those from poor families. Art-based students have a higher performance expectancy than science-based students. Location-wise, urban students have a higher performance expectancy than rural students. The positive relationship between performance expectancy and age suggests that older students are more likely to expect improved performance from using WhatsApp and Telegram for learning support. This finding implies that educational institutions should tailor their mobile learning strategies to cater to the needs of older students. According to the study by Yeboah et al. (2025), the relationship between performance expectancy was stronger for males than females, and this was not significant in the current study. They explained that male students were more concerned about seeking assistance to increase their academic performance. Hence, once they anticipate that interactions via WhatsApp would result in improvement in their academic performance, they were more likely than females to accept such usage of WhatsApp. From Table 9, there is a significant positive relationship between performance expectancy and wealth status of parents/guardian. The results thus imply that students from wealthy families are more likely to expect improved performance from using WhatsApp and Telegram for learning support. This finding highlights the need for educational institutions to address the digital divide and ensure that students from low-income backgrounds have equal access to mobile learning technologies. This is critical given that studies have shown that access to WhatsApp increased students achievement compared to other methods or platforms (Almogheerah, 2020; Gurluyer, 2019; Arash et al., 2018; Cetinkaya and Sutco, 2018; Liya and Dede, 2017).

In the second model, we see that older students have a higher effort expectancy than younger students while students from wealthy families have a higher effort expectancy than those from poor families. Art-based students also exhibit higher effort expectancy than science-based students. This is similar to urban students, who have a higher effort expectancy than rural students. From the above, we establish a positive relationship between effort expectancy and age. This implies that all things being equal older students are more likely to expect that using WhatsApp and Telegram for learning support will require less effort. Age can moderate the relationship between effort expectancy and behavioral intention. To bridge the potential gap, educational institutions may develop policies and provide training and support to help younger students effectively use mobile learning technologies. According to studies by Al-Emran et al. (2023), Al-Emran et al. (2020), and Al-Emran et al. (2016), effort expectancy is a significant predictor of behavioral intention to use mobile learning technologies. Therefore, educational institutions should provide training and support to help students, especially younger ones and those from low-income backgrounds, to effectively use mobile learning technologies. From the second model, we see a significant positive relationship between effort expectancy and wealth status of parents/guardian, which indicates that students from wealthy families are more likely to expect that using WhatsApp and Telegram for learning support will require less effort. This finding highlights the need for educational institutions to provide equal access to training and support for students from low-income backgrounds. In the context of technology adoption and user behavior, effort expectancy (ease of use) significantly influenced behavioral intention and actual usage. Higher income may amplify these effects as individuals with more resources can afford and are more likely to adopt technologies that offer perceived benefits (Utomo et al., 2021). Program of study proxied by students' faculty significantly influenced effort expectancy and behavioral intentions, with students in arts/humanities and social sciences potentially perceiving less effort required and therefore having higher intentions to use WhatsApp and Telegram in learning. Nwajiuba and Onyeneke (2023) also observed similar results when they studied the different learning styles preferred by students in Nigerian universities. Similarly, students schooling in universities located in urban areas perceived that less effort is required in using WhatsApp and Telegram for teaching and learning and therefore had higher intentions to use the technologies than their counterparts in rural areas. This is expected because of the Internet facilities, which are more readily available in urban locations than rural locations in Nigeria.

In the social influence model, the gender variable shows that female students are more socially influenced than male students. In addition, Art-based students are more socially influenced than science-based students. The positive relationship between social influence and gender suggests that female students are more likely to be influenced by others to use WhatsApp and Telegram for learning support. In other words, female students and those in art-based faculties are more likely to be influenced by others to use WhatsApp and Telegram for learning support. The findings support the study by Kotamena et al. (2024), which indicate that social influence is a significant factor in shaping behavior, particularly in the context of mobile learning. Therefore, educational institutions should encourage female students and those in art-based faculties to share their experiences and benefits of using mobile learning technologies with their peers. The findings also point to the general assertion that the use of social media among students increases their relationship, network, and potentially the social capital formation (Brown and Michinov, 2019; Kahai and Lei, 2019; Pang, 2018a).

In the institutional and political influence model, faculty is positively related to institutional and political influences. The study thus deduces that students in art-based faculties are more likely to be influenced by the institutional and political factors to use WhatsApp and Telegram for learning support. Students in the arts and social sciences are more inclined to be more aware about policies and regulations guiding the use of social media and other e-learning technologies than those in the sciences and engineering. Nwajiuba and Onyeneke (2023) found that program of study influences the teaching and learning styles used by universities in Nigeria.

In terms of the guidance and counseling model, variables such as gender, faculty, and year of study are key determinants. We found a strong positive effect between gender and the guidance and counseling construct. We found a significant negative relationship between faculty and guidance and counseling construct. In this model, male students and those in science-based faculties are more likely to receive guidance and counseling to use WhatsApp and Telegram for learning support than their respective counterparts. Zhang et al. (2022) and Ma

et al. (2024) observed that guidance and counseling can enhance intrinsic motivation and promote learning, particularly in the context of mobile learning. Therefore, educational institutions should provide guidance and counseling services to support students in using mobile learning technologies. Students in their lower years in school received more guidance and counseling in using Telegram and WhatsApp for learning. Students in their lower years are likely to be younger students who require more guidance and counseling in using social media. They are usually prioritized in guidance and counseling to guide them properly early and help them avoid distraction.

The results show that the in the facilitation model, gender, wealth status of parents/guardian, and faculty and location are critical determinants. In other words, male students, students from wealthy families, and those in art-based faculties schooling in universities located in urban areas are more likely to achieve better learning outcomes when using WhatsApp and Telegram for learning support. These achievements are therefore influenced by expectations and values, particularly in the context of mobile learning. Program of study proxied by students' faculty significantly influenced facilitating conditions and behavioral intentions, with students in arts/humanities and social sciences potentially having enabling conditions required to use the technologies and therefore having higher intentions to use WhatsApp and Telegram in learning. Nwajiuba and Onyeneke (2023) also observed similar results when they studied the different learning styles preferred by students in Nigerian universities. Similarly, students schooling in universities located in urban areas have better conditions required to use WhatsApp and Telegram for learning and therefore had higher intentions to use the technologies than their counterparts in rural areas. This is expected because of the Internet facilities, which are more readily available in urban locations than rural locations in Nigeria.

Challenges associated with WhatsApp and Telegram use for learning support

The challenges associated with student's usage of WhatsApp and Telegram for learning support include high cost of internet, poor connectivity, and epileptic/poor power supply to charge phones were the most common challenges. Others include mistrust, lack of structure and coherence, and irresponsible use of social media.

Using WhatsApp and Telegram for learning comes with challenges. Economic and financial limitations such as high cost of data subscription and the financial burden to buy Internet data affect students' use of WhatsApp and Telegram for effective learning. This has been reported by previous researchers as limitations for effective teaching and learning using the platforms (Ubaedillah and Pratiwi, 2021; Egielewa et al., 2022; Ajani and Khoalenyane, 2023). Students from low-income families may find it difficult to purchase Internet data for online learning.

In addition, the challenge of poor Internet network impedes the functionality of the platforms. Previous researchers (Fujiono et al., 2021; Yulianawati et al., 2021; Egielewa et al., 2022; Ajani and Khoalenyane, 2023) have reported the challenge of poor Internet connectivity as a serious obstacle affecting the use of WhatsApp for effective learning.

Irresponsible use of social media, mistrust, and lack of structure and coherence are also reported as challenges associated with using WhatsApp and Telegram for learning support. These platforms may be distractions to students because students often use the platforms for non-educational purposes during class time or use them as procrastination tool instead of focusing on their studies (Egielewa et al., 2022; Azizur Rahman et al., 2020). The risk of cyberbullying and the sharing of inappropriate content among students via WhatsApp and Telegram is possible (Aizenkot and Kashy-Rosenbaum, 2021). University managers and teachers should monitor students' use of WhatsApp and Telegram and ensure that they are using the platforms appropriately and safely (Ajani and Khoalenyane, 2023).

Epileptic power supply impedes usage of WhatsApp and Telegram by students and teachers. Teachers and students need electricity to charge their phones. There is poor electric power supply in Nigeria, which hinders effective teaching and learning, and limits access to technology and resources (Gwaivangmin, 2021; Egielewa et al., 2022; Musa and Adamu, 2025).

Conclusion, recommendations, and limitations

Technological advancement has revolutionized strategic approaches to business delivery in many sectors and industries including education. The use of technology is critical to the promotion of efficiency in the delivery and learning experience of both teachers and students in developing and developed economies. Interest in and usage of smart phones and growth in social media platforms for the delivery of academic programs was heightened by the COVID-19 pandemic. This necessitated a significant shift from traditional approaches used within the educational system. The introduction of smartphones creates different opportunities for users to communicate easily and faster, and platforms such as Telegram and WhatsApp are becoming popular options for educational purposes among university students. However, there is limited evidence documenting the use of social media platforms such as WhatsApp and Telegram as learning support to enhance students' performance. Much rarer are studies analyzing the determinants of using WhatsApp and Telegram as learning support to enhance students' performance in Nigeria, Africa's most populous country. Interest in this issue motivated the need for this study in a country with a large student population.

The current study attempts to capture the determinants of social media platforms such as WhatsApp and Telegram as learning support among university students in Nigeria. Using cross-sectional data from 206 students from public universities in Nigeria, we identified six constructs of using WhatsApp and Telegram as learning support in Nigerian public universities. These include performance expectancy, effort expectancy, social influence, institutional and political influence, guidance and counseling achievements, and facilitating conditions. The study also established that these constructs were all acceptable/accepted by the students, which further strengthens the argument that students use social media platforms for learning. The study also provided the relationships between each pair of constructs. The findings indicate only one strong association and seven moderate relationships. Only social influence and political and institutional

influence exhibited strong positive association. Guidance and counseling and institutional and political influence constructs, guidance and counseling and social influence constructs, social influence and effort expectancy constructs, institutional and political influence and effort expectancy constructs, guidance and counseling and effort expectancy constructs, and facilitating conditions and effort expectancy constructs exhibited moderated positive relationships. The study's findings provide valuable insights into the determinants of constructs of use/adoption of WhatsApp and Telegram for learning support among students. The significant predictors of effort expectancy include age, socioeconomic status of parents, student's faculty, and location of the university, while the significant predictors of social influence include gender, student's faculty, and level in school. The significant determinants of institutional and political influence construct include student's faculty and location of the university, while the significant predictors of guidance and counseling construct are gender, student's faculty, and level. The constraints to students' usage of WhatsApp and Telegram for learning support include high cost of Internet, poor connectivity and epileptic/poor power supply to charge phones, mistrust, lack of structure and coherence, and irresponsible use of social media.

The results have significant implications for educational institutions, policymakers, and stakeholders seeking to promote the effective use of mobile learning technologies. Adoption of these technologies can assist both students and educators to gain knowledge, skills, and improve interaction. Academic instructors can level on these two platforms to communicate lecture notes and materials easily and more flexibly. By adopting these technologies, tertiary institutions can improve the learning experience that is interesting and engaging for students. Furthermore, the empirical findings of this study provide strong evidence to support the promotion and adoption and use of WhatsApp and Telegram for learning support among university students in Nigeria. Nonetheless, this should be done since adoption is likely to be affected by a complex interplay of factors. For example, the role of effort expectancy, social influence, and institutional and political influence has a strong influence on shaping students' behavioral intentions to use mobile learning technologies such as WhatsApp and Telegram.

The study finding also highlights the importance of guidance and counseling in enhancing students' intrinsic motivation and promoting learning outcomes. From the results, the study also concludes that the theoretical and practical implications cannot be overlooked. The findings therefore have strong implications for educational institutions, policymakers in higher education institutions, and practitioners about the critical determinant to consider promoting the effective use of mobile learning technologies in higher education institutions. The study thus recommends that for successful integration of WhatsApp and Telegram into higher education, institutions should have a multifaceted approach that addresses the identified factors, for example, the cognitive, social, and institutional factors that influence students' learning behaviors. By providing a nuanced understanding of these factors, this study informs the development of evidence-based strategies for promoting the effective use of mobile learning technologies in higher education institutions.

Data availability statement

The data supporting the conclusions of this article will be made available on reasonable request to the authors.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study.

Author contributions

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Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

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