



Evidence-based strategies for effective deployment, and utilisation of new media for educational purposes by Nigerian university students

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Abstract

The study investigated the influence of demographics, a wide range of motivations of new media use and constraints of its use, on the pattern of new media use for educational purposes by Nigerian university students. The rationale was to proffer appropriate strategies towards sustainable and effective deployment, integration, and utilisation of new media for a better educational experience of students in Nigerian universities. The philosophical perspective was based on positivism. The quantitative approach with survey research design was adopted, covering a cross-section of Nigerian university students using questionnaires as the data collection instrument, complemented with structured interviews. Three large and geographically central universities were purposively selected for the study: University of Ibadan, University of Nigeria, and University of Ilorin. Stratified random sampling was used to select students from the selected faculties in the surveyed universities as respondents. A sample size of 647 students was used for the study. The findings of the study reveal that information seeking and surveillance, convenience and low cost, social interaction, broadcast media involvement, personal utility and self-promotion, affection, maintaining connections, and escape and new trends were significant motivations for using new media for educational reasons. Nevertheless, infrastructure required to use these technologies, privacy and security concerns, confusing acronyms, economic issues, inadequate knowledge and skills, and timing-related issues constitute obstacles to the use of new media for educational reasons. The paper recommends appropriate strategies towards effective and sustainable deployment, integration, ease of access, and utilisation of new media technologies by Nigerian university students.

Keywords Educational media · New media technologies · Social media · Smart mobile devices · Teaching/learning strategies · Nigerian university students · Educational information exchange

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1 Introduction

The advent of digital media has revolutionised the media environment. It has propelled ease of access, retrieval, use, dissemination, storage, and preservation of information in various formats, quantity, and quality in several locations at preferred periods by users (Lacka et al., 2021; Nduka & McGuire, 2017; Shafiq & Parveen, 2023; Woo et al., 2014). Past studies (Almansour, 2019; Jenkins, 2006) refer to digital media as “new media”. Currently, there is no universally acceptable consensus on how to conceptualise new media. New media was distinguished from old media by McQuail (2010, p. 39), who opines that “traditional mass communication was essentially one-directional, while the new forms of communication are essentially interactive.” This interactive component classifies social media platforms as a form of new media and confers unprecedented popularity on them. New media consists of modern interactive communication channels that facilitate connection among people as well as sharing of thoughts, experiences, pictures, messages, and information of common interest digitally. This is also a distinguishing factor that gives it an edge over the conventional means of communication. New media is considered in the study as digital media capable of storing, managing, sharing, and exchanging information digitally. It is on this premise, that smart mobile devices, the Internet, and social media can be categorised as new media.

Mobile communication technology has enjoyed unprecedented acceptance globally and the trend has been on an exponential increase (García-Martín & Cantón-Mayo, 2019; García-Martín et al., 2023; Gunter, 2019; Lee, 2017). Several reasons have been cited for the use of mobile communication devices. People want to use communication devices to make phone calls, exchange messages with family, friends, or colleagues; read and send e-mails; take pictures; listen to music; or have access to information. As Gunter (2019) rightly note, the mobile phone as one of the prominent examples of new media has become “a control hub that many uses to organise their lives.” It represents a converged new communication and information technology with a wide range of comprehensive interpersonal and mass communication services.

Although it is undeniable that the Internet remains the pivot for the digital age, cell phones and myriads of smart mobile media, such as tablets and smartphones (forms of new media) have been regarded as the tools that guarantee digital media prevalence and have permeated the twenty-first century with a new approach to information products and services. Smart mobile media and its numerous applications offer quick access to the Internet and social media through various applications, like Whatsapp, Facebook, Twitter, and Instagram. The smartphone has also facilitated the transmission of short messaging service and other instant messaging platforms. This phenomenon fostered the development of many mobile applications that enhance the everyday lives of several individuals. Mobile social networking sites (MSNSs) represent one of the most common applications (García-Martín & García-Sánchez, 2015; Nikou & Bouwman, 2014; Shafiq & Parveen, 2023). The unique characteristics of digitalisation, convergence, and interactivity make new media technologies to be unique platforms that offer users

wide alternatives, diversification of media content for consumption, and creation of a network society.

The growth of the network society has transformed almost every aspect of the world and enabled an instant, more direct, and interactive form of communication on the Internet (Akrimi & Khemakhem, 2012; Almansour, 2019; Camilleri & Kozak, 2022; Castells, 1996). Some of the most popular social media platforms are Facebook, WhatsApp, LinkedIn, Twitter, Instagram, and YouTube (Busari, 2016; Okereke & Oghenetega, 2018; Upadhyay & Sedain, 2019). Facebook, a social networking site (SNS) in which members share huge amounts of personal information and pictures, is currently the most utilised SNS (Gwena et al., 2018; Silver et al., 2019; Su & Chan, 2017). With about 3 billion people using social media worldwide, the use of SNSs is now the most popular online activity in the world (Statista, 2023a). In 2015, about two-thirds of American adults used SNSs, such as Facebook and Twitter, up from 7% in 2005 (Pew Research Center, 2015). These findings raise the question on what may be responsible for this trend. Despite the complexity that several sources may add to the information-seeking process and information literacy training, it has been affirmed that users still show preference for them due to several purposes they serve, and comparative advantages users enjoy (Kim et al., 2014; Upadhyay & Sedain, 2019). It appears that ease of access to the new media platform serves as a major reason for the preference users have for them.

Studies on information-seeking behaviour among teenagers and university students have noted that most of them predominantly engage new media for educational reasons and everyday life information seeking (Bharucha, 2018; Dumford et al., 2023; Head & Eisenberg, 2010; Kim et al., 2014; Lacka et al., 2021; Zickuhr, 2012) and comparatively have higher skills and dexterity with using technology than the older generation (Gros et al., 2012; Jones et al., 2010). It has become increasingly popular, particularly in higher degree education (Avci & Askar, 2012; Bharucha, 2018; Dumford et al., 2023; Gao et al., 2012; Kim et al., 2014; Manca & Ranieri, 2013; Ng'ambi & Lombe 2012). Most of college students affirmed that they use such platforms to seek information (Hosen et al., 2021; Kim et al., 2014) and for academic-related activities (Khan et al., 2016; Shafiq & Parveen, 2023).

Currently, universities are not taking full advantage of the informational access and communicative strengths of new media (Almansour, 2019). Management of educational institutions can also employ social media to update students on academic activities, workshops, and conferences. Students could equally avail themselves of the opportunity offered by the Internet to source relevant information on their subjects of interest, obtain information to complete assignments and conduct research, and exchange information through email, chats, blogs, and social networking sites (Everson et al., 2013; García-Martín & Cantón-Mayo, 2019; Papacharissi & Rubin, 2000). It has been revealed that the traditional information-seeking behaviour of university students, which was mainly reliant on human sources, has been diminishing, as students more and more rely on online sources (Almansour, 2019). An increased use of social media in higher education would better connect educational institutions with the new generations of students (Ali et al., 2017).

Although evidence about increasing use of some core digital communication technologies, platforms, or activities, only about one quarter of Nigeria's mobile telephone subscribers use smartphones (Statista, 2023b), leaving much room for its growth. Users may be limited because of circumstances related to the use of various new information communication technologies by the lack of relevant infrastructure to facilitate its use, such as low Internet bandwidth and limited Internet service; as well as lack of appropriate strategies or policies towards effective and sustainable technology deployment, integration and utilisation. Other inhibiting factors may include the memory size of the device, the life span of the battery, the smallness of keypads and screen, and other ergonomic issues. Wyche and Baumer (2017) view economic, infrastructural, and linguistic factors as major barriers among Zambians who were identified as non-users of social media and other information and communication technologies (ICTs). In particular, little was known about Nigerian university students' use of new media technologies especially for educational purposes and how these limiting factors predict their use.

Past studies made claims about the distinctive technology-related abilities of some individuals, most of whom fall within the traditional age of university students. These individuals which include university students are commonly referred to as the "digital natives" or the "net generation" (Prensky (2001), cited in (Corrin, 2014; Kennedy et al., 2008). Most of these students have a common interest, flair, and technology-associated attributes. These comprise the need to be perpetually connected, interact, collaborate, and exchange information, with their peers, parents, lecturers, and others (Almansour, 2019; Leung, 2007; Nwagwu, 2012a). Much of what we know has been based on the impression that this generation of young people is homogeneous, and uses technology in ways that are remarkably different from the older generation. It is assumed that this group of young people have the inherent capacity and motivation to understand, embrace, and use these emerging technologies in all aspects of their lives, particularly for educational purposes.

However, significant diversity in the adoption and use of new media technologies among students has been observed. The frequency and level of technology-based activities that students undertook for educational and other reasons were found to be diverse. In exploring the technologies used by students in the educational environment, there has been some evidence of students applying these technologies to enhance their academics (Corrin, 2014; Lacka et al., 2021; Margaryan et al., 2011; Shafiq & Parveen, 2023). Such evidence contradicts the notion that technical competencies, technology adoption, and usage are similar by this group of individuals labelled "digital natives". This implies that the deployment of new media may not be embraced by all students. Therefore, there is need to be cautious in relying on generalisations as a basis for the adoption, deployment, and integration of new communication technologies in Nigerian universities. The diversity observed in the use of technology in previous studies has prompted further study into the patterns of new media use by Nigerian university students by exploring motivations, demographics, and constraint factors that could influence new media use.

Despite the growing interest by educators and regulatory bodies of higher educational institutions in integrating new media technologies into many areas of higher education (Hamid et al., 2015), there are still problems with the effective and sustainable deployment, integration and utilisation of these technologies, especially in educational contexts. Greenhow and Lewin (2016) underscored the need for further research, on effective strategies to integrate these technologies for educational purposes. Given an enabling strategy that guarantees access and use, new media will enhance the educational experiences of students. An evidence-based understanding of the needs, behaviour, perspectives of students, and their diversities with respect to the use of new media technologies are vital in proffering strategies that will assist university authorities in the effective deployment, integration and utilisation of these technologies to enhance students' educational experience in Nigerian universities. This will help to constructively develop interventions directed at individuals that may be less likely to adopt and use the new systems. Research-informed strategies will most possibly enable university administrators in Nigeria to effectively deploy, integrate, and sustain utilisation of various forms of new media for an improved educational experience.

There is limited evidence about the motives, motivations, patterns, constraints, and other factors influencing the use of various forms of new media use by Nigerian university students. Much of what we know about the use of these media, deals with the use of a medium, and only considers the likelihood of integrating such technologies in education (Elitaş, 2015; Greenhow & Lewin, 2016; Shafiq & Parveen, 2023; Tess, 2013). The majority of these studies were carried out on other continents, such as Australia, Asia, Europe, and the Americas (Cheng et al., 2015; Elitaş, 2015; Greenhow & Lewin, 2016; Manca & Ranieri, 2016a, b; Tess, 2013). Most of these studies focused exclusively on faculty members while examining educational uses of new media (Carpenter et al., 2023; Manca & Ranieri, 2016a, b; Sobaih et al., 2016). Yet, the characteristics, perspectives, constraints, and experiences of students with regards to the use of these technologies have not been examined in any depth. There is no study that focused on Nigerian university students' use of various forms of new media for educational purposes as well as the strategies that could be adopted to ensure effective and sustainable deployment, integration, and utilisation of new media as communication tools for an improved educational experience.

The purpose of this study is to investigate the influence of demographics, a wide range of the motivations towards the increasing use of new media technologies for educational and other purposes, and the associated constraints, on the pattern of new media use among Nigerian university students. All this is targeted at recommending appropriate strategies that could be adopted to ensure sustainable and effective deployment, integration, and utilisation of these technologies for a better educational experience of students in Nigerian universities. Given an enabling strategy which guarantees access and use, various forms of new media will provide a platform for educational collaboration and exchange of educational related information in Nigerian universities.

2 Research questions of the study

The following research questions guided the conduct of the research:

1. What are the educational purposes for which Nigerian university students use new media?
2. What are the major gratifications that motivate university students in Nigeria to use new media?
3. What are the commonly perceived constraints of new media use?
4. How do demographics predict patterns of new media use among Nigerian university students?
5. To what extent do gratifications of new media use predict patterns of use among Nigerian university students?
6. To what extent do constraints of new media use predict patterns of use among Nigerian university students?
7. What are the appropriate recommendations/strategies towards sustainable and effective deployment, integration, ease of access, and utilisation of various forms of new media for the exchange of education-related information in Nigerian universities?

3 Literature review

3.1 Theoretical frameworks

Theories and theoretical models that explain people's behaviour for using communication media technology were employed to guide the study. These social and psychological media use theories/models are uses and gratifications theory, and the unified theory of acceptance and use of technology.

3.1.1 Uses and gratifications theory

The uses and gratifications approach is one of the first research approaches in communication research that focus on media behaviour from a user's perspective, with Lazarsfeld and Stanton's first study on radio research published in 1944 (Herzog, 1944). The term "uses and gratification" was coined to qualify motivation, usage, and experiences of audiences that listened to the radio. This theory guides the investigation of people's motivations for using and accessing media technology. According to Blumler and Katz (1974), the theory emphasises the superiority of the user's reason for the media over the content. Hence, the uses and gratifications theory research instrument will rather ask how a user's basic needs influence the choice of media instead of how the use of media influences a user's needs. Personal characteristics of the audience and motivations are the major predictors of choice of media and its uses. The media choices individuals make are driven by the need to fulfil a wide variety of needs. The theory focuses on the assumption that the audience actively uses various media and that there are specific motivations behind users'

preferences for a medium to satisfy their needs (Wu et al., 2010). For instance, some individuals may use particular media for educational reasons, while others may use it for social reasons. The main focus of the theory is to explain why and how people use the media as well as the purpose of its use.

The uses and gratifications theory has been long applied to various new communication technologies. Several studies have examined the motives people have for using communication media to determine their motivation for communication in several contexts. For example, Papacharissi and Rubin (2000) investigated the Internet usage of the audience and revealed five gratifications: information seeking, interpersonal utility, convenience, pastime, and entertainment. Lu and Lin (2022) investigated the motivations and behaviours of Generation Z and Millennials in engaging with Instagram Stories, as well as the emotional and psychological dependencies associated with such engagement. The findings suggest that users tend to consume content on Instagram Stories for entertainment, exploration, and perceived functionality, engage in contribution activities for relationship building and social sharing, and create content to fulfil needs related to relationship building, self-enhancement, social sharing, and novelty. Several uses and gratifications of social media, such as expression of opinion, knowledge about others, and convenience of use are highlighted by Whiting and Williams (2013).

A comprehensive study on motivation for iPad (smart mobile device) usage for academic purposes by Warschauer (2011) concludes that ease of mobility, its long battery life, the lighter weight, its immediacy, and user interactivity are major motivations for its use. The compact nature of the iPad and its sensitivity to touch, which has eliminated dependence on a mouse and keyboard, have been recorded as other key motivations. Bolt et al. (2010) study (cited in Leung & Zhang, 2016) observes that its high definition touch-screen has been credited for enhanced Web browsing experience by users. Leung and Zhang (2016) found information seeking, relaxation, fashion/status, and work management as propelling factors for the use of tablets. Ease of use and unhindered social connection are also cited as intrinsic motivations for its use. Using qualitative analysis grounded in the Uses and Gratifications Theory to understand the motivations behind college students' participation in viral social media challenges on TikTok, Falgout et al. (2022) identified six categories of motivations. They are entertainment, convenience and utility for communication, increasing social interaction, finding social support, seeking and sharing information, and escaping from everyday life.

Findings among South Korean smartphone users, according to Joo and Sang (2013), revealed that motivations for use of new media technologies were not based on trivial reasons, such as relaxation and entertainment, but goal-oriented information, which includes strategic information-seeking and learning. Kim and Sin (2015) investigated the major motivations behind American undergraduate students' preference for social media in the process of seeking information, and their method of evaluating information retrieved from social media for academic activities. Their findings showed that students primarily engaged social media for three major reasons when seeking information relating to their studies: finding solutions, obtaining others' opinions, and following popular trends. Moon et al. (2022) conducted a study that applied the theoretical lens of uses and gratifications theory to investigate

the motivations driving smartphone usage among tourists and its impact on the field of travel and tourism. The findings of the study revealed four distinct motivations for smartphone usage among tourists, which include social interaction, information-seeking, entertainment, and convenience. It is concluded that the findings of the study could help to better understand how user and contextual factors predict social media use as information sources.

Information seeking forms the fulcrum for various forms of new communication media among academics, students, women, and all other users who engage these technologies and/or platforms. This has been corroborated by Ku et al. (2013), who argue that information seeking cannot be exempted from the first four major gratifications that propel users to social media – a form of new media. New media platforms have been reported to be used for seeking information as well as being user-friendly and convenient to use.

Other studies on new media technologies (Adjin-Tettey, 2022), TikTok (Dias & Duarte, 2022), Facebook use (Alhabash & Ma, 2017), Twitter (Li & Greenhow, 2015), YouTube (Kaye & Johnson, 2015), blogs (Kaye, 2010), Instagram (Parmelee & Roman, 2019; Sheldon & Bryant, 2016), Mendeley (Jeng et al., 2015), mobile technology (Florenthal, 2019) found several motivations. These motivations include conversation and socialising, information seeking and exchange, information viewing, guidance, entertainment, convenience, education, escape and diversion, fashion and status, reassurance, documentation and creativity.

3.1.2 Unified theory of acceptance and use of technology

The unified theory of acceptance and use of technology is another research perspective on the understanding of people's behaviour for adopting and using media communication technology. User acceptance of technology has been defined as the willingness of a person or a group in an organisation to use technology to support the task it is designed for. In an educational setting, this means that communication media technologies are accepted as tools to support teaching, learning, and research. Researchers have found information and communication technologies to be capable of supporting academic activities within educational institutions, particularly university systems (Davis, 1989; Davis et al., 1992; DeGroot et al., 2015; Florenthal, 2019; Hosen et al., 2021; Lacka et al., 2021; Venkatesh et al., 2000). The theories/models of technology adoption are used in describing and predicting the use and non-use of ICTs and platforms. It also helps to describe and predict the motivating factors to adopt and use new communication technologies in order to proactively develop strategies directed at groups of users that may be less likely to accept and use the new technologies.

Scholars recognise the need to address the observed limitations associated with individual theories or models in the context of technology acceptance research with a view to integrate the main competing user acceptance models. Venkatesh et al. (2003) reviewed eight prominent and competing user acceptance models, integrated their salient elements, and, consequently, formulated a new model referred to as the unified theory of acceptance and use of technology. The reviewed and synthesised models by Venkatesh et al. (2003) are the theory of reasoned action (Fishbein & Ajzen, 1975), the social cognitive theory (Bandura, 1986), the technology acceptance model (Davis, 1989), the theory of planned behaviour (Ajzen, 1991), the model of

PC utilisation (Thompson et al., 1991), the motivational model (Davis et al., 1992), a model combining the technology acceptance model and the theory of planned behaviour (Taylor & Todd, 1995), and the diffusion of innovations theory (Rogers, 2003).

The theory, which plays a major role as a predictor of media user acceptance and usage behaviour comprises four main contributing factors of behavioural intention and usage (Fig. 1). These are performance expectancy, effort expectancy, social influence, and facilitating conditions. According to Venkatesh et al. (2003), these four constructs play an important role as direct determinants of user acceptance and ICT usage behaviour. These constructs are moderated by age, gender, experience, and voluntariness of use.

Venkatesh et al. (2003) assert that the unified theory of acceptance and use of technology is a major improvement over any of the original eight models in terms of explained variance and provides a useful tool to assess the probability of successful introduction of new communication technology. This was corroborated by Wu et al. (2007) through empirical evaluation of the unified theory of acceptance and use of technology which showed that the predicting capacity of the model for technology acceptance behaviour is more effective than any known model for the same purpose (Venkatesh et al., 2003).

Performance expectancy This is the extent to which a person believes that the use of new communication technology/media will enhance his/her educational and social experiences. A student may, for example, be more engaged in learning or communicating more with friends for educational related information or pleasure-related reasons, such as searching for games, shows, or fashion. In the technology acceptance model, perceived usefulness is similar to and may be used interchangeably with performance expectancy as one of the vital measures that motivates university students to use new communication media for both educational and social reasons.

Effort expectancy This refers to the degree of ease or difficulty in using technology/ the new communication media.

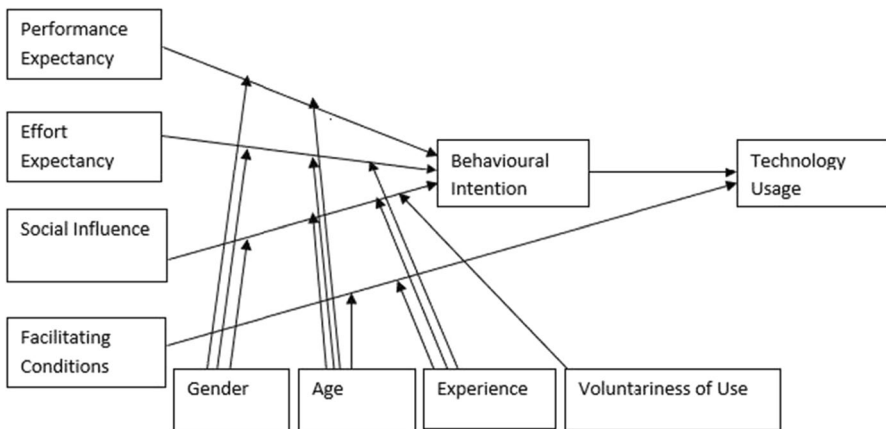


Fig. 1 Unified theory of acceptance and use of technology (Source: Venkatesh et al., 2003)

Social influence This is the degree to which a person perceives that important individuals or groups (such as family and friends) believe that a specific technology should be used by him/her. This implies the extent to which an individual observes that his/her social groups/peers believe new communication media should be used for both educational and social reasons.

Facilitating conditions This refers to the degree to which a person believes that the technological infrastructure is available to promote the use of technology. With respect to this study, it is the extent to which a student believes that there is an enabling environment that facilitates access to and utilisation of new communication media. The accessibility of technology is an important aspect that affects its utilisation. The perceived shortcomings of a technology/or limitations associated with the user, the technology as well as environmental or institutional limitations might prevent university students from using such technology or platform.

The unified theory of acceptance and use of technology has been widely used in examining technology acceptance. Bajunaied et al. (2023) explored consumers' behavioral intentions towards FinTech services in Saudi Arabia using Unified Theory of Acceptance and Use of Technology (UTAUT). The study found that performance expectancy, effort expectancy, facilitating conditions, and privacy enablers had a significant and positive impact on users' behavioral intention towards FinTech services. Isaias et al. (2017) examined the acceptance of an educational forum, used for mobile and distance learning by Portuguese university students based on the unified theory of acceptance and use of technology. The study shows that performance expectancy and effort expectancy had a positive impact on the behaviour of the students towards empathic forums, while social influence had a positive impact on the behavioural intention of the students to use empathic forums. Tak and Panwar (2017) deployed the unified theory of acceptance and use of technology model to predict mobile application-based shopping in India. The research established that facilitating conditions support the use of mobile applications for shopping. This finding validated the efficiency and robustness of the unified theory of acceptance and use of technology for studies on technology adoption and use.

3.2 Educational communication uses of new media technologies

There are indications of extensive usage of new media for educational purposes in Asia, Europe and the United States of America (Almansour, 2019; Bharucha, 2018; Cheng et al., 2015; Manca & Ranieri, 2016a, b; Shafiq & Parveen, 2023). In the same vein, Nigerian students are embracing the technology (Fasae & Adegbilero-Iwari, 2016). These new communication technologies are reported to have redefined the educational, social, and professional platforms globally, pervading all aspects of human daily living and influencing the pace of development (Rymarczuk, 2016; Vrocharidou & Efthymiou, 2012).

A new dimension to the use of social media, which was primarily intended for social communication, is its inclusion as a platform for the teaching and learning

process considering its interactivity characteristics, which have the capacity to create bonding between teachers and learners (Dyson et al., 2015; Hamid et al., 2015; Sugimoto et al., 2015). As acknowledged by Junco (2012), while studying Facebook usage and academic performance of university students residing in the United States, the use of Facebook by students is not limited to social interaction; it extends to the creation of educational contents for dissemination to their peers. Sobaih and Moustafa, (2016) add that cordiality could be brewed between students and members of faculty through frequent communication on Facebook and other social media platforms, which could also facilitate peer and social education, support students, enhance self-esteem, and build strong relationships and communities. A number of scholars (for instance, Aldoayan et al., 2019; Al-Rahmi et al., 2015; Hamid et al., 2015; Romero, 2015) have explored other huge benefits of social media in higher education. These include its valuable use in connection and interaction with students and communities, enhancing academic success by means of collective learning and the satisfaction of students' life, confidence, and engagement (Aldoayan et al., 2019; Al-Rahmi et al., 2015; Hamid et al., 2015; Romero, 2015).

Akbari et al. (2015) examined the effectiveness of online learning platforms such as Facebook in learning a foreign language among Iranian doctoral students. They compared the performance of twenty students who learn English face-to-face and twenty students who learn English on Facebook. The Facebook group became more competent, more independent, professional, and interdependent than the other group. In addition, students learning English using Facebook formed a learning community, and continued to connect and engage with each other long after the course was completed. Related studies show students' preference for social media, especially Facebook as a platform for educational communication and a convenient environment for learning better than structured classroom sessions with lecturers (Michikyan et al., 2015; Roblyer et al., 2010). As indicated by the aforementioned studies, Facebook, a social networking site is particularly suited as a student or course group platform for academic socialisation. It seems that Facebook offers a platform for students to gain greater autonomy, helping students to assume more responsibility for their own learning process.

In Nigeria, the use of SMS as a platform for the exchange of educational information, as noted by (Nwagwu & Okafor, 2014), is an emerging trend. According to him, Nigerian university students use SMS educational communication; and they connect each other, parents, family members, lecturers, and other categories of individuals for educational purposes. Nigerian students, having experienced the benefits of openness and interactivity associated with using various forms of new media, including social networking sites, YouTube, instant messaging, wikis, blogs, and other web 2.0 technologies, are increasingly relying on them for educational information. The use of new media platforms is not limited to students; university lecturers have also relied on them for mentoring, teaching, and counselling of students. It has been found that efforts of university lecturers are being directed towards integrating various digital-mediated technologies into teaching in order to encourage interactive teaching and learning process, allowing students to actively participate in classroom discussion and thereby stimulating sustainable interest in learning (Greenhow & Lewin, 2016; Gutierrez et al., 2020; Shrand, 2008).

Several authors (for instance, Bharucha, 2018; Greenhow & Lewin, 2016; Hamid et al., 2015; Manca & Ranieri, 2016b; Mbatha, 2014) examined various forms of new media use in universities. Although these authors examined new media technologies, these studies were limited in objectives and did not proffer strategies that could be adopted for effective deployment and utilisation of new media technologies for an enhanced educational experience in universities, especially in Nigeria. Mbatha (2014) investigated the educational value of Web 2.0 technologies at the University of South Africa. The major goal of the study was to find out whether Web 2.0 tools could improve teaching and learning. The study established that these tools are central in opening avenues and collapsing the transactional distance in an open distance learning institution. The study only highlights the perceived benefits of using new media for educational purposes and recommends its integration into educational activities.

Hamid et al. (2015) examined the perceptions and experiences with online social networking for educational activities among students of Malaysian and Australian universities. Their findings show how students use these technologies for interaction with their peers and lecturers, and with the course contents. This study only focused on the advantage of using online social networking in higher education from the students' perspective.

Greenhow and Lewin (2016) investigated the possibility of incorporating social media into formal and informal learning in European and American contexts by focusing on university-age youth and teenagers' uses of social media technologies to support educational activities in school and higher education. The study indicates that universities can benefit from the informational access and communicative strengths of new media to enhance teaching, learning, and research, which are the core objectives of the universities. However, the study only considered the possibility of integrating social media into higher education programmes, and was carried out in other climes.

Manca and Ranieri (2016b) investigated the purpose of social media use by members of faculty in an Italian university. The major aim of the study was to provide empirical evidence on how higher education scholars were using social media for personal, teaching, and professional purposes. They found that faculty members preferred to use social media for professional development purposes rather than engaging and integrating the platform for teaching.

Bharucha (2018) investigated the adoption of social media for educational purposes in India. The study focuses on the effectiveness and potential future role of social media enhancing learning in the Indian educational system. Bharucha's (2018) findings show the widespread usage and benefits of social media, particularly in business education. Further findings from the study show that colleges and universities in India are using social media in their academic activities, although inhibited by lack of alignment with the curriculum.

3.3 Predictors of new media usage for educational purposes

Understanding, explaining, and predicting people's behaviour for using different forms of innovative and emerging communication technologies, such as smart mobile devices, the Internet, and social media, are central to this study. Potential

factors that determine the usage pattern of new communication technology for educational purposes include demographics, gratifications, or motivations for using new media and constraints associated with its use.

3.3.1 Demographics

New media use has been correlated with demographic factors such as gender, age, course of study, level of study, socio-economic status, and marital status. There are divergent opinions on how demographic factors predict the pattern of various forms of communication technologies. Several studies have shown that males use different forms of new media than females. A study of Italian university students by Servidio (2014), that focused on the effects of the demographic profile, Internet usage and the “Big Five” personality traits (extraversion, agreeableness, conscientiousness, emotional stability and openness trait) on Internet addiction among Italian university students, found gender to significantly influence affinity to the Internet. The study established a higher tendency of affinity to the Internet amongst males than females. Malik et al. (2016) compared gender in relation to privacy issues regarding information sharing on Facebook and found that the males tended to disclose more information relating to themselves, family and friends without apprehension, while the females embraced restraint in sharing of personal information. Dumford et al. (2023) investigated American higher institution students’ perceptions of their own social media usage in comparison to their peers. The study found that both first-year students and seniors perceive their peers to use social media more frequently than themselves, with males showing a more pronounced effect. Females also perceived higher social media usage among themselves and their peers compared to males. These studies illustrate a discrepancy between gender and the use of various forms of new media, suggesting that males may be more comfortable while using new communication technologies than females.

Age has also been reported in the literature as a significant demographic factor influencing new media use. As shown in a report by the Pew Research Center (2015), the most likely set of people to use social media are youths, ranging from 18 to 29 years. Manca and Ranieri (2016b), while investigating the nexus between socio-demographic variables (age, sex, teaching experience, discipline, academic title) and social media use among tertiary scholars in Italy, established the influence of age and seniority on the adoption of social media. The study reveals that age and seniority take precedence as factors that could aid or inhibit the use of social media; specifically, the most active users of social media were young members of faculty (under age 35).

García-Martín and García-Sánchez (2013) conducted a study to examine the usage patterns of Web 2.0 tools among 757 Spanish students in educational and social contexts. The objective of their research was to identify differential patterns of tool usage based on sex, educational level, and age. Ten Web 2.0 tools were investigated in the study, including wikis, blogs, Moodle, Google Docs, Google Reader, Google Maps, Skype, Flickr, YouTube, and general or personal social networks. The findings revealed that female students showed a greater preference for social tools compared to males, who preferred instrumental tools. Additionally, higher

educational levels were associated with increased knowledge about Web 2.0 tools, and functional knowledge of tools requiring greater digital competence tended to increase with age and vice versa.

In their study, García-Martín and Cantón-Mayo (2019) examined the usage patterns of five tools (search engines, wikis, blogs, podcasts, and instant messaging) among 1,488 Spanish adolescents, and how these tools impacted their academic performance in science, mathematics, Spanish language, and English. The findings revealed differences in technology usage based on purpose, with adolescents using search engines and wikis for academic tasks and podcasts for entertainment. Additionally, the study found differences in academic performance based on sex, age, and tool usage, with females showing better performance in linguistic subjects and younger adolescents performing better overall. Furthermore, the use of search engines was associated with better performance in science, Spanish language, and English, while the use of podcasts was associated with better performance in mathematics.

Dahlstrom et al. (2012) had earlier viewed the adoption of social media from the perspective of different scientific disciplines and recorded the variance existing among different disciplines. Their study of undergraduate students and information technology concludes that faculty in the humanities and arts, the social sciences, and applied sciences were using social media more than those in mathematics or other natural sciences and computer science. It is noted by Hampton (2010) that access to digital information could be very low among the low-income and minority communities. On the other hand, students that are financially buoyant, have higher accessibility to digital devices and the Internet than those who have limited financial support (Hargittai & Hinnant, 2008; Hassani, 2006). The aforementioned demographic factors among others may be a contributing factor to whether or not new media technologies are used.

3.3.2 Constraints or limiting factors

Positive attributes about new media have been incontestably proven by scholars. These include interactivity, openness, and sociability as unique facilitators of change for educational and other purposes. Extensive reviews, however, also revealed barriers and limitations related to its use. Wyche and Baumer (2017) in an investigative study of Facebook non-users that live in a rural area of Zambia identified economic, infrastructural and linguistic factors as major barriers among Zambians that live in the countryside who were viewed as non-users of social media and other information and communication technologies (ICTs). These include linguistic difficulties, inadequate skills, and economic issues.

Sobaih et al. (2016) found privacy and security to be predominant among the eleven limitations to the use of social media for teaching and learning as identified by faculty members in eight Egyptian public higher institutions. Moran et al. (2012) reported that members of faculty teaching in the United States higher education were concerned about integrity issues in relation to academic resources to be submitted by students on social media if accepted as a learning tool.

The need for frequent updating of software for specific functions or applications was also cited as one of the limitations experienced by users that engage their mobile phones for social media use (Au et al., 2015). The cost and smallness of the screen were also referred to as possible hindrances to engaging social media and mobile communication technologies for academic activities (Alzaza & Yaakub, 2011). Manca and Ranieri (2016a) discovered lack of relevant infrastructure to facilitate various forms of new communication media usage and low Internet bandwidth; unruly activities of students, such as posting of obscene information, improper comments, and their carefree attitudes, constitute barriers to the use of new communication media for teaching and learning.

It has also been reasoned among faculty members that the use of social media for teaching and learning might not be realistic owing to the difficulty of control and monitoring (Au et al., 2015). This stance has also been supported by Sobaih et al. (2016), who reported that lecturers argued that social media is volatile, porous, and hard to control. Faculty further noted that academic materials found on social media might not be factual and original (Au et al., 2015). Moran et al. (2012) found that the integrity of students' submissions was the main concern by faculty for using social media as an educational tool.

Young Britons that participated in a qualitative study conducted by Eynon and Geniets (2012) to ascertain the perceived causes of low or non-use of social media affirmed that quality of access, costs, support, skills, and attitudes may be responsible for low or discontinued Internet use amongst young people in Britain. There may also be other specific challenges or factors limiting the use of new media in developing countries, like Nigeria.

Dahlstrom and Bichsel (2014) examined American undergraduate students' emerging information technology experiences and expectations. Although the study found that the use of technologies, such as laptops and tablets, was pervasive among the students, the lack of motivation and required skills to use the technologies to their full potential for academic purposes was also observed. Students could use various functionalities embedded in new information technology if they are better skilled at using various forms of new communication technology.

It was also reported that, despite the general acceptance of SMS by the general populace, there are also other challenges confronting its use. Some of the challenges of text messaging have been identified by Leung (2007), who argues that the 160 characters' limit per message has constrained users and forced them to come up with practices such as the use of abbreviations, slang, acronyms, and images that create ambiguity in messages sent. Nwagwu, (2012a) also confirms this assertion through the investigation he conducted on educational information sharing through SMS by Nigerian university students. He also found that ambiguity characterised most of those messages, through the use of confusing acronyms. The intent of the messages was sometimes hard to decipher due to the contents, which sometimes intended to be jokes. Limited network services that cause delay in the delivery of messages, the smallness of keypads, dull screen surfaces, and other ergonomic issues are said to be part of major the challenges of SMS use. There may also be environment-specific challenges in a developing country like Nigeria. These include lack of communication technologies, epileptic power supply, and the perception that the cost

of electricity increases drastically with the use of digital communication devices as well as poor network services, which may delay delivery of messages, and thus disallows instant messaging expectations of new communication media.

In summary, the review of relevant literature has established that information exchange takes place through multiple media among media users, yet most studies on media use focus on the use of a specific medium instead of a holistic view of the various communication media. These studies were mostly conducted in other climes. Various studies carried out on educational uses of new media, failed to recommend strategies for its deployment, integration, and utilisation in higher education contexts. There is no study that focused on Nigerian university students' use of various forms of new media for educational purposes with the intent to proffer strategies that could be adopted to ensure effective and sustainable deployment, integration, and utilisation of new media as communication tools for an improved educational experience. Some factors have been found to influence new media use. Hence, this study aimed to fill these knowledge gaps, with particular reference to Nigeria. Research was, therefore, required to establish how demographics, motivations, and constraints of new media use predict the pattern of its use among students of Nigerian universities, with an intent to recommend strategies towards effective deployment and utilisation of various forms of new media technologies for an enhanced educational experience in Nigerian universities.

4 Methodology

4.1 Research paradigm, approach, and design

The current study was based on the positivism paradigm. The ontological belief of positivists is naive realism, which proposes that there is a single reality which consists of what is observed directly by human senses. The reality is seen as objective and fixed. Positivists seek to understand the social system as the natural world. In the natural, there is a cause-effect relationship between phenomena, and once they are well-known, it can be predicted in the future with certainty. The same applies to the social world for positivists. According to Myers (2013) the positivist paradigm aims to test a theory in order to increase the predictive understanding of the measured phenomena. Its knowledge helps a researcher to predict the result of natural and human activities. Positivists theorise that reality can be measured empirically, using quantitative techniques to discover the social trends and to achieve an overview of a phenomenon (Sarantakos, 2005). This test involves a complex statistical process to evaluate the relationships between the variables, resulting in wide generalisations of the phenomenon being investigated. Humans are viewed as rational beings who interpret truth independently without being conscious of them. Human behaviour is understood by experience and observation, driven by external influences that yield reliable behavioural results.

Positivists have an epistemological view of dualism and objectivism, which occurs when two distinct entities (the researcher and the subject) exist independently of each other during a research process. The researcher serves as an objective

observer to study phenomena that exist independently of him without affecting what is being observed (Sarantakos, 2005).. The ethical behaviour is premised on respecting respondents' privacy by using informed consent in research.

Methodologically, positivists believe that the social world should be examined by using the same approaches and techniques by physical world researchers. Therefore, positivists believe that reality can be measured empirically, using quantitative methods to answer research questions, discover social trends, and to achieve an overview of a phenomenon (Sarantakos, 2005). The numeric data used by positivist researchers can be obtained through experiments or quasi-experiments, and large or small-scale-surveys using structured questionnaires and/ or interviews. These data are analysed using descriptive or inferential statistics. With a positivist view, it is known that research is 'value-free,' which means that a strict methodological procedure is followed to maintain objectivity and eliminate subjective misrepresentations. In this current study, specific methodological guidelines including the procedure for data collection, and data analysis were implemented. This position is taken because of its suitability and relevance to the current study.

The current study was designed to demonstrate objectivity. Objectivity is measured by the degree to which the research findings are consistent irrespective of the researcher's character. Findings are the product of an investigation, not the interpretation of such findings by the researcher. The purpose is to prove that the investigation is value-free, free of the researcher's constructs. The goal of the current study is, therefore, to accurately capture and reveal the objective reality and truth, independent of the researcher. It is important that the researcher is separated from the participants of the study so that; they are free to express as honest views as possible, to help achieve the research objectives. Therefore, the position of the researcher is as an objective observer, who collects data and reports on the data objectively.

Within the current study, the researcher views reality; patterns of new media use, and strategies for its deployment and utilisation, as independent of the researcher. The researcher objectively explains this reality (patterns of new media use and its relationship with demographics, motivations towards increasing use of new media technologies and associated constraints) based on the positivist perspective.

Given the complexity and nature of the research problem, the insistence of an objective reality, and the previously stated research objectives, it was decided to adopt a positivist approach. The paradigm in this current study is positivist since it aimed to define and examine factors that affect outcomes in order to test, verify, and refine a theory (Creswell, 2009). The positivist paradigm was used to collect data that are relevant to the research problem and the theoretical frameworks upon which the present study is based. The two theories that form the theoretical framework for the present study are compatible with the positivist perspective. This enabled the researcher to draw inferences with respect to the use of new media among Nigerian university students. The researcher also seeks numerical evidence as a basis for objective knowledge which conforms with the quantitative methods, data, and analysis associated with the positivist paradigm. In positivist research, quantitative method is used.

The quantitative method is the research approach used in the study. The quantitative approach was utilised because of the targeted population was large as well as of

the need to generalise results, its strength on objectivity, cost-effectiveness in terms of time and other resources. Furthermore, the adoption of the quantitative approach was to effectively determine the motivation towards increasing the use of new media technologies for educational purposes and its associated constraints. This was carried out by obtaining and analysing numerical data using the quantitative research method.

This study also adopted the survey research method, using a questionnaire, complemented by a structured interview, as data collection instruments. It was adopted because the targeted population was made up of individuals of whom various variables could be examined. It also enabled the collection of data from a large sample owing to its relative cost-effectiveness. Moreover, since generalisation across populations is a major interest of this study, the survey was considered the ideal choice. Several scholars have used the survey method to study the use of communication technologies in Nigeria (Ezeah et al., 2013; Nwagwu, 2012a) and elsewhere (Le Roux & Parry, 2017; Pilli, 2015).

4.2 Study area, population of the study, and sampling

The area of study was Nigeria, a West African country. Nigeria, which is organised into 36 states and the federal capital territory (FCT), Abuja, is divided into six geopolitical zones: North-Central, North-East, North-West, South-East, South-South, and South-West. The country has a relatively high teledensity compared with other African countries. According to the Nigerian Communications Commission (2023), the country's teledensity stood at 119.01% at the end of February 2023, with active telephone lines of 227.1 million. Essentially, this study focused on undergraduate and postgraduate students at universities in Nigeria. According to the National Universities Commission, there were 221 public and private Nigerian universities in February 2023. These universities are located around the 36 states of the federation and Federal Capital Territory, Abuja (National Universities Commission, 2023). Three large and geographically central universities were purposively selected for the study: University of Ibadan, University of Nigeria, and University of Ilorin. These universities were selected based on the factors discussed below.

Firstly, the geographical locations of these three universities were considered in their selection. The University of Ibadan, Nigeria's first and largest university is located in South-West Nigeria, consisting of a mixture of Christian and Moslem students and staff; the University of Nigeria is in the Christian-dominated South-East Nigeria, and the University of Ilorin in the Islam-dominated North-Central Nigeria. Diversity in education and culture in Nigeria is adequately shown by the location of these universities in the major regions that represent the major distinctive characteristics of people living in diverse regions. While there are indications of social and demographic disparities among these universities and their students, these universities were also selected on the premise that they are the oldest and the largest universities in each of the regions. In contrast to the newer universities, the size, prestige, and central location of the selected universities make them the most sought after

for university education among prospective students across different socio-economic statuses within their regions (Joint Admissions and Matriculation Board 2018).

Furthermore, the selected universities are the most prominent and equipped with respect to human resources as well as physical infrastructure. They also have long histories of academic and infrastructural development. The recent universities are largely sophisticated, and their exorbitant fees are usually paid by students of wealthy backgrounds. These universities are considered to be poorly staffed academically, and provide lesser education quality than the older universities (Erinoso, 2008). The choice of university for prospective students in Nigeria tends to be following the direction where students seek to gain admission into older universities first before choosing new universities. Consequently, older universities consist of students whose social class stretches through all strata of the Nigerian society.

Considering a strategy of having appropriate data and ensuring that students from various academic backgrounds/disciplines are involved in the study, students from faculties that the three selected universities (University of Ibadan, University of Nigeria and University of Ilorin) have in common were purposively selected for the study. These faculties/disciplines are: Agriculture, Arts, Education, Engineering/Technology, and Social Sciences. Stratified random sampling was used to select the sample (students) from the selected faculties in the three universities as respondents in this study. The number of students in the selected faculties at the University of Ibadan was 16,008, the University of Nigeria was 21,518, and 26,984 in the University of Ilorin. Therefore, the total population for the study comprised 64,510 students.

The stratified sampling technique was used to split the population into two strata, consisting of undergraduate students and postgraduate students. The stratified sampling technique allows the research to target undergraduate and postgraduate students from the selected faculties in the three selected universities.

Regarding the sample size for the current study, several scholars have observed that the larger the sample size of a study the more accurate, even though costly, the findings of the study (Bless & Higson-Smith, 2000). However, the sample size is likely to decrease with a relatively large population. If random sampling technique is adopted, a sample size larger than 500 units will not be necessary irrespective of the population size (Welman et al., 2005).

Welman et al. (2005) also note that the population size should not be regarded as the only factor in determining the size but also the heterogeneity of the population. Only a small sample is required for a study with a homogeneous population, unlike a heterogeneous population that requires a large sample. Considering the fact that not all prospective study participants might be accessible or willing to complete the questionnaire or respond to the interview, the researcher extracted a sample larger than the one for which the complete data and copies of the administered questionnaire was desired in the end.

Therefore, following the adoption of the stratified random sampling technique in the selection of the respondents, and considering the fact that the study population was reasonably homogeneous, and not all prospective study participants would be accessible or willing to complete the questionnaire, the study used a total sample size of 647 students drawn from the study population. The sample size constituted

Table 1 Sample sizes in each population group ($N=647$)

Faculties	University of Ibadan		University of Nigeria		University of Ilorin	
	Study Population	Sample	Study Population	Sample	Study Population	Sample
Agriculture	2,766	28	2,862	29	5,304	53
Arts	3,366	34	4,546	45	4,632	46
Education	3,811	38	6,069	61	10,377	104
Engineering/ Technology	3,009	30	2,988	30	3,577	36
Social Science	3,056	31	5,053	51	3,094	31
TOTAL	16,008	161	21,518	216	26,984	270

one per cent of the total population of the students selected from the three universities. This conforms to the views of Frankfort-Nachmias and Nachmias (1996), that the researcher should “determine the strata; from each stratum, select a random sample proportionate to the size of the stratum in the population”. Hence, the researcher used faculties as strata in determining the sample size for the study. The details for the sample size of the selected universities are shown in Table 1 (This is approximated to the nearest whole number).

Several past studies used a similar sample size. For instance, a sample size of 600 was adopted by Ekwelem et al., (2009) in order to examine e-resources use by Nigerian university students. Furthermore, Nwagwu and Okafor (2014) used a sample size of 400 to examine the diffusion of e-books among postgraduate of the University of Ibadan, Nigeria. Similarly, Nwagwu (2012b) used a sample size of 315 to investigate information sources and information needs of postgraduate students at the University of Ibadan, Nigeria. In a related study, Aulenbach (2011) used a sample size of 278 to explore factors associated with the use of new media by college students for educational and social reasons. The choice of this sample size was also made because of limited resources (time and money) and the need to have a logistically manageable sample size.

For the structured interview, which requires a small sample size, the researcher adopted the random sampling technique in selecting 30 university students from the selected faculties across the three surveyed universities. This choice was based on Silverman (2001), who advocates the use of random sampling for a structured interview in survey research as against the purposive sampling technique most commonly used in unstructured interviews. Therefore, two students per faculty in each of the three surveyed universities were selected for the interview. This translates to a sample size of 10 students per university.

4.3 Data collection methods, instruments and measures

A questionnaire was used as the main data collection instrument. It was designed in five sections. Section A of the questionnaire measured the demographic variables of the students (respondents). Data were collected from the students on their age,

gender, institution, faculty/discipline, level of study, place of residence, marital status, highest educational status of father and mother, and occupation of father and mother.

Section B measured the kind of new media used, frequency, and level of new media use by Nigerian university students. Questions were asked to understand the level of new media use. Section C measured various educational purposes for which Nigerian university students use new media. Section D measured the motivations for using new media by university students in Nigeria. Section E measured constraints of new media use for educational purposes. Copies of the questionnaire were administered to a sample of 647 students from a population of 64,510.

Data for this study were collected directly from the respondents surveyed. In order to guide against having forged data, data collection was done by the researcher and two research assistants who were recruited and trained in each university to assist in the administration and retrieval of copies of the questionnaire. Before administering the questionnaire, the researcher discussed the study with the Deans and Heads of Department (HODs) of the concerned faculties/departments to seek their cooperation and receive permission to administer the questionnaire to the students in their faculties/departments. Thereafter, the consents of the students to participate in the survey were sought, after which copies of the questionnaire were distributed by the researcher and research assistants to the students who agreed to participate in the study. The students filled in the questionnaire at their convenience, and retrieval of the completed copies of the questionnaire was done by the researcher/research assistants at an agreed time.

In addition, a structured interview was also conducted in the study to complement the questionnaire. For the structured interview, the researcher met the students in their respective classes, introduced himself, and presented the purpose of the study. The students were thereafter invited to participate in the short interview voluntarily. Following Babbie et al. (2001), the researcher personally conducted the interviews with the students who agreed to participate in the exercise. The interview sessions were recorded after securing the permission of the participants.

4.4 Validity and reliability of instruments

To ensure face validity of the instruments, the questionnaire and interview schedule were validated by experts in the field of media studies and information science, who were capable of measuring effectively the use of new communication media. Modifications were made based on these experts' assessments. Content validity was established by carrying out a pilot study at the University of Ilorin. During the pilot study, the questionnaire was administered to a few students that were randomly selected from various faculties and re-administered to the same students after two weeks. Based on the results of the pilot study, the questionnaire and interview schedule were modified to make them measure what they were meant to measure. The students that were involved in the pilot study did not participate in the final study. Statistical Package for the Social Science (SPSS), version 23, was used to measure the reliability of the questionnaire as a data collection instrument using the test–retest

method. The first-time responses were compared with the responses obtained after two weeks. The items that did not have up to 75% correlation were removed from the questionnaire for the actual study.

Some steps were taken to improve the reliability of the interview schedule in the study. Firstly, the vocabulary items used to formulate the questions in the interview schedule were carefully chosen in order to assist each respondent to understand the concepts used as intended by the researcher. Confusing and vague questions were avoided. Secondly, a pilot study was carried out to pre-test the interview schedule, and, subsequently, the required corrections were incorporated. Finally, the researcher recorded the respondents' responses with clarity and accuracy, as driven by the interview schedule.

4.5 Data analysis and interpretation

Responses from the questionnaire and the structured interview were coded and analysed using the Statistical Package for Social Science (SPSS) software, version 23.

Firstly, descriptive statistics, such as simple frequencies, charts, and mean, were used to describe the demographic data about the respondents and their level of use of new media. Next, a principal component factor analysis was used to reduce gratification variables and constraint variables into a parsimonious few that could absorb the effect of other variables in each group and determine their potential groupings. Varimax rotation was used to better account for expected correlations among potential factors. Regression analysis was utilised to examine how demographics, gratifications, and constraints of new media use, predicted its use. Also, data extracted from the structured interviews were analysed using descriptive statistics, such as simple frequencies and percentages. Finally, the data were interpreted. Conclusion and recommendations were then made from the analysed and interpreted data.

5 Findings

A total of 633 out of the 647 copies of the distributed questionnaire were completed and retrieved from the respondents. This represents a return rate of 97.8%. Table 2 shows the university and faculty/discipline of the respondents in the study. Most of the students were from the University of Ilorin 42.2% (267). Education students accounts for the largest proportion of the respondents 30.8%.

5.1 Demographic characteristics of the respondents

Table 3 shows that more males (53.9%) with an average age of 22.1 years, than females (46.1%) with an average age of 21.9 years were the study participants. The overall mean age of the respondents was 22.3 (SD=0.80) years. The largest proportion of the respondents were within the age range of 18–22 years and accounts for 66.7% of the respondents. Most of the respondents were single 568 (89.7%), and most of their fathers and mothers had tertiary education, and were self-employed.

Table 2 Distribution of the respondents by university and faculty/discipline

Faculty	University of Ibadan (<i>N</i> =161) Frequency (%)	University of Ilorin (<i>N</i> =267) Frequency (%)	University of Nigeria (<i>N</i> =205) Frequency (%)	Total (* <i>N</i> =633) Frequency (%)
Agriculture	28 (17.4)	53 (19.9)	28 (13.7)	109 (17.2)
Arts	34 (21.1)	46 (17.2)	44 (21.5)	124 (19.6)
Education	38 (23.6)	101 (37.8)	56 (27.3)	195 (30.8)
Engineering	30 (18.6)	36 (13.5)	26 (12.7)	92 (14.5)
Social Science	31 (19.3)	31 (11.6)	51 (24.9)	113 (17.9)
Total	161 (100.0)	267 (100.0)	205 (100.0)	633 (100.0)

*Note: *N*=633 is the total number of respondents that completed the questionnaire from the three surveyed universities

Most of the respondents were mainly undergraduate who live in the hostel and off-campus on their own.

5.2 Frequency of new media use

Various forms of new media usage patterns were examined in terms of the level and frequency of their use by students in the surveyed universities. On a dichotomous scale, inquiries about the use of new media were guided by the following questions: “Do you use the Internet?” and “Do you use social media?” More respondents (98.6%) reported that they used the Internet than those who reported using social media (96.2%). This indicates that, even though few were, not all Internet users are social media users. The two variables were aggregated to read “Do you use new media?” The result shows that 99.7% of the respondents were using new media.

The frequency of new media use was examined by asking the respondents the following: “How often do you use the Internet?”, “How often do you use smart mobile devices?” and “How often do you use social media?” The responses from the participants were measured using a five-point Likert scale: 1 = Not at all, 2 = Not often, 3 = Not very often, 4 = Often, 5 = Very often. As shown in Table 4, the majority of the students, namely 66.7%, 65.2%, and 62.4%, used smart mobile devices, the Internet, and social media very often, respectively. Fewer, and about the same number of respondents, namely 11 (1.7%), reported that they never used the Internet and social media than those who reported that they never used any of the smart mobile devices (2.5%). The means and standard deviation of each response from the participants to the questions were conducted. A high mean score indicates more frequent usage of each new media form (Internet, social media, and smart mobile devices) by the respondents, and a low score indicates less frequent usage of these technologies by Nigerian university students. In a similar pattern, the result indicates a high frequent usage of the Internet ($M=4.53$, $SD=0.805$), smart mobile devices ($M=4.50$, $SD=0.893$), and social media ($M=4.47$, $SD=0.857$).

The use frequency of each social media platform and activities engaged in were also summarised. The frequency of use of one social media platform might be

Table 3 Demographic characteristics of the respondents

Variable	Measurement	Frequency	Per cent	Cum. Per cent
Age	18–22 years	422	66.7	66.7
	23–27 years	149	23.5	90.2
	28–32 years	38	6.0	96.2
	33–37 years	7	1.1	97.3
	Above 37 years	10	1.6	98.9
	No response	7	1.1	100.0
Gender	Male	341	53.9	53.9
	Female	292	46.1	100.0
Level of study	100	121	19.1	19.1
	200	163	25.8	44.9
	300	120	19.0	63.9
	400	124	19.6	83.5
	500	22	3.5	87.0
	Postgraduate	83	13.1	100.0
Place of residence	Living in the hostel	268	42.3	42.3
	Living off campus (on my own)	305	48.2	90.5
	Living off campus (with my parents)	56	8.8	99.3
	No response	4	0.6	100.0
Marital status	Single	568	89.7	89.7
	Married	52	8.2	97.9
	Separated	4	0.6	98.5
	Divorced	2	0.3	98.8
	Co-habiting	3	0.5	99.3
	No response	4	0.6	100.0
Highest educational status of father	None	37	5.8	5.8
	Primary	28	4.4	10.2
	Secondary	124	19.6	29.8
	Diploma/NCE	54	8.5	38.3
	HND/Bachelor's degree	216	34.1	72.4
	Master's degree	112	17.7	90.1
	Doctorate degree	57	9.0	99.1
	No response	5	0.8	100.0
Highest educational status of mother	None	39	6.2	6.2
	Primary	34	5.4	11.6
	Secondary	112	17.7	29.3
	Diploma/NCE	96	15.2	44.5
	HND/Bachelor's degree	216	34.1	78.6
	Master's degree	90	14.2	92.8
	Doctorate degree	35	5.5	98.3
	No response	11	1.7	100.0

Table 3 (continued)

Variable	Measurement	Frequency	Per cent	Cum. Per cent
Occupation of father	Self-employed	316	49.9	49.9
	Private sector	89	14.1	64.0
	Public sector	205	32.4	96.4
	Unemployed	17	2.7	99.1
	No response	6	0.9	100.0
Occupation of mother	Self-employed	342	54.0	54.0
	Private sector	79	12.5	66.5
	Public sector	192	30.3	96.8
	Unemployed	16	2.5	99.3
	No response	4	0.6	100.0

Table 4 Frequency of new media use

Frequency of new media use	Frequency	Per cent
How often do you use the Internet? (<i>N</i> =633)		
Very often	413	65.2
Often	183	28.9
Not very often	9	1.4
Not often	17	2.7
Not at all	11	1.7
How often do you use smart mobile devices? (<i>N</i> =633)		
Very often	422	66.7
Often	158	25.0
Not very often	17	2.7
Not often	20	3.2
Not at all	16	2.5
How often do you use social media? (<i>N</i> =633)		
Very often	395	62.4
Often	190	30.0
Not very often	12	1.9
Not often	25	3.9
Not at all	11	1.7

different from other platforms. The respondents were asked to rate their frequency of use of eleven social media platforms and activities. The participants' responses were measured using a five-point Likert scale, ranging from 1 = "Not at all" to 5 = "Very often".

Table 5 reveals the use frequency of each of the various social media platforms and activities engaged by the respondents. Based on the average mean score of 3.39, the deduction can be made from Table 5 that high frequent use of social media

platforms and activities was evident among Nigerian university students. Specifically, the most frequently used social media platforms, as indicated by the respondents, were Instant messaging Apps, such as WhatsApp ($M=4.15$, $SD=1.24$). These were followed by social networking sites, such as Facebook ($M=4.03$, $SD=1.17$), and multimedia sharing sites for example YouTube and Instagram ($M=3.77$, $SD=1.34$). The least frequently used social media platforms were online blogs, for instance, Blogspot and Wordpress ($M=2.59$, $SD=1.48$); online forums, such as Nairaland ($M=2.65$, $SD=1.49$); and microblogging sites, for example, Twitter ($M=2.72$, $SD=1.53$). However, status updates ($M=3.80$, $SD=1.33$) was the most frequently engaged activity on social media platforms. This was followed by group discussions ($M=3.46$, $SD=1.38$) and making comments ($M=3.43$, $SD=1.38$).

5.3 Educational purposes for using new media

The educational purposes the students had ever used new media for were grouped broadly into five: contact and exchange educational information with peers, contact family/relatives about educational needs, communicate educational issues with lecturers, seek information and advice on academic issues, and connect with others. A 5-point Likert scale was used to measure opinions, using 1 for very often, 2 for often, 3 for not at all, 4 for not often, and 5 for not very often. However, very often and often were aggregated to read often, while not often and not very often were aggregated to read not often.

The various educational uses of new media, as reported by the students, are shown in Fig. 2a—e and Table 6. The results show that using new media to contact and exchange educational information with peers is the highest educational purpose (96.7%) for which the students used new media and 85.6% reported using new media often for this purpose. Communicating educational issues with lecturers is the least-mentioned reason (73.3%) for which the students used new media. Only 48.3% of the students reported using it often and 26.7% reported to have never used it for this purpose. Seeking information and advice on academic issues is the educational reason why 93.2% of the students used new media; 92.6% of the students used these technologies to connect with others on research purposes, while 89.1% indicated that they used it for contacting family and relatives about educational needs.

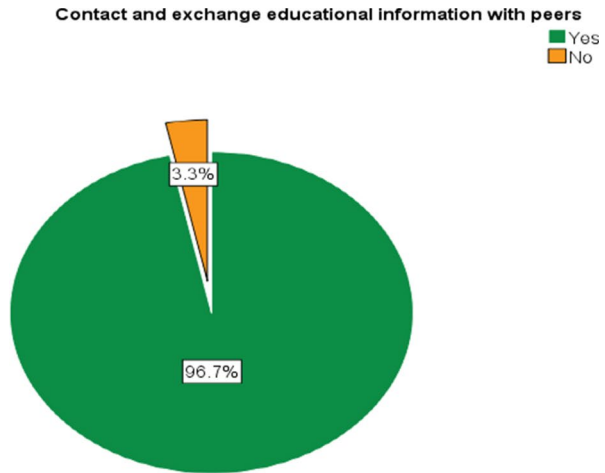
5.4 Major gratifications of new media use

To identify the major gratifications that motivate university students in Nigeria to use new media, a principal component analysis was used to assess 58 gratification items of new media use in order to identify the underlying motivations for its use. Based on measures used in past studies (such as Leung, 2007; Leung & Zhang, 2016; Manca & Ranieri, 2016a, b; Sobaih et al., 2016), 58 statements that reflect gratifications of students' use of new media were tested. A 5-point Likert scale was created to measure the students' opinions, ranging from 1 = strongly disagree to 5 = strongly agree. The Kaiser–Meyer–Olkin measure of sampling adequacy (0.953) indicated that the samples were adequate for the analysis. Bartlett's test of sphericity

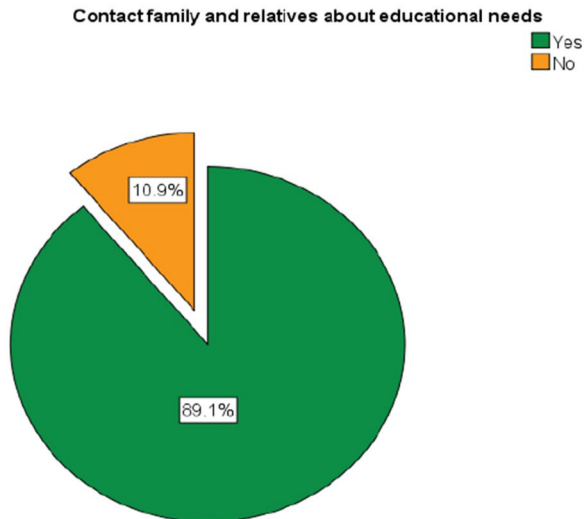
Table 5 Distribution of use of social media and activities engaged in

Social media platforms and activities (<i>N</i> = 633)	Frequency of use, <i>N</i> (%)				M	SD
	Very often	Often	Not very often	Not at all		
Social networking sites (e.g. Facebook and LinkedIn)	227 (43.8)	235 (37.1)	23 (3.6)	62 (9.8)	4.03	1.17
Academic collaborating and networking sites (e.g. Academia.edu and ResearchGate)	125 (19.7)	251 (39.7)	41 (6.5)	96 (15.2)	3.26	1.43
Microblogging sites (e.g. Twitter)	107 (16.9)	147 (23.2)	51 (8.1)	118 (18.6)	2.72	1.53
Online blogs (Blogspot, Wordpress)	82 (13.0)	147 (23.2)	50 (7.9)	135 (21.3)	2.59	1.48
Instant messaging Apps (e.g. WhatsApp and Snapchat)	345 (54.5)	177 (28.0)	19 (3.0)	43 (6.8)	4.15	1.24
Online forums (e.g. Nairaland)	85 (13.4)	157 (24.8)	56 (8.8)	121 (19.1)	2.65	1.49
Wikis (Wikipedia, WikiHow)	161 (25.4)	236 (37.3)	36 (5.7)	97 (15.3)	3.40	1.43
Multimedia sharing sites (e.g. YouTube and Instagram)	242 (38.2)	213 (33.6)	31 (4.9)	86 (13.6)	3.77	1.34
Status updates	239 (37.8)	228 (36.0)	29 (4.6)	73 (11.5)	3.80	1.33
Comments	164 (25.9)	225 (35.5)	44 (7.0)	119 (18.8)	3.43	1.38
Group discussions	174 (27.5)	217 (34.3)	41 (6.5)	127 (20.1)	3.46	1.38
Average mean = 3.39						

Fig. 2 **a** Contact and exchange educational information with peers, **b** Contact family and relatives about educational needs, **c** Communicate educational issues with lecturers, **d** Seek information and advice on academic issues, **e** Connect with others on research purposes



a: Contact and exchange educational information with peers

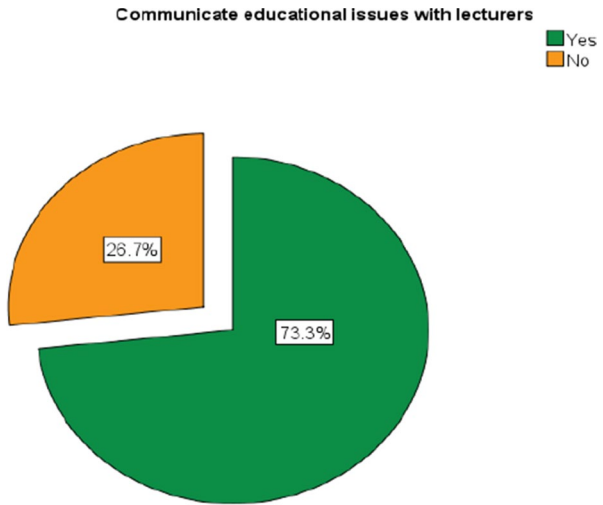


b: Contact family and relatives about educational needs

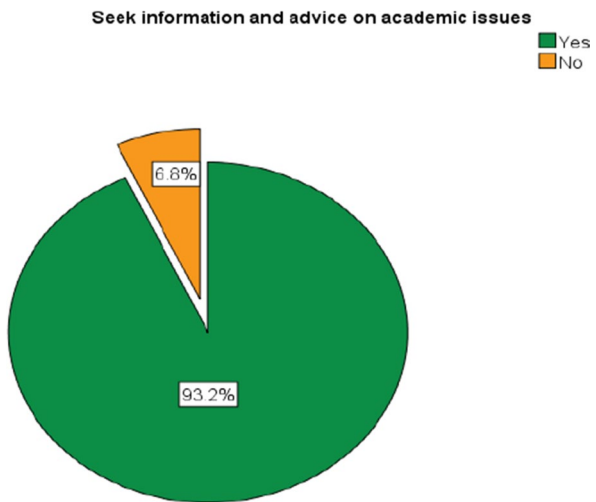
was significant ($p=0.000$) for all the factors. This indicates that correlation matrices were significantly different from an identity matrix, and, therefore, the correlations among the variables were suitable for analysis.

The result from this analysis shows that factor loadings from the Varimax rotation were high (greater than 0.4). These factor loadings are the correlation coefficients of each item with the factor. This indicates that all the factors have strong loadings, and this provided support for the factors being extracted and retained on the basis that the eigenvalues must be greater than 1.0. The eigenvalue is a measure of how much of the variance of the observed variables a factor explains. This analysis reveals

Fig. 2 (continued)



c: Communicate educational issues with lecturers

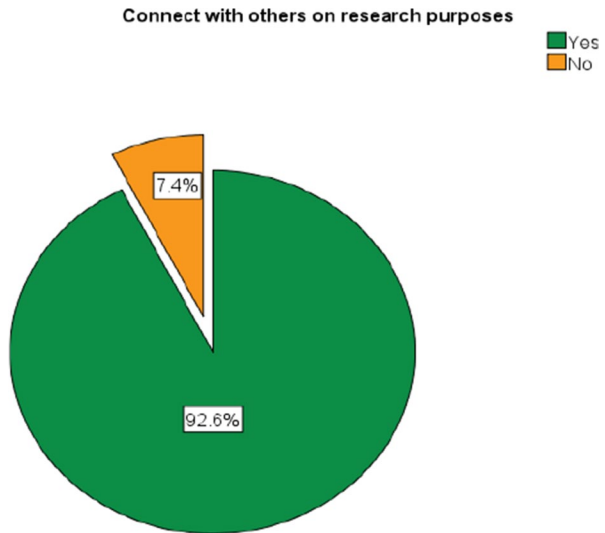


d: Seek information and advice on academic issues

ten motivation factors for using new media, with eigenvalues greater than 1.0 and explained 64.78% of the total variance. These principal components represent major motivations for using new media. The results are shown in Table 7. Definitions and terms of these motivations were adapted from past studies (such as Leung, 2007; Leung & Zhang, 2016; Manca & Ranieri, 2016a, b; Sobaih et al., 2016) to fit new media use context, as follows:

The first factor was “personal utility and self-promotion”. This consists of ten items. These are the items: “To share and express personal opinions”, “To share

Fig. 2 (continued)



e: Connect with others on research purposes

personal information and living conditions to build up self-image”, “To educate others”, “To make other people know me more conveniently”, “To learn new things”, “To project a professional image”, “To listen to other’s opinions”, “To join groups, get involved in discussions and forums on my academic work”, “To join conversations”, and “To pass time, particularly when I’m bored”. The average mean score for these items ($M=3.88$, $SD=1.03$) is the third highest, suggesting that personal utility and self-promotion were strong motives for using new media technologies. This factor had an eigenvalue of 20.61, accounts for the highest proportion of the total variance (35.54%), and very strong reliability (Cronbach’s $\alpha=0.93$).

The second factor was “affection”, with an eigenvalue of 3.78, explaining 6.51% of the total variance (Table 7). It contains eight items: “To encourage and comfort people”, “To send goodwill messages to loved ones”, “To show appreciation”, “To send romantic messages to lovers”, “To maintain relationships”, “To share personal feelings”, “To rebuke and express dissatisfaction with someone”, and “It serves as an alternative to get involved in face-to-face communication” (Cronbach’s $\alpha=0.87$). While the factor contains two social interaction items, four items from the gratification of “affection” comprise most of the factor. Hence, “affection” was created from the eight items. The mean score was high ($M=3.75$, $SD=1.07$), indicating that showing affection was an important motivation for using new media by Nigerian university students.

“Entertainment” was the third factor (eigenvalue=3.09, 5.33% of the total variance). It consists of the following seven items: “To share and download photos, music and videos or watch movies”, “To play games”, “To discover new music, videos and other entertainment such as social events”, “New media gives me pleasure and makes me to feel more relaxed”, “Get sports news”, “To keep up

Table 6 Educational purposes for using new media

Educational uses of new media	Very Often		Often		Not at all		Not often		Not Very Often		M	SD
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Contact and exchange educational information with peers	259	40.9	283	44.7	21	3.3	56	8.8	14	2.2	1.87	0.99
Contact family and relatives about educational needs	185	29.2	275	43.4	69	10.9	88	13.9	16	2.5	2.17	1.08
Communicate educational issues with lecturers	106	16.7	200	31.6	169	26.7	125	19.7	33	5.2	2.65	1.13
Seek information and advice on academic issues	183	28.9	311	49.1	43	6.8	80	12.6	16	2.5	2.11	1.04
Connect with others on research purposes	203	32.1	273	43.1	47	7.4	75	11.8	35	5.5	2.16	1.16

Table 7 Principal component analysis of gratifications of new media use by the students

Measures	M SD Factors											
	1	2	3	4	5	6	7	8	9	10		
Personal utility and self-promotion	3.88	1.03										
To share/express personal opinions	3.88	1.01	.764	.132	.140	.045	.158	.090	.174	.188	-.052	.051
To share personal information and living conditions to build up self-image	3.73	1.14	.726	.143	.093	.209	.026	.044	.146	-.045	-.017	.190
To educate others	3.97	0.96	.711	.168	.132	-.051	.188	.108	.115	.221	.171	.103
To make other people know me more conveniently	3.76	1.08	.700	.111	.171	.148	.091	.129	.195	.149	-.140	.087
To learn new things	4.05	0.96	.673	.175	.155	.024	.269	.100	.074	.168	.292	.047
To project a professional image	3.82	1.07	.671	.132	.122	.073	.130	.160	.152	.192	-.169	.094
To listen to other's opinion	3.95	0.94	.668	.183	.173	.067	.261	.064	.055	.135	.175	.061
To join groups, get involved in discussions and forums on my academic work	3.85	1.02	.646	.116	.209	.046	.314	.101	.107	.099	.118	.001
To join conversations	3.87	1.03	.637	.213	.191	.112	.294	.175	.080	.095	.195	.028
To pass time, particularly when I'm bored	3.96	1.07	.505	.235	.235	.152	.326	.196	.025	-.052	.186	-.255
Affection	3.75	1.07										
To encourage, comfort people	3.88	1.03	.202	.738	.148	-.067	.179	.152	.129	.181	.078	.017
To send goodwill messages to loved ones	4.00	0.96	.159	.722	.205	-.026	.155	.157	.108	.139	.151	.064
To show appreciation	3.85	1.03	.147	.721	.119	-.061	.189	.167	.175	.190	.040	.019
To send romantic messages to lovers	3.69	1.11	.163	.679	.215	.213	-.003	.056	-.004	.080	-.063	.182
To maintain relationships	4.05	0.96	.313	.538	.223	.055	.024	.226	.267	.129	.242	.037
To share personal feelings	3.70	1.11	.244	.532	.182	.210	.014	.081	.140	-.001	.013	.131
To rebuke and express dissatisfaction with someone	2.87	1.34	.015	.515	.130	.179	.078	.032	.213	-.052	-.057	-.011
It serves as an alternative to get involved in face-to-face communication.	4.01	0.99	.298	.443	.232	.054	.094	.194	.363	.101	.224	-.016
Entertainment	3.92	1.04										
To share and download photos, music and videos or watch movies	4.03	1.00	.187	.255	.724	.022	.142	.182	.145	.127	.056	.026
To play games	3.78	1.11	.177	.236	.724	.131	.079	.082	.114	-.042	-.073	.127
To discover new music, videos and other entertainment such as social events	3.93	1.09	.159	.231	.696	.021	.177	.159	.079	.135	.073	.160

Table 7 (continued)

Measures	M SD Factors											
	1	2	3	4	5	6	7	8	9	10		
New media gives me pleasure and makes me to feel more relaxed.	3.96	0.98	.207	.186	.641	.110	.142	.187	.243	.092	.088	-.011
Get sports news	3.78	1.12	.201	.096	.593	.136	.162	.091	.100	.096	-.006	.219
To keep up with the latest news and events.	4.10	0.96	.212	.214	.576	-.022	.219	.200	.168	.154	.316	.052
To share jokes	3.87	1.04	.221	.187	.554	.201	.077	.131	.121	.115	.073	.259
Escape and new trends	2.84	1.27										
To escape from work	2.77	1.24	.051	.024	.052	.834	.054	.080	.092	.089	-.029	-.068
So that I can forget about school, work, or other things.	2.87	1.31	.052	.014	.103	.770	-.019	.074	.018	.063	-.118	-.024
To get away from what I am doing	3.00	1.23	.128	.134	.066	.764	.113	.097	.010	.118	.263	.063
Helps me play tricks on other people	2.83	1.25	.103	.027	.105	.759	.094	.007	.117	.029	.090	.118
Because everybody else is using it	2.63	1.30	-.008	.026	.034	.691	.122	-.009	.099	.021	-.235	.082
To put off something I should be doing	2.93	1.29	.169	.176	.045	.669	.141	.070	.047	.087	.352	.180
Information seeking or Surveillance	3.69	1.10										
To connect with others on research purposes	3.84	1.04	.305	.107	.124	.073	.698	.128	.145	.151	.070	.075
To obtain and express opinions about others	3.62	1.16	.278	.173	.091	.184	.668	.161	.015	.125	-.071	.128
To follow popular trends	3.63	1.20	.220	.151	.190	.174	.656	.106	-.059	.167	.034	.219
To share, critique and validate academic information and discoveries among colleagues	3.79	1.03	.359	.055	.235	.075	.560	.143	.150	.176	.112	-.041
To seek information on academic matters	3.99	0.97	.384	.127	.300	.027	.536	.072	.096	.250	.152	-.064
To track recent articles and new development in my discipline	3.97	0.98	.384	.175	.273	.018	.490	.039	.112	.137	.157	-.075
To know secrets of others	3.02	1.28	.177	.023	.007	.376	.477	.081	.159	-.140	-.309	.285
Convenience and low cost	3.81	1.10										
New media is cheap.	3.46	1.27	.090	.057	.076	.140	.065	.772	.107	.060	-.109	.037
New media is not intrusive, is free from interruption.	3.46	1.18	.094	.129	.122	.065	.131	.694	.131	.011	-.151	.101

Table 7 (continued)

Measures	M	SD	Factors														
			1	2	3	4	5	6	7	8	9	10					
New media technologies are easily accessible.	3.91	1.02	.159	.155	.238	.050	.105	.679	.148	.140	.244	.049					
New media is easy to use.	4.03	1.01	.229	.288	.213	.061	.199	.573	.145	.145	.312	-.008					
There is ease of mobility.	4.00	1.00	.234	.231	.284	.056	.060	.564	.088	.146	.363	.067					
New media is quick and immediate.	3.96	1.10	.237	.326	.211	-.003	.169	.555	.152	.147	.320	.051					
Social Interaction	3.67	1.14															
I feel more confident when using new media for interpersonal communication with family and friends.	3.71	1.13	.210	.226	.203	.115	.032	.178	.689	.109	.043	.075					
To tell someone what I cannot say face-to-face	3.76	1.18	.226	.245	.196	.103	.126	.100	.686	-.051	-.009	.025					
People tend to be more honest, desirable, and open in disclosing their opinions and beliefs while using new media.	3.70	1.16	.142	.212	.196	.122	.109	.158	.679	.032	.077	-.032					
To participate in discussions	3.89	0.95	.237	.208	.167	.072	.140	.238	.450	.192	.343	.129					
Family members/or friends want me to use it.	3.27	1.28	.122	.153	-.023	.312	-.085	.110	.435	.083	-.159	.366					
Coordination	3.81	1.02															
To agree and clarify how and when to meet	3.82	0.99	.349	.170	.183	.176	.241	.175	.081	.692	.050	.019					
To arrange time to phone/talk with each other	3.67	1.11	.288	.218	.096	.222	.209	.129	.062	.653	.065	.098					
To clarify information about an event	3.91	0.96	.428	.196	.188	.110	.209	.134	.041	.623	.088	.009					
I use new media to create events/arrange activities.	3.85	1.02	.451	.144	.235	.128	.249	.175	.091	.502	.052	.011					
Maintain connections	4.15	0.94															
To keep in touch with family and friends	4.15	0.94	.276	.471	.252	.001	.154	.175	.239	.112	.477	.069					
Broadcast media involvement	3.30	1.29															
Participate in TV/Internet-based lotteries	3.20	1.29	.115	.098	.325	.171	.089	.130	.055	-.001	-.041	.739					
Take part in radio/TV programmes	3.39	1.29	.131	.156	.286	.058	.189	.067	.051	.069	.167	.735					
Eigenvalues of the rotated factor								20.61	3.78	3.09	1.94	1.82	1.58	1.37	1.30	1.07	1.02

Table 7 (continued)

Measures	M SD Factors									
	1	2	3	4	5	6	7	8	9	10
Per cent of variance explained	35.54	6.51	5.33	3.34	3.13	2.73	2.37	2.23	1.84	1.76
Cronbach's alpha	0.93	0.87	0.89	0.87	0.86	0.86	0.78	0.88	1.00	0.82
KMO and Bartlett's test (sig level)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Rotation method: Varimax with Kaiser Normalization. N = 633

Bold entries under factors are the factor loadings from the Varimax rotation that were greater than 0.4. These factor loadings are the correlation coefficients of each item with the factor

with the latest news and events”, and “To share jokes”. The mean score ($M=3.92$, $SD=1.04$) of the seven items underlying this factor is the second highest, with strong reliability (Cronbach’s $\alpha=0.89$), indicating that entertainment was an important motivation for the students to use new media.

The fourth factor was “escape and new trend”. It contains six items: “To escape from work”, “So that I can forget about school, work, or other things”, “To get away from what I am doing”, “Helps me play tricks on other people”, “Because everybody else is using it”, and “To put off something I should be doing”. It has an eigenvalue of 1.94 and explains 3.34% of the total variance. Four of the six items are escape items, while two items are new trends; therefore, a new scale “escape and new trends” was created. However, the average mean score of the six items underlying this factor is the lowest ($M=2.84$, $SD=1.27$), although the reliability remains high (Cronbach’s $\alpha=0.87$). These items suggested that students used new media to escape from what they were doing or from their work and follow new trends.

The fifth factor, “information seeking or surveillance”, with an eigenvalue of 1.82, explains 3.13% of the total variance. It includes seven items: “To connect with others on research purposes”, “To obtain and express opinions about others”, “To follow popular trends”, “To share, critique and validate academic information and discoveries among colleagues”, “To seek information on academic matters”, “To track recent articles and new development in my discipline”, and, “To know secrets of others” (Cronbach’s $\alpha=0.86$). The item’s average mean score ($M=3.69$, $SD=1.10$) is relatively high, indicating that information seeking or surveillance was a major motivation for the Nigerian university students to use new media.

“Convenience and low cost”, which was the sixth factor that emerged from the analysis, is composed of six items: “New media is cheap”, “New media is not intrusive, is free from interruption”, “New media technologies are easily accessible”, “New media is easy to use”, “There is ease of mobility”, and “New media is quick and immediate”. One of the items is low cost items, while the other items are convenience items. “Convenience and low cost” was created, with a high mean score ($M=3.81$, $SD=1.10$) and exhibited strong reliability (Cronbach’s $\alpha=0.86$). The eigenvalue is 1.58 and it accounts for 2.73% of the total variance.

“Social interaction” is the seventh factor, with an eigenvalue of 1.37, and explains 2.37% of the total variance contributed by ten factors. The factor consists of the following items: “I feel more confident when using new media for interpersonal communication with family and friends”, “To tell someone what I cannot say face-to-face”, “People would tend to be more honest, desirable, and open in disclosing their opinions and beliefs while using new media”, “To participate in discussions”, and “Family members/or friends want me to use it”. With a high mean score ($M=3.67$, $SD=1.14$) and strong reliability of the factor’s scale (Cronbach $\alpha=0.78$), social interaction was considered to be a major motivation for using new media.

“Coordination” is the eighth factor and it contains four items (eigenvalue=1.30, 2.23% of the total variance). The result shows that the Nigerian university stu-

dents used new media “to agree and clarify how and when to meet”, “to arrange a time to phone/talk with each other”, “to clarify information about an event”, and, “to create events and arrange activities” ($M=3.81$, $SD=1.02$, Cronbach’s $\alpha=0.88$).

The ninth factor is “maintain connections”, with an eigenvalue of 1.07, and accounts for 1.84% of the total variance. Using new media to keep in touch with family and friends was the only component in this factor. The factor load was 0.477 and had the highest mean score ($M=4.15$, $SD=0.94$), indicating that showing affection was an important motivation for the students to use new media. The last factor whose eigenvalue is 1.02 and that accounts for 1.76% of the total variance was measured with two items: “Participate in TV/Internet-based lotteries” and, “Take part in radio/TV programmes”. The two items are part of the entertainment items. However, a new scale “broadcast media involvement” was created. This factor had a high average mean score ($M=3.30$, $SD=1.29$) and a strong reliability scale (Cronbach’s $\alpha=0.82$), indicating that involvement in broadcast media could be considered to be a major motivation for using new media.

5.5 Constraints of new media use

To identify commonly perceived constraints in the use of new media, a principal component factor analysis with Varimax rotation was used to examine the underlying structure of 38 identified constraints based on measures used in past studies (such as Leung, 2007; Manca & Ranieri, 2016a, b; Sobaih et al., 2016; Wyche & Baumer, 2017). A 5-point Likert scale was created to measure students’ opinions, ranging from 1 = strongly disagree to 5 = strongly agree. The Kaiser–Meyer–Olkin measure of sampling adequacy (0.933) indicated that the samples were adequate for the analysis. Bartlett’s test of sphericity was significant ($p=0.000$) for all the factors. This indicates that correlation matrices are significantly different from an identity matrix, and, therefore, the correlations among the variables were suitable for analysis.

As shown in Table 8, a nine-factor solution emerged, and these factors account for 58.53% of the variation in the factors that constrained Nigerian university students’ use of new media. The result from this analysis reveals that factor loadings from the Varimax rotation, which were the correlation coefficients of each item with the factor were high (greater than 0.4). This indicates that all the factors had strong loadings, and this provided support for the factors being extracted and retained on the basis that the eigenvalues must be greater than 1.0. The eigenvalue is a measure of how much of the variance of the observed variables a factor explains. These principal components represented commonly perceived constraints of new media use by the Nigerian university students.

The first factor in this regard is “ergonomic issues”. This consists of six items, namely “Smallness of the screen”, “Limited in the volume of information carried”,

Table 8 Principal component factor analysis of the constraints of new media use by the students

Measures	M	SD	Factors																	
			1	2	3	4	5	6	7	8	9									
Ergonomics issues	3.40	1.18																		
Smallness of screen	3.24	1.18	.798	.070	.149	.176	.099	-.042	-.002	.102	-.015									
Limited in volume of information carried	3.25	1.17	.792	.082	.126	.083	.138	.082	.092	.051	.051									
Smallness of keypads	3.18	1.24	.758	.047	.141	.155	.202	.065	-.028	.053	-.036									
Limited size of new media memory	3.43	1.18	.739	.145	.023	.097	.071	.071	.212	.151	.155									
Limited lifespan of the battery	3.63	1.19	.720	.125	.039	.059	.176	.168	.192	.154	.166									
Consequence of prolonged electronic text reading	3.64	1.11	.626	.199	.037	.039	.156	.138	.125	.168	.154									
Privacy and Security concerns	3.74	1.08																		
Unauthorised individuals might have access to personal information.	3.77	1.08	.113	.755	.144	.097	.125	.211	.091	.118	.033									
Information found on new media might not be factual and original.	3.82	1.05	.096	.739	.155	.144	.183	.149	.203	.078	.094									
Unruly activities of new media users e.g. posting of obscene information, improper comments.	3.86	1.04	.166	.702	.166	.131	.097	.213	.207	-.018	.042									
My privacy could be compromised.	3.59	1.15	.126	.681	.165	.140	.211	.194	.052	.181	.097									
Difficulty of quality control and monitoring of information shared	3.65	1.06	.130	.662	.158	.221	.146	.058	.044	.184	.087									
Knowledge and skills	3.44	1.15																		
Inadequate technical knowledge/ required skills to use the new media technologies to its full potential	3.24	1.20	.172	.196	.749	.123	.031	.028	.156	.124	.068									
Difficulty in keeping abreast of the fast growth and ever-changing nature of new communication technologies	3.46	1.15	.066	.184	.709	.134	.170	.152	.119	.187	.162									
Difficulty in finding relevant information	3.21	1.23	.128	.075	.692	.117	.132	.119	.115	.248	.134									
Poor level of knowledge awareness on the use of new media for teaching, learning and research	3.55	1.10	.066	.154	.675	.118	.101	.221	.084	.044	.303									
Some level of literacy is required.	3.73	1.05	.137	.360	.557	.143	.090	.201	.206	-.105	.041									
Infrastructural challenges	3.67	1.14																		
Inadequacy of tools (smartphones, laptops)	3.53	1.16	.153	.121	.193	.787	.135	.038	.087	.186	.095									

Table 8 (continued)

Measures	M	SD	Factors								
			1	2	3	4	5	6	7	8	9
Unavailability of devices to access information	3.57	1.17	.165	.136	.202	.774	.144	.102	.116	.194	.049
Frequent demand for software updates for specific functions or applications	3.73	1.13	.172	.250	.148	.602	.129	.288	.232	-.039	.088
Low Internet bandwidth	3.74	1.10	.150	.226	.044	.597	.090	.360	.267	-.012	.089
Inadequate service (limited network coverage, slow internet speed)	3.79	1.14	.132	.319	.130	.480	.182	.288	.308	-.042	-.005
Confusing acronyms	3.56	1.13									
Annoying when you don't know what the acronyms stand for	3.68	1.10	.141	.201	.061	.089	.773	.103	.120	.036	.086
Different acronyms for the same word are difficult to understand	3.32	1.25	.164	.173	.169	.068	.746	.062	.039	.138	.096
Acronyms in messages have other meanings that might cause confusion	3.71	1.06	.214	.128	.057	.121	.731	.181	.139	.048	.024
Non-obvious long phrases when shortened are confusing	3.53	1.11	.232	.128	.124	.186	.712	.058	.078	.129	-.021
Economic issues	3.83	1.11									
Internet subscription is costly.	3.88	1.10	.076	.227	.236	.112	.115	.784	.096	.125	.020
High cost of Internet-enabled device	3.82	1.14	.089	.242	.180	.182	.167	.734	.215	.045	.057
High cost of electricity	3.76	1.14	.170	.203	.186	.164	.108	.681	.074	.160	.097
Erratic electric power supply	3.85	1.08	.097	.206	-.032	.454	.090	.548	.249	.037	.184
Timing	3.64	1.09									
Sometimes there are delays in the delivery of messages.	3.80	1.01	.096	.122	.175	.117	.138	.188	.762	.127	.000
Sometimes messages come when it is not convenient to read the messages.	3.66	1.10	.231	.284	.135	.008	.119	.161	.676	.150	.046
It takes too long to view or download pages.	3.57	1.09	.075	-.009	.178	.286	.110	.050	.652	.221	.090
Using new media is time consuming.	3.54	1.15	.097	.166	.083	.226	.038	.087	.602	.142	.032
Intention difficult to understand	3.12	1.21									
Hard to figure out whether a message is serious or a joke	3.16	1.20	.222	.125	.157	.122	.111	.110	.172	.809	.052
Unsuitable and incomprehensible information	3.17	1.18	.204	.098	.165	.090	.033	.026	.234	.808	.093
Difficult to determine intent from message	3.03	1.24	.167	.208	.129	.080	.225	.168	.163	.706	.038

Table 8 (continued)

Measures	M	SD	Factors																	
			1	2	3	4	5	6	7	8	9									
Policy	3.37	1.18																		
Incompatibility or exclusion of new media technologies from Learning Management System (LMS)	3.40	1.19	.176	.158	.233	.126	.039	.093	.069	.066	.828									
Lack of approval and support from the University management and relevant authorities governing university education	3.34	1.18	.149	.077	.297	.099	.117	.096	.045	.097	.810									
Eigenvalues of the rotated factor	13.10	2.69	2.03	1.79	1.64	1.45	1.16	1.13	1.01											
Per cent of variance explained	34.46	7.09	5.35	4.70	4.32	3.80	3.05	2.97	2.65											
Cronbach's alpha	0.88	0.87	0.84	0.86	0.83	0.84	0.78	0.86	0.82											
KMO and Bartlett's test (sig level)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Rotation method: Varimax with Kaiser Normalization. $N = 633$

Bold entries under factors are the factor loadings from the Varimax rotation that were greater than 0.4. These factor loadings are the correlation coefficients of each item with the factor

“Smallness of keypads”, “Limited size of new media memory”, “Limited lifespan of the battery”, and “Consequence of prolonged electronic text reading”. The average mean score for these items ($M=3.40$, $SD=1.18$) is high, suggesting that both users and non-users of new media clearly perceived ergonomic issues as a constraining factor in using new media technologies. This factor has the highest eigenvalue of 13.10, and accounts for the highest proportion of the total variance (34.46%) and the reliability of these six items was strong (Cronbach’s $\alpha=0.0.88$).

The second factor is “privacy and security”, with an eigenvalue of 2.69, explaining 7.09% of the total variance. It contains five items: “Unauthorised individuals might have access to personal information”, “Information found on new media might not be factual and original”, “Unruly activities of new media users, e.g. posting of obscene information, improper comments”, “My privacy could be compromised”, and “Difficulty of quality control and monitoring of information shared” (Cronbach’s $\alpha=0.87$). While the factor contains two privacy items, three items from “security” completed the factor. Therefore, “privacy and security” was created from the five items. The mean score is the second highest ($M=3.74$, $SD=1.08$), indicating that privacy and security concerns are perceived as constraints of using new media by the Nigerian university students.

“Knowledge and skills” is the third factor (eigenvalue=2.03, 5.35% of the total variance). It includes five items, namely “Inadequate technical knowledge and required skills to use the new media technologies to its full potential”, “Difficulty in keeping abreast of the fast growth and ever-changing nature of new communication technologies”, “Difficulty in finding relevant information”, “Poor level of knowledge and awareness of the use of new media for teaching, learning and research”, and “Some level of literacy is required”. The average mean score for the five items underlying this factor is high ($M=3.44$, $SD=1.15$). It had high reliability (Cronbach’s $\alpha=0.84$).

The fourth factor is “infrastructural challenges”. It contains five items: “Inadequacy of tools (smartphones, laptops)”, “Unavailability of devices to access information”, “Frequent demand for software updates for specific functions or applications”, “Low Internet bandwidth”, and “Inadequate service (limited network coverage, slow internet speed)”. It has an eigenvalue of 1.79 and explains 4.70% of the total variance. The average mean score of the five items underlying this factor is high ($M=3.67$, $SD=1.14$), and it has strong reliability (Cronbach’s $\alpha=0.86$).

The fifth factor is “confusing acronyms”. This consists of four items: “Annoying when you don’t know what the acronyms stand for”, “Different acronyms for the same word are difficult to understand”, “Different acronyms for the same phrase”, “Acronyms in messages have other meanings that might cause confusion”, and “Non-obvious long phrases, when shortened were confusing”. This factor has an eigenvalue of 1.64 and explains 4.32% of the total variance. The reliability of these four items is high (Cronbach’s $\alpha=0.83$) and the mean score is also high ($M=3.56$, $SD=1.13$).

“Economic issues”, which is the sixth factor that emerged from the analysis, is composed of four items: “Internet subscription is costly”, “High cost of Internet-enabled device”, “High cost of electricity”, and “Erratic electric power supply”. One of the items (erratic electric power supply) is one of the infrastructure items, while

the other items are part of the economic issues. Hence, “economic issues” was created. It had the highest mean score ($M=3.83$, $SD=1.13$) and exhibits strong reliability (Cronbach’s $\alpha=0.84$). The eigenvalue is 1.45 and it accounts for 3.80% of the total variance.

“Timing” is the seventh factor, with an eigenvalue of 1.16, and explains 3.05% of the total variance contributed by the nine factors. The factor consists of the following four items: “Sometimes there are delays in the delivery of messages”, “Sometimes messages come when it is not convenient to read the messages”, “It takes too long to view or download pages”, and “Using new media is time-consuming”. It had a high mean score ($M=3.64$, $SD=1.09$) and moderately high reliability of the factor’s scale (Cronbach $\alpha=0.78$).

“Intention difficult to understand” is the eighth factor (eigenvalue = 1.13, 2.97% of the total variance). It includes three items, namely” users and non-users of new media found it “hard to figure out whether a message is serious or a joke”; they received “unsuitable and incomprehensible information”; and found it “difficult to determine intent from message” (Cronbach’s $\alpha=0.86$). The mean scores for the three items underlying this factor are high, though the lowest among the nine factors ($M=3.12$, $SD=1.21$).

The last factor was “policy”. The eigenvalue is 1.01 and it accounts for 2.65% of the total variance. This factor was measured with two items: “Incompatibility or exclusion of new media technologies from Learning Management System (LMS)” and, “Lack of approval and support from the university management and relevant authorities governing university education”. The average mean score is moderately high ($M=3.37$, $SD=1.18$) and had a strong reliability scale (Cronbach’s $\alpha=0.82$).

On the whole, this study shows that both users and non-users of new media perceived that there were constraining factors in using new media technologies.

5.6 Predicting the usage pattern of new media for educational purposes

Regression analysis was conducted to predict the usage pattern of various educational uses of new media, using demographics, gratifications, and constraints as predictors. Regression is used to test for significant relationships between a dependent variable and various independent variables. Demographic variables were dummy coded into dichotomous variables suitable for regression, while major gratifications for using new media and common perceived constraining factors of new media use derived from the principal component factor analysis were used as predictors. All regression models were tested for multi-collinearity and no variable scored more than 4.0 when variance inflation test (VIF) was conducted. Assumptions of linearity, normally distributed errors and uncorrelated errors were checked and met for all regression analyses.

As shown in Table 9, the variance explained in the five regression equations are as follows: for using new media to contact peers 0.9%, to contact family 0.9%, to contact lecturers 8.6%, to contact others on academic issues 6.0%, and to contact others for research 5.1%.

5.6.1 Predicting usage pattern of new media for educational purposes using demographics as predictors

The regression analysis results in Table 9 show the pattern of the relationship between various educational uses of new media and demographic variables. As shown in Table 9 demographically, age is positively and significantly related with the use of new media to contact peers for educational reasons ($r=0.099$, $p<0.01$) and with making contact with lecturers ($r=0.104$, $p<0.01$). However, it is negatively and significantly related with using new media to contact family members ($r=-0.095$, $p<0.05$). This implies that older students were more likely to contact their peers and lecturers for educational purposes, but less likely to contact their family members for educational needs. Being a postgraduate student ($r=0.087$, $p<0.05$) relates significantly to using new media to contact others for research. Living off-campus (“on my own”) ($r=0.084$, $p<0.01$) and living off-campus (“with my parents”) ($r=0.085$, $p<0.01$) relate significantly with using new media to contact lecturers.

Being an Arts student ($r=0.106$, $p<0.01$) was only significantly related with using new media to contact others for research, while education ($r=0.103$, $p<0.05$) and engineering students ($r=0.096$, $p<0.01$) were more likely to contact lecturers using new media. Using new media to contact family was related to the student’s father being self-employed ($r=0.213$, $p<0.05$) or working in the public sector ($r=0.204$, $p<0.05$). Conversely, a student having a father who was employed in the private sector was less likely to use new media to contact family ($r=-0.165$, $p<0.05$) and others on academic issues ($r=-0.160$, $p<0.05$).

The three levels of the occupation of the mother, namely self-employment ($r=0.412$, $p<0.01$), private sector employment ($r=0.187$, $p<0.01$), and public sector employment ($r=0.397$, $p<0.01$) relate significantly with the use of new media for contacting lecturers. Only self-employment ($r=0.256$, $p<0.01$) and public sector employment ($r=0.229$, $p<0.01$) relate significantly to “contact others on academic issues”, while students whose mothers were self-employed ($r=-0.215$, $p<0.05$) and worked in the private sector ($r=-0.178$, $p<0.01$) were less likely to use new media to contact others for research.

5.6.2 Predicting usage pattern of new media for educational purposes using gratifications as predictors

Table 10 presents the results of the regression analysis showing the pattern of the relationship between various educational uses of new media, using gratifications as predictors. As shown in Table 10, the results of the regression analysis indicate that information seeking and surveillance ($r=0.067$, $p<0.05$), and convenience and low cost ($r=0.105$, $p<0.01$), positively and significantly related with the use of new media to contact peers, even though the latter was more significant than the former. Only social interaction ($r=0.075$, $p<0.01$) and broadcast media involvement ($r=0.144$, $p<0.01$) relate significantly with using new media to contact family, indicating that social interaction and broadcast media entertainment are the motivation students have for using new media to contact family. Personal utility and self-promotion ($r=0.071$, $p<0.05$),

Table 9 Regression analysis of educational uses of new media with demographics as predictors

Demographics	Contact peers	Contact family	Contact lecturers	Contact others on academic issues	Contact others for research
	Beta	Beta	Beta	Beta	Beta
Age	0.099**	-0.095*	0.104**	0.031	-0.017
Gender (Ref. cat. = Males)					
Females	0.002	0.018	0.048	0.027	0.046
Level of study (Ref. cat. = undergraduates)					
Postgraduates	-0.038	0.038	0.064	0.042	0.087*
Residence (Ref. cat. = hostel)					
Off hostel (on my own)	0.033	-0.001	0.084**	0.035	-0.001
Off hostel (with my parents)	-0.022	-0.023	0.085**	0.009	-0.004
Marital status (Ref. cat. = Divorced)					
Single	-0.069	-0.027	-0.081	0.038	-0.089
Married	-0.053	0.009	-0.081	0.025	-0.061
Co-habiting	-0.022	-0.066	-0.079	0.030	0.003
Discipline (Ref. cat. = Agriculture)					
Arts	0.050	0.078	0.073	0.030	0.106**
Education	-0.070	0.004	0.103*	-0.059	0.058
Engineering	0.006	0.051	0.096**	0.071	0.068
Social sciences	-0.022	0.000	0.021	-0.003	0.015
Occupation of father (Ref. cat. = None)					
Self-employed	-0.127	0.213*	-0.102	-0.162	0.190
Private sector	-0.165*	0.044	-0.083	-0.160*	0.108
Public sector	-0.069	0.204*	-0.011	-0.060	0.114
Occupation of mother (Ref. cat. = None)					
Self-employed	0.055	-0.023	0.412**	0.256**	-0.215*
Private sector	0.113	0.006	0.187**	0.056	-0.178**
Public sector	0.148	0.007	0.397**	0.229**	-0.094
Education of father (Ref. cat. = None)					
Primary	0.023	0.043	0.027	-0.037	-0.038
Secondary	0.085	-0.002	-0.017	0.078	-0.031
Tertiary	0.071	0.020	-0.042	0.049	0.013
Education of mother (Ref. cat. = None)					
Primary	0.050	0.001	-0.037	-0.016	0.002
Secondary	0.052	0.019	-0.006	-0.048	0.013
Tertiary	0.015	0.001	0.085	-0.015	-0.051
Adjusted R ² (%)	0.009	0.009	0.086	0.060	0.051

New media users were dummy coded as user=1, else=0; Figures are standardised beta coefficients; * $p < 0.05$; ** $p < 0.01$

Table 10 Regression analysis of educational uses of new media with gratifications as predictors

Gratifications predictors	Contact peers		Contact family		Contact lecturers		Contact others on academic issues		Contact others for Research	
	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta
Personal utility and self-promotion	0.008	0.033	0.071*	0.106**	0.128**					
Affection	0.013	0.053	0.041	0.089**	0.152**					
Entertainment	-0.055	0.049	-0.033	-0.062	0.057					
Escape and new trend	-0.057	0.016	-0.018	-0.034	-0.114**					
Information seeking and surveillance	0.067*	0.008	0.046	0.031	0.040					
Convenience and low cost	0.105**	-0.003	-0.006	-0.026	0.018					
Social interaction	-0.034	0.075**	0.119**	0.085**	0.001					
Coordination	0.051	0.012	0.025	0.061	0.048					
Maintain connections	0.016	-0.002	-0.042	0.123**	0.075**					
Broadcast media involvement	-0.003	0.144**	0.150**	0.094**	0.108**					

New media users were dummy coded as user = 1, else = 0; Figures are standardised beta coefficients; * $p < 0.05$; ** $p < 0.01$

social interaction ($r=0.119$, $p<0.05$), and broadcast media involvement ($r=0.150$, $p<0.01$) are significantly linked to using new media to contact lecturers.

Personal utility and self-promotion ($r=0.106$, $p<0.01$), affection ($r=0.089$, $p<0.01$), social interaction ($r=0.085$, $p<0.01$), maintaining connections ($r=0.123$, $p<0.01$), and broadcast media involvement ($r=0.094$, $p<0.01$) were the reasons for using new media to contact others on academic issues. Similarly, personal utility and self-promotion ($r=0.128$, $p<0.01$), affection ($r=0.152$, $p<0.01$), maintaining connections ($r=0.075$, $p<0.01$), broadcast media involvement ($r=0.108$, $p<0.01$), and escape and new trends ($r=-0.114$, $p<0.01$) related significantly with using new media to contact others for research. Therefore, they are important predictors for students who used new media to contact others for research.

5.6.3 Predicting usage pattern of new media for educational purposes using constraints as predictors

As evident in Table 11, the regression analysis shows that none of the constraint variables significantly related with contacting peers and family members for educational reasons. However, privacy and security concerns ($r=0.076$, $p<0.01$), and knowledge and skills ($r=0.086$, $p<0.01$) required for maximising new media usage had a significant relationship with contacting lecturers for educational purposes. While confusing acronyms ($r=0.068$, $p<0.05$) and economic issues ($r=0.108$, $p<0.01$) had a significant relationship with the educational uses of new media to contact others on academic issues. Only economic issues ($r=0.086$, $p<0.01$) significantly related with the use of new media to contact others for research.

5.7 Results of structured interviews

The results of the structured interviews are presented as follows: descriptions of the participants, usage pattern of new media, motives for using new media, new media policies/technical infrastructure for its use, and constraints of new media use.

5.7.1 Descriptions of the participants

The participants engaged in the brief interview were 10 students from the three surveyed universities, which translated to a total of 30 students. The participants, who were selected from the group of participants that responded to the questionnaire, comprised 18 males and 12 females from selected faculties in the surveyed universities. In order to protect the identities of the participants engaged in the interview, pseudonyms (S_n) were assigned to each participant. A brief description of each participant is presented in Table 12.

5.7.2 Usage pattern of new media

In order to assess the usage pattern of new media by students in the surveyed universities, the respondents were asked to mention different forms of new media (smart

Table 11 Regression analysis of educational uses of new media with new media constraints as predictors

Constraints predictors	Contact peers	Contact family	Contact lecturers	Contact others on academic issues	Contact others for Research
	Beta	Beta	Beta	Beta	Beta
Ergonomics issues	-0.032	0.017	0.027	0.017	0.016
Privacy and security concerns	-0.007	-0.028	0.076**	0.057	0.031
Knowledge and skills	-0.012	0.019	0.086**	0.042	0.021
Infrastructural challenges	-0.020	-0.005	0.021	-0.002	-0.007
Confusing acronyms	0.045	0.015	-0.011	0.068*	0.019
Economic issues	0.012	0.024	0.037	0.108**	0.086**
Timing	0.064	0.051	-0.043	0.046	0.064
Intention difficult to understand	-0.015	-0.015	0.038	-0.029	0.019
Policy	-0.015	0.010	-0.027	0.010	0.018

New media users were dummy-coded as user=1, else=0; Figures are standardised beta coefficients; * $p < 0.05$; ** $p < 0.01$

mobile devices, Internet, and social media) they used and give details on how they used them and what each was mostly used for.

Smart mobile devices The respondents were asked during the interview if they used any smart mobile device and how often they used it. Almost 29 (96.7%) all the respondents affirmed that they had access to and used smartphones frequently for academic purposes. One respondent (S_1) at the University of Ibadan said that he had some apps on his smartphone for academic purposes. The respondent eagerly demonstrated several education-based apps on his smartphone.

The Internet Considering the importance of the Internet as an essential tool required to assess social media and other web-based apps and electronic resources, the respondents were asked to express their general views on how often they used the Internet and for what purposes. All the students claimed to be using the Internet. Most of those who used the Internet 23 (76.7%) always used it for both academic and social purposes in a similar pattern. A student (S_{27}) from the University of Ilorin said that he was able to access and uses the Internet always, because an Internet service was provided to all students wirelessly and without limit at their university campus, and he was skilful at using it.

Social media Furthermore, the researcher wanted to know whether students used social media as well as how often they used various social media platforms. Almost all the students 29 (96.7%) stated that they used social media. They used these platforms to interact with their peers and also found educational value in using them.

Table 12 Descriptions of the participants

S_n	Age	Level of Study	Sex	Faculty	University
S_1	18—22 years	Undergraduate	Male	Arts	University of Ibadan
S_2	18—22 years	Undergraduate	Male	Agriculture	University of Ibadan
S_3	18—22 years	Undergraduate	Male	Engineering	University of Ibadan
S_4	18—22 years	Undergraduate	Male	Engineering	University of Ibadan
S_5	18—22 years	Undergraduate	Female	Social Science	University of Ibadan
S_6	18—22 years	Undergraduate	Male	Agriculture	University of Ibadan
S_7	18—22 years	Undergraduate	Female	Arts	University of Ibadan
S_8	33—37 years	Postgraduate	Male	Education	University of Ibadan
S_9	18—22 years	Postgraduate	Male	Education	University of Ibadan
S_{10}	Above 37 years	Postgraduate	Male	Social Science	University of Ibadan
S_{11}	18—22 years	Undergraduate	Male	Agriculture	University of Nigeria
S_{12}	18—22 years	Undergraduate	Male	Arts	University of Nigeria
S_{13}	18—22 years	Undergraduate	Male	Education	University of Nigeria
S_{14}	18—22 years	Undergraduate	Male	Engineering	University of Nigeria
S_{15}	18—22 years	Undergraduate	Male	Social Science	University of Nigeria
S_{16}	18—22 years	Undergraduate	Female	Social Science	University of Nigeria
S_{17}	18—22 years	Undergraduate	Female	Education	University of Nigeria
S_{18}	23—27 years	Undergraduate	Female	Engineering	University of Nigeria
S_{19}	23—27 years	Postgraduate	Female	Arts	University of Nigeria
S_{20}	28—32 years	Postgraduate	Female	Agriculture	University of Nigeria
S_{21}	18—22 years	Undergraduate	Male	Arts	University of Ilorin
S_{22}	18—22 years	Undergraduate	Male	Agriculture	University of Ilorin
S_{23}	18—22 years	Undergraduate	Female	Arts	University of Ilorin
S_{24}	18—22 years	Undergraduate	Female	Education	University of Ilorin
S_{25}	18—22 years	Undergraduate	Male	Social Science	University of Ilorin
S_{26}	18—22 years	Undergraduate	Female	Education	University of Ilorin
S_{27}	18—22 years	Undergraduate	Male	Engineering	University of Ilorin
S_{28}	18—22 years	Undergraduate	Female	Social Science	University of Ilorin
S_{29}	33—37 years	Postgraduate	Female	Agriculture	University of Ilorin
S_{30}	Above 37 years	Postgraduate	Male	Engineering	University of Ilorin

YouTube was frequently used for educational reasons. Some respondents 18 (60.0%) specifically identified YouTube to be useful for their assignments. Some explained how much YouTube helped them to solve academic problems and learn more. One respondent (S_{28}) said she used YouTube “to find video tutorials on how to use applications or do something that I don’t know how to do and to have more comprehensive understanding.”

5.7.3 Motives for using new media

The motives for using new media were established during the interviews by asking the respondents which educational purposes they used new media. A number of reasons were given by the respondents. The students asserted that the ease and speed with which they could interact with others and access information using new media served as motivations for its use. They also identified the mobility, portability, and accessibility of the new communication media and technologies anytime and anywhere.

Other motives they identified for using these technologies are as follows: to learn new things and keep in touch with trends; to keep connected with friends and loved ones; and the interactive nature of the technologies. Most of the respondents 27 (90.0%) used new media to exchange educational information with friends and colleagues. Most postgraduate students 5 (71.4%) used it to facilitate interaction between them and their lecturers. They 7 (100.0%) also used it to clarify academic issues and collaborate with colleagues for research purposes. One of the respondents (S_{13}) said new media has the capacity “to increase the relevance of learning and engagement of learners.” A male postgraduate student (S_8) from the University of Ibadan said he used new media to say what he could not say face-to-face to his lecturers. Another postgraduate student (S_{20}) at the University of Nigeria stated that new media technologies “contribute to the quality of my research activities and enhances the efficiency of my research through access to electronic resources and collaboration with others remotely”. When asked if they were satisfied with the functionality of new media technologies in providing them with the things sought for, all the students responded in the affirmative. In summary, the new media technologies facilitated the integration of relationships and collaboration with learning among the sampled Nigerian university students.

5.7.4 New media policies/technical infrastructure for its use

The availability of the required infrastructure and formulation of relevant policies/strategies are vital in facilitating access and usage of new media technologies among university students. Therefore, the respondents were asked during the interviews to state the existing policies, strategies, or technical infrastructure of their universities to facilitate access to and support of new media technologies used in the universities. The responses of the students from the three surveyed universities were significantly different. Most of the respondents from the University of Nigeria 7 (70.0%) were negative in their responses. They preferred to identify some policies/strategies and infrastructure that the university authorities should put in place towards improved access and use of new media technologies by their students for educational and social purposes. One student (S_{18}) from the University of Nigeria, whose responses can be seen as a reflection of those of the other students on the subject, observed that there is “no supportive policy that encourages accessibility and utilization of new media technologies. For instance, Internet access is not free. There is also erratic electric power supply within the university campus”. Access and effective use of new media technologies depend on these policies and infrastructure.

However, the majority of the respondents at the University of Ilorin 8 (80.0%) were of the opinion that the existing policies and infrastructure effectively support their access to and use of these technologies. All of them indicated that fast and unhindered wireless Internet services, provided at no cost by the university authorities, and which they could use at their hostels and other locations within the campus, facilitated the increased use of new media technologies. One student (S_{21}) from the university said, “lecturers and staff even use these technologies to send academic-related and student affairs information to students”. There were also conflicting responses from students of the University of Ibadan about existing policies and infrastructure that supported the effective use of new media. Half of the respondents 5 (50.0%) were of the opinion that the Internet services provided by the University were usually slow. As a result of the slowness of the Internet speed, one respondent (S_5) from the University of Ibadan asserted that she used a commercial cybercafé to access the Internet when she used her laptop. However, when she accessed the Internet service provided by mobile telecommunication companies, she used her smartphone to connect to social media and other web-based services and platforms.

5.7.5 Constraints of new media use

Despite the numerous and profound advantages offered by new media technologies and platforms to students, some characteristics of the new media potentially inhibit its use. More respondents from the University of Ibadan 4 (40.0%) and the University of Nigeria 4 (40.0%) than the University of Ilorin 2 (20.0%) expressed that economic issues limited the frequency of being connected to the Internet particularly with their laptop computers, though these were not a constraint when they used smartphones to connect with the Internet for the same reason. Other constraining factors expressed by most respondents 27 (90.0%) were slowness of Internet speed, low Internet bandwidth, erratic electric power supply, quality control, privacy, and security concerns. For instance, a postgraduate student (S_{10}) said “sorting and filtering through large volumes and variety of information in order to establish the credibility of their sources are time-consuming”. Being easily exposed to fraud and unruly behaviours of some users were part of the privacy concerns expressed by the students interviewed. One student (S_4) said “using social media can increase the risk of being a victim of “yahoo yahoo” (Internet fraudsters), virus attacks, and different kinds of data thefts”. Some respondents 16 (53.3%) said the lack of face-to-face contact with other new media users permitted and encouraged violent expressions and foul languages. Other respondents expressed that the large volume and variety of information shared could lead to confusion, boredom, and dissatisfaction.

6 Discussion and conclusion

Undoubtedly, new media technologies were perceived by most Nigerian university students to be valuable platform for enhancing educational collaboration and exchange of educational related information. It is evident that Nigerian university students are extensive users of these technologies and are more connected to peers,

family, lecturers and to others by using them. This finding aligns with many other past studies (Igbafe & Anyanwu, 2018; Nández & Borrego, 2013; Veletsianos, 2012) that have also established that WhatsApp, Academia.edu, and Twitter (forms of new media technologies) are perceived to be valuable educational tools to connect, collaborate, and interact with others.

The findings of this study show that the Nigerian university students sampled were using various forms of new media for educational reasons in varying degrees. They mostly used the technologies to contact and exchange educational information with their colleagues. This is followed by seeking information and advice on academic issues, connecting with others for research purposes, and contacting family and relatives about educational needs. However, communicating educational issues with lecturers was the least educational reason why the students used various forms of new media. These findings underscore huge and frequent communication among university students during the learning process and, therefore, reveal the preference of students in contacting one another for education-related information over other educational reasons for using new media. Although much of the information students need is obtainable from their peers, students might likely require education-related information that could not be provided by their peers but from other sources.

Furthermore, over 90% of the students used new media technologies to connect with others for research purposes. This agrees with the findings of Nández and Borrego (2013) on the educational uses of social networks by academics in a Spanish university. They showed that connecting with other researchers for collaboration, and following research publications of others were the educational purpose for using social networking sites.

Even though communicating educational issues with lecturers was the least reason for which the students used new media, the relatively large proportion of the students (73.3%) who reported using new media technologies to contact their lecturers for educational reasons was unexpected. This finding contradicts Hickerson and Giglio's (2009) study which found that many university lecturers were sometimes unwilling to utilise these technologies. Waycott et al. (2010) also maintain that the difficulty experience by lecturers to keep their academic work separate from other responsibilities and the perception of being available all the time, which lead to higher workload, negatively affect the use of new communication media by lecturers with their students for educational reasons.

Many lecturers, even those with technological abilities, are unwilling to use new media technologies as learning tools except these technologies are perceived to be capable of improving their students' knowledge (Brittain et al., 2006). The result of the present study can be explained by the fact that communication with lecturers using new media is likely to be viewed by some students as a means of avoiding the apprehension associated with face-to-face communication. Likewise, Nigerian university lecturers might have found these innovative communication technologies to be capable of improving their students' knowledge.

Personal utility and self-promotion, affection, entertainment, escape and new trend, information seeking and surveillance, convenience and low cost, social interaction, coordination, maintaining connections, and broadcast media involvement/entertainment are the major motives behind utilising new media

technologies. When the composition of each dimension of motivation factor for using new media is considered, the diversity of its function can be better understood. The students wanted these technologies to be useful in all aspects of their everyday lives, ranging from personal utility and self-promotion to broadcast media involvement. Similar motivations were identified by Whiting and Williams (2013) for using social media (a form of new media). They are social interaction, convenience, information seeking, entertainment, passing time, relaxation, surveillance, expression of opinion, information sharing, and communicatory utility.

Despite having incontestable and proven positive attributes for educational purposes, ergonomic issues, privacy and security concerns, knowledge and skills, infrastructure, confusing acronyms, economic issues, timing, the intention is difficult to understand, and policy, represent commonly perceived constraints of new media use by Nigerian university students.

Regression analysis shows that the older students were more likely to contact their peers and lecturers for educational purposes, but less likely to contact their family members for educational needs. The higher likelihood of older students, who were largely at the postgraduate level, using new media to contact their lecturers, could be explained by the research nature of their studies, requiring supervision and mentoring from their supervisors. The findings of the present study regarding using new media to contact peers and lecturers contradict the findings of Nwagwu (2012a) and Oladejo et al. (2013)'s studies, which found that younger students were more likely to use new media for educational reasons. However, the younger students keep in touch with their family members for educational needs more than older ones. This is in tandem with Nwagwu (2012a) and Oladejo et al. (2013)'s studies.

Postgraduate students appear to stay in contact more with others for research using new media technologies. Postgraduates might be finding these technologies useful in seeking relevant information for their studies and collaborating with others for research purposes. New media use by students has been shown to vary by level of study and platform, with many studies reporting conflicting findings. Procter et al. (2010) reported that doctoral students from the United Kingdom were more likely than other scholars to use social media for educational reasons. However, Dowling and Wilson (2017) found unwillingness to use new media for research by Australian doctoral students.

It has also been established that discipline tends to influence the usage pattern of new communication media by doctoral students in the United Kingdom (Coverdale, 2011). The findings of the present study reveal that Arts students were more likely than students from other disciplines to use new media to contact others for research; while Education and Engineering students were more likely to communicate educational issues with lecturers using new media technologies. These findings are not consistent with the study of Priem et al. (2011), who found that there were no disciplinary differences in the use of certain new media technologies. However, the findings of the present study are consistent with the findings Carpenter et al. (2012), whose results showed that doctoral students in the arts, humanities, and social sciences were more likely to use new media platforms for research than students in the sciences.

The students whose fathers were self-employed or working in the public sector and those whose mothers were self-employed or working in the public sector were most likely to contact family members and others on academic issues using new media. Also, the students whose fathers were employed in the private sector were less likely to use new media to contact peers and others on academic issues. But the students whose mothers were self-employed or worked in the private sector were less likely to use new media to contact others for research. The three levels of occupation of the mothers, namely self-employment, private-sector employment, and public-sector employment relate significantly with the use of new media for contacting lecturers. Students living off-campus (on their own or with their parents) significantly related only with using new media to contact lecturers. This implies that students residing off-campus (on their own and with their parents) are likely to use new media to contact their lecturers than students residing in the hostel. Students living off-campus could be contacting their lecturers partly to explain reasons for coming late or being absent from classes, which could be caused by the distracting nature of off-campus activities.

Information seeking and surveillance, and convenience and low cost positively and significantly predict the use of new media to contact peers, even though the latter was more significant than the former. This suggests that students who used new media to contact their colleagues did so largely to obtain information on academic matters as well as monitor activities of other media users easily and at low cost. Only social interaction and broadcast media involvement relate significantly with using new media to contact family members. This indicates that using new media to contact family members is most likely motivated by the desire for interpersonal communication with family members, which appear to be predicted by students' broadcast media involvement. For contacting lecturers, personal utility and self-promotion, social interaction, and broadcast media involvement are significantly linked to using new media. The need to project professional images and discoveries, and socialise, as well as the need for self-expression and share opinions, are most likely based on involvement in broadcast media programmes.

Personal utility and self-promotion, affection, social interaction, maintaining connections, and broadcast media involvement are the reasons for using new media to contact others on academic issues. The students who had a high desire for expressing affection, interacting with others, sharing opinions, projecting professional images and discoveries, networking and seeking information for higher academic recognition tended to use new media for contacting others on academic issues. Similarly, personal utility and self-promotion, affection, maintaining connections, broadcast media involvement, and escape and new trends were significant predictors of using new media to contact others for research. The students who used new media for personal utility and self-promotion, to satisfy affection needs, to maintain connections, escapism and new trends, and broadcast media involvement tended to use new media to contact others for research.

None of the constraint variables significantly relate with contacting peers and family members for educational reasons. However, privacy and security concerns, and the knowledge and skills required for maximising new media usage have a significant relationship with contacting lecturers for educational purposes. The

perception that privacy and security could easily be compromised, as well as inadequate required knowledge and skills to use these technologies to their full potential, seemed to constitute obstacles for non-frequent users of new media for contacting lecturers. Conversely, confusing acronyms, and economic issues have a significant relationship with educational uses of new media to contact others on academic issues. This suggests the non-frequent users of new media to contact others on academic issues are most likely to be constrained by the misunderstanding that is associated with the use of shortened words and lack of funds or high cost of using new media technologies. Only economic issues significantly relate with the use of new media to contact others for research. This implies that the high cost of using new media as well as lack of funds could limit students from using new media to contact others for research. Given an enabling strategy which guarantees access and use, various forms of new media will provide a platform for educational collaboration and exchange of educational related information in Nigerian universities.

7 Recommendations

In view of the findings of the study, the following strategies are recommended towards effective and sustainable deployment, integration, and utilisation of various forms of new media for a better educational experience of students in Nigerian universities:

- a. The study has established that Nigerian university students have access to and frequently use new media technologies for both educational and other purposes, despite the constraints inherent in the use of these technologies. Nigerian universities have much valuable information that can be provided to the students, such as enrolments information, examination scores, announcements, information on scholarship, and internship opportunities. It is therefore recommended that the university authorities in Nigeria should engage and communicate with students through various new media platforms to bring about timely information. Nigerian universities should also raise the level of awareness of lecturers on the need to integrate these technologies for a better educational experience of students.
- b. The findings of this study show that students consider new media to be consistent with their needs as well as being valuable for learning and other education-related information. In view of the appropriateness of new media for educational purposes, lecturers should be active in accessing and using new media technologies to connect, interact, and communicate with students, which could bring about a sense of familiarity that could foster the teaching–learning process. Lecturers and university authorities should acquire the relevant skills to use these technologies fully through capacity building programmes. This implies that they must be knowledgeable in the operation of these innovative technologies and know the appropriate platforms/technologies for various educational purposes. The capacity building should be extended to cover the area of technical support skills to ensure continued use of various forms of new media without interruptions.

- c. Based on the aforementioned, training of students on the effective use of new media, especially for various educational purposes, should be embedded in the curriculum, making it compulsory to all freshmen. This study established the relevance of new media technologies for research collaboration. However, unlike postgraduate students, undergraduate students tend not to use new media to connect with others for research purposes. Therefore, in order to ensure the effective use of new media technologies, continuous skills training/development should be extended to all undergraduate students before the commencement of their research projects. It should not be assumed that students have the knowledge of all the functionalities of the technologies owned by them/or the capacity to adapt these technologies in enhancing their educational experience. Support may be needed to adapt the functionalities of the technologies to academic demands. The development of such capacity building programmes should be based on demographic factors such as age, gender, discipline, level of study, and socio-economic status of parents.
- d. The findings of this study show that lack of approval and support from university managements and relevant regulatory authorities inhibit the use of new media by students in Nigerian universities. Therefore, it is imperative for managements of Nigerian universities to develop appropriate policies towards effective and sustainable deployment, integration, and utilisation of various forms of new media for the exchange of education-related information in Nigerian universities. This should essentially include increased budgetary allocations for acquisitions and deployment of ICT infrastructural facilities in line with the emerging digital trend in world-class universities and provision of reliable, fast and sustainable Internet service for all devices all the time. It should also include offering Internet service for free or at low cost, creating interesting and useful services based on users' needs, integration of new media into classes to promote learning activities, and inclusion of new media technologies in the Learning Management System. Others include clarity on standards, infrastructural acquisition, and information security.
- e. Generally, the findings of this study affirm demographic differences with respect to the use of new media for educational reasons among Nigerian university students. Hence, university authorities and lecturers should consider Nigerian university students' motivations and demographic factors that predict various uses of new media before adopting, implementing, or choosing not to implement such. They should also constructively develop interventions directed at students who may be less likely to adopt and use the new systems in these universities. These interventions should support the use of technology by students who have not previously had access to these technologies in the academic context, as well as for those students who have used these technologies in the past but in a different context.
- f. The new media facilitates interaction between people of different statuses, perspectives, and behaviours. Privacy and security concerns inhibit using new media to contact lecturers. As digital natives, students should be courteous, maintain self-awareness, and practise good digital citizenship when interacting with others using new communication media. Students should be trained on how to handle undesirable feedbacks, improper comments, and unruly behaviours from them-

- selves and other users. Consequently, lecturers' supervision and participation are recommended in ensuring that students maintain an acceptable attitude when using new media, particularly for educational purposes.
- g. Undergraduate students, according to the results of this study, are less likely to contact their lecturers using new media technologies. This could be explained by the timidity and apprehensiveness of students at lower classes. Therefore, undergraduate students should undertake training programmes aimed at improving their self-esteem in order to remove or minimise their anxiety as they connect with their lecturers via new media technologies, particularly for educational reasons. This uncommunicativeness may be corrected by the normal maturation that takes place as such students advance through their university years.
 - h. The study recognises preference of Nigerian university students to connect with the Internet and social media using smart mobile devices. It is, therefore, imperative to adopt and/ develop mobile-friendly information systems that the majority of the students can access and use for educational and other purposes. Instead of merely sending out information to students, Nigerian universities should aim at engaging and connecting with students through new media technologies. The interactivity nature of new media permits students to actively participate in knowledge creation and sharing; it also provides effective and efficient feedback to students. For instance, it is a common complaint that students do not know that their library books are overdue because they have not read the notice board. With smart mobile devices now becoming almost ubiquitous, it is important for university administrators to take advantage of these new and maturing communication media, in particular social media which is accessible to almost all smart mobile device users, aided by the Internet.
 - i. WhatsApp, Facebook, and YouTube are the most utilised social media platforms by Nigerian university students, as found by this study. Therefore, Nigerian universities should create their own account on these platforms; ensure that these platforms contain essential and current information for their students; and make the university official account or link available and accessible to all students.

8 Suggestions for further studies

The present study was limited in certain areas. Only students from three Nigerian universities were sampled. Therefore, further research should extend to other universities in Nigeria. This should include state and private universities.

The present study also focused exclusively on university students and did not investigate lecturers who are equally users of new communication technologies particularly for educational reasons. Future studies should aim at understanding, from the perspective of the lecturers, factors affecting the use of new communication technologies in educational context.

Further studies should also be conducted to examine details of the information communicated by students with their lecturers especially by students living off-campus. This is necessary for designing and developing digital communication technologies which have become important in interpersonal communication between

students and their lecturers. Conducting a focus group discussion and in-depth interview could give more insight in this regard.

Data availability The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. Data will be de-identified when shared.

Declarations

Competing interests We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by both of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

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