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# The Effects of Smartphone Usage on Students' Academic Performance: Case Study of Four Selected Tertiary Institutions in North-West Nigeria

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## Abstract
*This study investigates the effects of smartphone usage on the academic performance of undergraduate students in tertiary institutions in North-West Nigeria. With the increasing integration of smartphones into daily life, understanding their influence on education has become essential. The study adopted survey research design. Data were collected through closed ended questionnaire instrument and administered to 400 students from the University and Polytechnic which 396 questionnaire were returned correctly. Simple random sampling technique was used. Descriptive statistical illustrator such as tabulations, frequency distribution and percentage were used for statistical analysis. The findings shows that 97.22% of the respondents identify the purpose of smartphone usage is mainly for making phone calls and 98.23% for chatting with friends and family (via apps such as WhatsApp). The result also reveals that 76.26% of the respondents utilised it for academic purposes. More so, the study indicates that 81.31.16% of the respondents strongly agree and agree that they spent more time in their studies rather than on their smartphone. Also the findings shows that 86.11% of the respondents combined agree that they use smartphone to obtain materials to complement their lecture note. Finally the study indicates that 74.24% of the respondents identified inadequate ICT infrastructure whereas 74.75% identified inadequate knowledge of the use of smartphones for learning as the challenges of smartphone usage to access or share academic materials. Therefore, the study recommends that tertiary institutions should consider incorporating smartphone usage into their curricula. By training students on effective ways to utilise smartphones for academic purposes, institutions can transform potential distractions into powerful learning. The study further recommends that the institutions should address infrastructural issues and provide resources for students, ensure that they can leverage smartphones effectively for their studies.*

**Keywords:** Smartphone; Academic performance; Nature of usage; Students; Tertiary institution.

## INTRODUCTION
The rise of Information and Communication Technology (ICT) and internet access has profoundly impacted nearly every aspect of human life, particularly in education (Darko-Adjei, 2019). ICT has played a crucial role in educational development, including the

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integration of smartphones as valuable learning tools in schools (Rambitan, 2015). Smartphones have become essential to daily life for many, especially undergraduate students. Recently, their use among undergraduates has surged, serving various purposes like communication, entertainment, and accessing educational materials (Zhang *et al*., 2021). These devices are now among the most popular multifunctional tools in communication technology. Research indicates that a significant number of individuals, particularly younger people, are constantly engaged in activities such as calling, texting, chatting, and gaming, making smartphones an indispensable part of modern life. With internet access, information can be shared almost instantly, spreading rapidly throughout the online community (Bello & Aliyu, 2022).

According to Taylor (2023) from Statista, a global business data platform, the number of smartphone users in Nigeria, Africa's largest economy and most populous country, is projected to exceed 140 million by 2025. Current estimates suggest that there are between 25 and 40 million smartphone users in Nigeria, though exact numbers are difficult to ascertain. However, data indicates a strong growth trajectory for the Nigerian smartphone market, with user numbers expected to triple in the next five to six years. Moreover, research shows that smartphone ownership is notably high among university students, who use their devices for various personal and academic purposes (Ataş & Çelik, 2019). The use of smartphones among tertiary students has surged in recent years, prompting higher education institutions to devise effective strategies to harness this trend and foster a more autonomous learning environment (Ng *et al*., 2017). Furthermore, smartphone usage is widespread among college students in Nigeria, who represent a significant portion of the country's smartphone users (Nwachukwu & Onyenankeya, 2017).

However, there are concerns about the negative impact of smartphones on academic performance due to students' increasing dependence on these devices. One major issue is the potential for distraction; students engaged in their studies can easily be side-tracked by online entertainment, instant messaging, and social media. Excessive smartphone use for non-academic activities can reduce productivity, hinder time management, and make it difficult to focus on essential academic tasks (Punir, 2021). Despite the clear advantages of convenience and connectivity that smartphones provide, worries persist about their effects on students' academic success. It is crucial for educators, policymakers, and students to understand the complex relationship between smartphone usage and academic performance (Sarumaha, 2024).

Thus, this study aims to investigate the effects of smartphone usage on students' academic performance, a case study of four selected tertiary institutions in North-West Nigeria. The specific objectives of the study are: to determine the purpose of smartphone usage among students; to determine how students use smartphones for academic activities; to determine the perception on the effect of time spent on smartphone and students' academic performance; to determine the benefits of smartphone usage to academic performance; and to determine the challenges of smartphone usage to access or share academic materials.

**The Concept of Smartphone**

A smartphone is an advanced mobile device equipped with a unique operating system that integrates features typical of personal computers and offers high-speed mobile broadband capabilities. This innovation is one of the most dynamic developments globally (Gupta, 2015). Over recent years, smartphones have emerged as the next generation of mobile phones and have quickly dominated the market. With their mini keyboards, smartphones serve not only

as phones but also perform computer functions such as email, calendar management, and office applications for reading and editing documents. Their multimedia capabilities, including advanced cameras, video recording, and podcasting, can compete with specialised devices. Also, smartphones can be customised with an increasing variety of software applications. Popular features include social media platforms (like Facebook, Twitter, Instagram, and WhatsApp), GPS functionality, and gaming (Sheeba, 2022).

**The Uses of Smartphones for Academic Activities**

In the digital age, smartphones are powerful tools for students, providing quick access to vast information beyond traditional textbooks. They enable online research, collaboration through virtual platforms, and interactive learning, fostering self-directed learning. Smartphones also revolutionise communication, allowing real-time interactions with professors and classmates via email, messaging apps, and video conferencing. This connectivity supports effective academic exchanges and personalised learning experiences (Punir, 2021). The works of Ifeanyi & Chukwuere (2018) found that students frequently use smartphones to interact with peers and professors, but identified several features that serve as distractions, negatively affecting academic capabilities and progress. Darko-Adjei (2019) did a study on the use and effects of smartphones as learning tools in distance education. The author's findings showed that distance learning students found smartphones to be beneficial for their academic activities. However, the study also identified some negative effects associated with smartphone use among these students.

**The Impact of Smartphones on Students' Academic Performance**

Different research has been carried out to explore the impact of smartphone on students' academic performance. Ahmed *et al*. (2020) examined the impact of smartphones on the academic performance of university students. Their findings revealed that smartphone functionalities significantly affect students' academic performance and that both moderating and mediating variables also play a crucial role in influencing both external and internal factors. Amez & Baert (2020) conducted the first systematic review of existing research on smartphone use and academic success. The study indicated a consistent negative correlation between the frequency of smartphone use by students and their academic success. However, the strength of this relationship varied depending on (a) data collection methods, (b) measures of academic performance used, and (c) definitions of smartphone use. Bjerre-Nielsen *et al*. (2020) conducted a two-year study on university students to assess the impact of in-class smartphone use on academic performance. Their findings confirmed a negative correlation between smartphone use and grades. However, using a fixed-effects model, the strength of this association decreased significantly, suggesting that previous studies may have overestimated the impact by focusing only on observed characteristics.

Punir (2021) researched on the complex relationship between smartphone use and academic performance, highlighting both positive and negative effects. While smartphones provide instant access to information and enhance learning, excessive use can lead to distractions, procrastination, and lower grades. Chathurangaa & Jaysundarab (2021) examined the impact of smartphone usage on academic performance among undergraduates. They found that students use smartphone for communication with peers and lecturers significantly improved academic outcomes, indicating that effective use of smartphones positively influences students' performance. Bello & Aliyu (2022) studied the link between smartphone use for learning and academic performance among secondary school students. The research found that students often use smartphones for accessing e-learning, sharing materials, and

communicating, which enhances their academic performance. Overall, the study concluded that smartphone use positively impacts students' academic success.

However, this study seeks to fill a critical gap by examining the relationship between smartphone usage and academic performance among students of tertiary institutions in North-West Nigeria, an area that has been underrepresented in existing research. Most studies focus on general trends in developed countries, neglecting the unique cultural, economic, and infrastructural challenges that Nigerian students face. This research offers important insights into the specific contexts of developing nations, most especially sub-Saharan Africa, particularly Nigeria, by examining how these characteristics affect both the academic benefits and possible diversions of smartphone use. Furthermore, it addresses the need for practical strategies that tertiary institutions, educators and policymakers can implement to harness the educational potential of smartphones while mitigating their adverse effects, contributing to a more informed dialogue on technology's role in enhancing learning outcomes in similar educational settings.

## METHODOLOGY

### Study Area

The study was conducted in four tertiary institutions in North-West Nigeria. The North-West is one of the six geopolitical zones of Nigeria. The zone is the largest in the country with seven states namely: Kaduna, Kano, Katsina, Kebbi, Jigawa, Sokoto and Zamfara States. The zone according to the 2006 census shows a total population of 35,786,944 with total percentage of 25.56%. The zone is home to various federal government and state government owned tertiary institutions and as well private owned tertiary institutions, which include universities and polytechnics.

### Research Method

The study deployed a quantitative survey method using questionnaires to collect data. A random sampling technique was used in selecting participants across the institutions. The questionnaire was divided into six sections, section 1 centred on the demographic characteristics of the respondents while section 2 to 6 contains the targeted questions to convey the entire enquiry.

### Population of the Study

The study's target population consists of students from four selected tertiary institutions in North-West Nigeria namely, Federal Polytechnic, Kaura Namoda, Federal University, Gusau, Ahmadu Bello University, Zaria and Kaduna Polytechnic, Kaduna. The population of the study comprises of 200 level to 500 level students in the University and National Diploma II, High National Diploma I and II in the Polytechnic.

The student population in Ahmadu Bello University is 45,000 and Federal University, Gusau is 4,000 (EduRank, 2024) while; Federal Polytechnic, Kaura Namoda has 5,000 students and Kaduna Polytechnic, Kaduna has 25,000 students (Schchat, 2024).

### Sample of the Study

100 questionnaires were distributed to students at each institution, making a total of 400 questionnaires. The questionnaires were handed out through direct engagement in classrooms across various departments. 396 responses were found correct and complete while 4 were incorrect or incomplete and excluded. This is shown in Table 1. Therefore, the sample size used was 396 comprising both male (47.73%) and female (52.27%) students.

**Table 1: Distribution of Questionnaires**

| S/No. | Institution | No. of questionnaires administered | No. of questionnaires returned correctly |
|---|---|---|---|
| 1. | Federal Polytechnic, Kaura Namoda | 100 | 100 |
| 2. | Federal University, Gusau | 100 | 99 |
| 3. | Ahmadu Bello University, Zaria | 100 | 98 |
| 4. | Kaduna Polytechnic, Kaduna | 100 | 99 |

### Data Collection

Data were collected using a self-structured questionnaire. The questionnaire contained close ended questions. The questions are structured to allow respondents to answer questions to achieve the research objectives of the study.

### Data Analysis

The gathered data from the questionnaires returned correctly were analysed using IBM Statistical Package for Social Science (SPSS) version 22 and descriptive statistics such as tabulations, frequency distribution and percentage were used for statistical analysis.

## RESULTS AND DISCUSSION

### Results

This section focuses on analysing and interpreting the data collected during the study. The data was collected through the use of close-ended questionnaires. Respondents have been asked questions that lead to achieving the research objectives of this study. Descriptive analyses were done using relevant percentages as reflected in the tables.

**Table 2: Demography of respondents**

| Characteristics | Variables | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 189 | 47.73 |
| | Female | 207 | 52.27 |
| Age group | 15-18 years | 6 | 1.52 |
| | 19-21 years | 124 | 31.31 |
| | 22-25 years | 171 | 43.18 |
| | 26-30 years | 84 | 21.21 |
| | Above 30 years | 11 | 2.78 |
| Level of study | ND II | 55 | 13.89 |
| | HND I | 69 | 17.42 |
| | HND II | 75 | 18.94 |
| | 200L | 44 | 11.11 |
| | 300L | 56 | 14.14 |
| | 400L | 51 | 12.88 |
| | 500L | 46 | 11.62 |

Source: Fieldwork (2024)

### a. Demographic of the respondents

Table 2 analyses the demographic characteristics of the 396 respondents, highlighting a slightly higher proportion of females (52.27%) compared to males (47.73%). The majority of participants fall within the age range of 19-25 years (74.49%), with the largest groups being 19-21 years (31.31%) and 22-25 years (43.18%). Only a small percentage are younger than 19 or older than 25, indicating a focus on young adults, indicating that most respondents are in the typical age range for university and polytechnic students. In terms of academic level, the distribution shows a diverse range of respondents. The highest representation is from HND II students (75 respondents, 18.94%), followed by HND I (69, 17.42%) and ND II (55, 13.89%). University students in the 200L, 300L, 400L, and 500L categories contribute 11.11%, 14.14%,

12.88% and 11.62%, respectively. This diversity across academic levels indicates that smartphone usage is prevalent among students at various stages of their education, reinforcing the notion that smartphones play a significant role in the academic lives of students across different programmes.

The demographic result suggest that the sample is primarily composed of young adults, with a slightly higher number of female respondents and a range of academic levels represented. This distribution provides a solid foundation for exploring how smartphone usage impacts academic performance, given the context of a predominantly young, engaged student population. The results indicate a relevant sample for understanding smartphone usage trends in education within the selected institutions in North-West Nigeria.

**Table 3: Purpose of smartphone usage**

| S/No | Variables | Yes (%) | No (%) | Neutral (%) |
|---|---|---|---|---|
| 1. | Make phone call | 385 (97.22%) | 4 (1.01%) | 7 (1.77%) |
| 2. | Access social media (Such as Facebook and Twitter) | 369 (93.18%) | 19 (4.80%) | 8 (2.02%) |
| 3. | Check and send email | 267 (67.42%) | 117 (29.55%) | 12 (3.03%) |
| 4. | Chatting with friends and family (such as WhatsApp) | 389 (98.23%) | 0 (0.00%) | 7 (1.77%) |
| 5. | Learning and other academic activities | 302 (76.26%) | 67 (16.92%) | 27 (6.82%) |
| 6. | Browsing the internet | 378 (95.45%) | 11 (2.78%) | 7 (1.77%) |
| 7. | Send and receive text messages (SMS) | 289 (72.98%) | 96 (24.24%) | 11 (2.78%) |
| 8. | Read documents (PDF, Word etc.) | 246 (62.12%) | 122 (30.81%) | 28 (7.07%) |
| 9. | Read news | 225 (56.82%) | 131 (33.08%) | 40 (10.10%) |
| 10. | Mobile banking/paying for goods or services | 349 (88.13%) | 31 (7.83%) | 16 (4.04%) |
| 11. | Shopping | 127 (32.07%) | 243 (61.36%) | 26 (6.57%) |
| 12. | Playing games | 266 (67.17%) | 94 (23.74%) | 36 (9.09%) |
| 13. | Take/edit pictures | 331 (83.59%) | 53 (13.38%) | 12 (3.03%) |
| 14. | Record/edit videos | 323 (81.57%) | 64 (16.16%) | 9 (2.27%) |
| 15. | Watch movie | 243 (61.36%) | 141 (35.61%) | 12 (3.03%) |
| 16. | Watch TV | 204 (51.51%) | 169 (42.68%) | 23 (5.81%) |
| 17. | Listen to music | 353 (89.14%) | 32 (8.08%) | 11 (2.78%) |
| 18. | Use as clock | 366 (92.42%) | 22 (5.56%) | 8 (2.02%) |
| 19. | Use as an alarm clock | 286 (72.22%) | 97 (24.49%) | 13 (3.28%) |
| 20 | Manage schedules | 167 (42.17%) | 201 (50.76%) | 28 (7.07%) |

Source: Fieldwork (2024)

**b. Purpose of Smartphone Usage**

Table 3 analyses the various purposes for which respondents utilise their smartphones, categorised by the percentage of respondents who answered "Yes," "No," or "Neutral." The most prominent uses of smartphones among respondents are for communication. Making phone calls (97.22%) and chatting with friends and family via apps like WhatsApp (98.23%) are overwhelmingly endorsed, indicating that these functions are essential to users' daily lives. Accessing social media platforms, such as Facebook and Twitter (93.18%), also ranks highly, reflecting the importance of these platforms for social connectivity. Smartphones serve as tools for academic engagement, with 76.26% of respondents using them for learning and other academic activities, while 67.42% check and send emails. The ability to browse the internet is affirmed by 95.45% of respondents, further indicating that smartphones are integrated into academic tasks and research. However, reading documents (62.12%) and reading news (56.82%) are less frequently noticed, suggesting that while smartphones are used for academic purposes, traditional methods may still be favoured for specific tasks.

Entertainment purposes are significant as well, with a large portion of respondents using smartphones to listen to music (89.14%), watch movies (61.36%), and record/edit videos (81.57%). Playing games also garners support from 67.17% of respondents, highlighting the smartphone's role as a source of entertainment. The data indicates that leisure activities are a major aspect of smartphone usage, which could impact academic performance if not balanced. Mobile banking and paying for goods or services are utilised by 88.13% of respondents, showcasing the smartphone's role in financial management. Functions like using the smartphone as a clock (92.42%) and alarm clock (72.22%) further emphasise its practical utility in daily life. However, the management of schedules appears less popular (42.17%), indicating potential areas for increased awareness or application.

**Table 4: Uses of smartphone for academic activities**

| S/No | Variables | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| 1. | The smartphone enables me to look up for an announcement | 206 (52.02%) | 126 (31.82%) | 31 (7.83%) | 21 (5.30%) | 12 (3.03%) |
| 2. | My smartphone enables me to look up my course timetable | 202 (51.01%) | 121 (30.56%) | 37 (9.34%) | 27 (6.82%) | 9 (2.27%) |
| 3. | My smartphone enables me to chat/email school staff/classmates | 224 (56.57%) | 117 (29.55%) | 42 (10.60%) | 8 (2.02%) | 5 (1.26%) |
| 4. | Smartphone enables me to read lecture notes | 147 (37.12%) | 134 (33.84%) | 24 (6.06%) | 67 (16.92%) | 24 (6.06%) |
| 5. | My smartphone enables me to share lecture notes with classmates | 246 (62.12%) | 95 (23.99%) | 29 (7.32%) | 19 (4.80%) | 7 (1.77%) |
| 6. | Smartphone enables me to read learning documents (such as PDF and Word) | 133 (33.58%) | 111 (28.03%) | 43 (10.86%) | 58 (14.65%) | 51 (12.88%) |
| 7. | My smartphone enables me to watch an instructional video | 97 (24.49%) | 84 (21.21%) | 37 (9.34%) | 91 (22.98%) | 87 (21.97%) |
| 8. | Smartphone enables me to surf the internet for learning materials | 203 (51.26%) | 148 (37.37%) | 13 (3.28%) | 21 (5.30%) | 11 (2.78%) |
| 9. | My smartphone enables me to take photos of lectures | 69 (17.42%) | 57 (14.39%) | 32 (8.08%) | 146 (36.87%) | 92 (23.23%) |
| 10. | My smartphone enables me to record videos of lectures | 64 (16.16%) | 61 (15.40%) | 28 (7.07%) | 131 (33.08%) | 112 (28.28%) |
| 11. | My smartphone enables me to record audio of lectures | 87 (21.97%) | 75 (18.94%) | 32 (8.08%) | 111 (28.03%) | 91 (22.98%) |

Source: Fieldwork (2024)

**c. Uses of Smartphone for academic activities**

Table 4 analyses the various academic uses of smartphones among respondents. The result show that smartphones are primarily viewed as tools for communication and information access. A majority of respondents strongly agree (52.02%) and agree (31.82%) that smartphones enable them to look up for announcements, highlighting their role in facilitating communication with educational institutions. Similarly, 56.57% strongly agree and 29.55% agree that smartphones allow them to chat or email school staff and classmates, reinforcing the importance of these devices in maintaining academic connections. Respondents also recognise the value of smartphones in managing academic resources. A high percentage of combined 86.11% (strongly agree and agree) concur that smartphones enable them to share lecture notes with classmates, indicating a collaborative approach to learning. Moreover, 51.26% affirm that smartphones help them surf the internet for learning materials, which aligns with modern educational practices that encourage online research.

The responses regarding reading lecture notes and learning documents reveal a more mixed perspective. While a combined 70.96% affirm that smartphones enable them to read lecture notes (strongly agree and agree), there is a noticeable proportion (16.92%) who disagree. Similarly, 61.61% indicate that they can read learning documents, but a significant number express disagreement (27.53%), suggesting potential limitations in using smartphones for in-depth reading. The use of smartphones for multimedia learning, such as watching instructional videos and recording lectures, receives less favourable responses. Only 24.49% strongly agree and 21.21% agree that they can watch instructional videos, while a substantial number (44.95%) disagree. This pattern is echoed in the responses about recording lectures, where only 16.16% strongly agree that they use their phones to record videos, and many respondents (61.36%) disagree. This may point to a reluctance to use smartphones for recording or viewing instructional content.

**Table 5: Perception on the effect of time spent on smartphones and academic performance**

| S/ No | Items | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| 1. | Time spent on my smartphone is greater than the time spent on my studies | 32 (8.08%) | 19 (4.80%) | 23 (5.81%) | 166 (41.92%) | 156 (39.39%) |
| 2. | The time spent on my studies is greater than the time spent on my smartphone | 163 (41.16%) | 159 (40.15%) | 26 (6.57%) | 17 (4.29%) | 31 (7.83%) |
| 3. | No improvement in my results since I became engaged with a smartphone | 8 (2.02%) | 11 (2.78%) | 46 (11.62%) | 124 (31.31%) | 207 (52.27%) |
| 4. | No relationship between time spent on smartphones and academic performance. | 107 (27.02%) | 111 (28.03%) | 16 (4.04%) | 87 (21.97%) | 75 (18.94%) |

Source: Fieldwork (2024)

**d. Perception on the effect of time spent on smartphones and academic performance**

Table 5 analyses respondents' perceptions regarding the effect of time spent on smartphones and academic. The majority, 41.92%, disagree with the statement that they spend more time on their smartphones than studying, while 39.39% strongly disagree, indicating that most students believe they prioritise their studies over smartphone use. In contrast, a significant portion (41.16%) strongly agree and 40.15% agree that their study time exceeds smartphone time, reinforcing the idea that students strive to balance their academic responsibilities.

However, when it comes to the perceived effectiveness of this balance, only a small percentage (2.02% strongly agree and 2.78% agree) claim that there has been no improvement in their

academic results since using smartphones. This suggests that while smartphones are prevalent, they might not necessarily be detrimental to academic performance for many students. In terms of the relationship between smartphone usage and academic performance, a combined total of 55.05% agree or strongly agree that there is no correlation, suggesting a divided opinion. While some students might see smartphones as beneficial tools, others may recognise potential distractions.

**Table 6: Benefits of smartphone usage to students' academic performance**

| S/No | Variables | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| 1. | My smartphone is used to obtain materials to complement my lecture notes | 209 (52.78%) | 132 (33.33%) | 8 (2.02%) | 24 (6.06%) | 23 (5.81%) |
| 2. | Smartphone is used to enhance my understanding of topics discussed in class | 204 (51.51%) | 147 (37.12%) | 7 (1.77%) | 21 (5.30%) | 17 (4.29%) |
| 3. | Smartphones help me to learn more independently | 149 (37.63%) | 164 (41.41%) | 38 (9.59%) | 26 (6.57%) | 19 (4.80%) |
| 4. | Smartphones promote the global sharing of knowledge | 143 (36.11%) | 171 (43.18%) | 36 (9.09%) | 24 (6.06%) | 22 (5.56%) |
| 5. | Smartphone enhances the learning environment | 148 (37.37%) | 163 (41.16%) | 31 (7.83%) | 28 (7.07%) | 26 (6.57%) |

Source: Fieldwork (2024)

**e. Benefits of smartphone usage to students' academic performance**

Table 6 analyses the perceived benefits of smartphone usage on students' academic performance. A significant majority of respondents (52.78% strongly agree and 33.33% agree) use smartphones to obtain materials that complement their lecture notes, indicating that smartphones are seen as valuable tools for enhancing educational resources. Similarly, 51.51% strongly agree and 37.12% agree that smartphones enhance their understanding of class topics, suggesting that these devices play an important role in facilitating comprehension of academic content. Furthermore, 37.63% and 41.41% of respondents strongly agree and agree respectively that smartphones help them learn independently, highlighting the autonomy that smartphones provide in the learning process. The feeling is echoed in the belief that smartphones promote global knowledge sharing, with 36.11% strongly agreeing and 43.18% agreeing, emphasising the devices' role in connecting students to a wider array of information and perspectives. Finally, a considerable number of respondents (37.37% strongly agree and 41.16% agree) feel that smartphones enhance the overall learning environment.

**Table 7: Challenges of smartphone usage to access or share academic materials**

| S/No | Items | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| 1. | Inadequate knowledge of the use of smartphones and other mobile devices in learning | 151 (38.13%) | 143 (36.11%) | 43 (10.86%) | 31 (7.83%) | 28 (7.07%) |
| 2. | Inadequate ICT infrastructure (Power, data subscription, unstable internet connection) | 162 (40.91%) | 134 (33.84%) | 24 (6.06%) | 37 (9.34%) | 39 (9.85%) |
| 3. | The modern learning environment is moving towards adopting the use of smartphones and other mobile devices in learning | 147 (37.12%) | 139 (35.10%) | 67 (16.92%) | 27 (6.82%) | 16 (4.04%) |
| 4. | I am addicted to smartphone usage which affect my academic. | 16 (4.04%) | 12 (3.03%) | 46 (11.62%) | 139 (35.10%) | 183 (46.21%) |

Source: Fieldwork (2024)

**f. Challenges of smartphone usage to access or share academic materials**

Table 7 analyses the challenges faced by students in using smartphones to access or share academic materials. A substantial portion of respondents indicated that inadequate knowledge of smartphone usage poses a significant barrier, with 38.13% strongly agreeing and 36.11% agreeing. This suggests that many students may not fully leverage the capabilities of their devices for educational purposes. In terms of infrastructure, 40.91% of respondents strongly agree and 33.84% agree that inadequate ICT infrastructure (such as inconsistent power supply, costly data subscriptions, and unstable internet connections) hinders their ability to effectively utilise smartphones for learning. This reflects broader systemic issues that can impact students' access to digital resources.

Interestingly, while 37.12% strongly agree and 35.10% agree that the modern learning environment is increasingly adopting smartphones, the high levels of agreement with the challenges suggest a disparity between potential and practice. Furthermore, only 4.04% strongly agree that addiction to smartphone usage affects their academics, with a significant 46.21% strongly disagreeing. This indicates that while students acknowledge the benefits and challenges, many do not perceive their smartphone use as detrimental to their academic performance.

**Discussion**

The study has offered important insights into the complex and varied relationship between smartphone and students' academic performance. The study noted a gender balance with a slight female majority in smartphone usage (52.27% female and 47.73% male), and a strong usage among younger age groups (74.49% aged 19-25). This aligns with existing literature, which found that younger students are more likely to use smartphones for both social and academic purposes (Ifeanyi & Chukwuere, 2018; Darko-Adjei, 2019). However, this findings indicate a broader usage spectrum across academic levels, which could suggest a more widespread acceptance of smartphones in educational settings.

The study's findings will be discussed in relation to each of the research objective. The first objective was to determine the purpose of smartphone usage among students. The purposes identified by this study such as social interaction, internet browsing, and learning correspond with findings from previous research. For instance, Punir (2021) noted that while smartphones facilitate communication, they can also distract students from academic tasks. This study results confirm this duality, showing that while students use smartphones for academic activities (76.26% for learning), they predominantly utilise them for social interaction and entertainment. This reinforces findings by Amez & Baert (2020), who pointed out a consistent negative correlation between heavy smartphone use and academic success.

The second objective was to determine how students use smartphones for academic activities. This findings reveal that students perceive a generally positive impact of smartphones on academic performance resonate with the mixed outcomes reported in the literature. For example, Ahmed et al. (2020) highlighted both positive and negative effects, aligning with this finding that students who utilise smartphones for academic purposes often report enhanced performance. However, this study also reflects concerns about distraction, similar to Bjerre-Nielsen *et al*. (2020), who found that in-class smartphone use negatively correlated with grades. The complexity of this relationship is well-mentioned in this study literature review, suggesting that context (e.g., cultural and infrastructural factors in Nigeria) can significantly influence outcomes.

The third objective was to determine the perception on the effect of time spent on smartphone and students' academic performance. In Table 5, the majority of respondents believe they spend more time studying than on smartphones. This contradicts some studies, like those by Punir (2021) and Amez & Baert (2020), which often found that excessive smartphone use detracted from study time. This study results may reflect a more positive self-assessment among students in North-West Nigeria, perhaps influenced by cultural factors or differences in educational approaches that encourage academic engagement.

The fourth objective was to determine the benefits of smartphone usage to students' academic performance. The study findings show a strong consensus on the benefits of smartphones for academic performance, particularly in obtaining supplementary materials and enhancing understanding of topics discussed in class. This supports the findings of Bello & Aliyu (2022), who demonstrated that smartphones can significantly aid students in accessing educational resources. The high levels of agreement on the usefulness of smartphones for enhancing comprehension suggest that, when effectively integrated into their academic routines, smartphones can positively influence learning outcomes.

The fifth objective was to determine the challenges of smartphone usage to access or share academic materials. This study identified inadequate ICT infrastructure and knowledge as significant challenges aligns with findings from previous research. Many studies, including those by Bello & Aliyu (2022), have noted that poor connectivity and lack of training on digital tools can hinder effective smartphone use for academic purposes. This highlights a crucial gap in the existing literature, particularly in the context of developing countries, emphasising the need for targeted interventions to improve both access and training.

The study highlights the multifaceted role of smartphones in the academic lives of students in North-West Nigeria. While smartphones offer numerous benefits that can enhance learning, the challenges associated with their use and the prevalence of social interaction over academic purposes present a complex picture. These findings resonate with existing literature, emphasising the need for targeted strategies to maximize the educational potential of smartphones while addressing infrastructural and usage challenges. Furthermore, the study contributes valuable insights into the nuanced role of smartphones in academic settings, particularly within a Nigerian context that has been underrepresented in existing research. By comparing these findings with related literature, it becomes clear that while many trends are consistent with global patterns, local factors play a significant role in shaping student experiences and outcomes.

## CONCLUSION

This study examined the complex relationship between smartphone usage and academic performance among students of tertiary institutions in North-West Nigeria. While smartphones serve as valuable tools for enhancing access to educational resources and facilitating communication, they also present challenges such as potential distractions and inadequate infrastructure. The findings indicate that 97.22% of respondents primarily use smartphones for making phone calls, while 98.23% use them for chatting with friends and family through apps like WhatsApp. Additionally, 76.26% of respondents reported using their smartphones for academic purposes. The study also found that 81.31% of participants combined agree that they dedicate more time to their studies than to their smartphones. Furthermore, 86.11% of respondents collectively agree that they use smartphones to obtain materials that complement their lecture notes. However, the findings shows that 74.24% of the respondents identified inadequate ICT infrastructure while 74.75% identified inadequate

knowledge of the use of smartphones for learning as the challenges of smartphone usage to access or share academic materials. To maximise the benefits of smartphone technology in educational settings, tertiary institutions must develop targeted strategies that promote effective use while addressing the challenges identified. Finally, this research contributes to understanding of how students use their smartphones and recommends how smartphones can be used for positive purposes, offering insights that are particularly relevant for tertiary institutions, educators and policymakers in Nigeria. The findings are significant and merit further attention, as such, the researchers would like to recommend the following:

- Tertiary institutions should consider incorporating smartphone usage into their curricula. By training students on effective ways to utilise smartphones for academic purposes, institutions can transform potential distractions into powerful learning tools.
- Addressing the identified challenges such as inadequate ICT infrastructure is crucial. The institutions should invest in improving internet connectivity and providing resources for students, ensuring that they can leverage smartphones effectively for their studies.
- Implementing workshops focused on digital literacy can help students maximise the educational benefits of smartphones. These programmes should cover topics such as using educational apps, conducting effective online research, and managing time spent on devices.
- The institutions should promote awareness about responsible smartphone use, highlighting strategies to avoid distractions while studying. This could involve creating guidelines or campaigns that encourage balance between academic responsibilities and smartphone activities.
- The institutions could benefit from partnerships with educational technology experts to develop tailored applications or platforms that support academic activities and enhance student engagement.
- Future research should continue to explore this evolving relationship, considering additional variables such as socio-economic factors and the specific contexts of different educational settings.

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