KNOWLEDGE AND APPLICATION OF CHATGPT FOR ACADEMIC PURPOSES AMONG UNIVERSITY STUDENTS IN BORNO STATE, NIGERIA

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ABSTRACT

AI-powered technologies such as ChatGPT are impacting how students carry out their academic activities. While ChatGPT has the capabilities to serve as an e-teacher, an analyst, and a writer, research on the knowledge and application of this novel technology in Borno State, a post-conflict recovery area, is not clear. This study examines the awareness, areas of application, and challenges of adopting ChatGPT among students for academic purposes in the State. A quantitative survey method was employed for the study. A total of 278 university students participated in the research through the use of the questionnaire. The study revealed that the majority of the university students in Borno State are aware of ChatGPT (60.1%), and they got to know about it on the internet. Furthermore, the study revealed that although the majority of university students are aware of ChatGPT, only 53% of the total respondents have used it before, and their mobile phones were the major devices (88.6%) they used. This study further revealed that students use ChatGPT as a research assistant (47.1%), and overdependence and the limited understanding of context by ChatGPT were the major challenges faced by students using this chatbot for academic purposes. Based on these findings, this study recommends that ChatGPT be redesigned to capture and operate in line with the peculiar socio-cultural settings of Africa vis-à-vis academic learning.

KEYWORDS: ChatGPT, Artificial Intelligence (AI), Large Language Model (LLMs), OpenAI, Chatbot

Introduction

One of the unique developments of the 21st century is Artificial Intelligence (AI). This new and evolving technology has transformed different sectors such as health, agriculture, marketing, security, and education. This new technology, called AI has redefined the relationship between man and machine from one-way communication (human to machine) to two-way communication (humans to machine and machine to human). One AI technology that is redefining this

relationship between machine communication and human communication is ChatGPT. ChatGPT is a large language model-based Chatbot developed by OpenAI and trained to generate human-like texts based on context and past experiences, and conversations. It was released to the public on 30th November, 2022, by OpenAI and has increasingly been used as an educational technology across the world (Harris 2022). Though AI has not been integrated into the education curricula in Nigeria and other African countries, some tertiary institutions in Borno State have personalized it into some of their programmes and courses.

AI tools such as ChatGPT are major players in the contemporary education system globally (Joshi, 2022). With the rate at which ChatGPT is increasingly gaining acceptance among students of tertiary institutions, as it can be easily accessed through mobile devices, there is a high probability that this figure will drastically increase with the availability of adequate knowledge about its application. Berg (2023) argued that AI tools have three potential uses for academic practices: first, AI serves as a mentor, second, AI serves as an analyst, and third, AI serves as a writing tool. Furthermore, ChatGPT has improved accessibility to education, enabling students with disabilities and non-English speakers to have access to academic content in different forms (audio, video, and text). Unlike well-known AI tools like Siri (developed by Apple), Alexa (by Amazon), and Google Assistants, which require a slew of related products such as an iPhone, Echo Dot, or Google devices despite not having voice processing capabilities, ChatGPT is more affordable – it can run on any device and with basic literacy. Although ChatGPT has positive implications for academic activities, Harve (2023) observes that ChatGPT can lead to a lack of academic integrity.

University students in Borno State, like their counterparts in other states of the federation, are active users of technology. They frequently use it for research, learning, communicating, and socializing. The impact of the decade-long insurgency has affected every facet of human life in the state, most especially the education sector. It has also affected the state's economy and families, creating a digital divide in terms of the availability and accessibility of educational technology in the state. Despite the great benefit students could derive from using ChatGPT for educational purposes, it seems like there is inadequate knowledge about the cutting-edge technology among university students in Borno State. Hence, this explorative study empirically examines the knowledge of AI-powered ChatGPT, its application, and challenges among university students in Borno State for academic purposes. Considering the ethical challenges surrounding its usage, the key question is how do university students utilize ChatGPT for their assignments, research, and learning.

The newness of frontier technology, such as ChatGPT, opens an empirical gap in the knowledge and application of this AI-propelled chatbot among students. Students are constantly searching for better ways to improve productivity in their academic pursuits and are always the early adopters and users of new technologies. One of the challenges that students tend to face in the adoption and use of Chatbots is the knowledge of how the chatbot works and how to deploy them for academic purposes, given the novelty of generative AIs. Sirimanne (2023) notes that low and mostly middle-income countries are in the worst situation to take advantage of these technologies, given their low share of skilled workers and relatively slow download speed. This study, therefore, examines the knowledge and application of CatGPT for academic purposes among university students in Borno State. It firstly attempted to examine the level of awareness of ChatGPT among university students in Borno State. Secondly, the study sought to identify the channels through which the university students got to know about ChatGPT. Thirdly, the researchers attempted to determine the areas of application of ChatGPT for academic purposes among university students. Finally, the paper sought to ascertain the challenges faced by university students in adoption of ChatGPT for academic purposes in Borno State.

LITERATURE REVIEW
AI, ChatGPT, and Education in Borno State

ChatGPT, an AI tool developed by OpenAI, is a cutting-edge language model built on 175 billion parameters that has revolutionized education by offering personalized learning experiences (Heaven 2023). Its ability to generate human-like responses and engage in dynamic conversations could create an interactive learning environment for students (Mikalef, Fjortoft, & Torvatn, 2019). ChatGPT can serve as a virtual tutor, clarify doubts, explain complex concepts, and provide tailored guidance to students (Zhai, 2023). Additionally, it offers a diverse range of educational resources, aiding research and project development if correctly utilized.

ChatGPT's integration in education marks a promising advancement, enhancing accessibility and fostering a tech-savvy, knowledge-driven society. More so, in a society like Nigeria, where the education sector over the years has been endangered by persistent strict actions by the Academic Staff Union of Universities (ASUU), insecurity, unstable economy, and, recently, the COVID-19 pandemic. This is also coupled with the poor economic and financial strength of families to educate their children at all levels. To solve this, the application of AI tools such as ChatGPT in education may be the panacea. ChatGPT can promote

learning among students from poor families. Interestingly, there are deliberate and demonstrated efforts by both the federal and state governments to revive the education sector in Borno State. The federal government's Digital Literacy Policy and Strategic Action Plan to promote digital literacy proficiency in the country will be helpful if implemented.

Through the implementation of the above strategies, the federal government expects that by 2025, it will enroll over 5 million out-of-school children back in school and increase the literacy rate to about 80%. This plan will focus on achieving some goals, such as training teachers, providing IT facilities and ICT training tools, developing e-learning programmes, and introducing digital literacy in the curricula at all levels. There are some collaborations by these institutions and other government agencies, like NIITDA, and NCC, in the training of both students and teachers in modern ICT skills to enhance their proficiency in the use of technology like AI for the development of society.

Therefore, it will not be surprising to see students in these institutions using ChatGPT for academic purposes. In addition, the economic hardship that students in these institutions face as victims of the Boko Haram insurgency, either directly or indirectly, and the cost of using ChatGPT have created some perceptions among the students concerning the use of ChatGPT. These perceptions may be because of the digital divide created by the unavailability and inaccessibility of ChatGPT to some of the students (Nuhu & Onojah, 2022). Despite some challenges surrounding the use of AI in the education sector such as credibility (Bonsu & Baffour-Koduah, 2023) and plagiarism (Aydin & Karaarslan, 2022), AI education does not recognize the contextual and cultural values in the African context to allow students deploy their skills and knowledge in the application of the technology (Sanusi, Olaleye, Oyelere, & Dixon, 2022). But ChatGPT, as a chatbot, can also play a crucial role in promoting digital inclusion and literacy, bridging the digital divide by providing easy-to-understand information on digital technology and internet usage. This can empower students, especially in a society affected by insurgency like Borno State. However, it is crucial to teach students to discern reliable sources through critical thinking and verification of information. ChatGPT can contribute significantly to the education sector to help increase the literacy rate. The world is already digital, and students need to be computer and AI literate to compete favourably in the future.

AI, ChatGPT, and National Development
Technology is a major driver of national development in most African countries. In recognition of this fact, the government of Nigeria has made it a component

of its national development plan (2021-2025). The country accounts for over 29% of internet users in Africa, with an increasing internet penetration. Most of these internet users access internet services through their mobile phone devices with the help of telecommunication and internet service providers. Likewise, the federal government of Nigeria established the National Agency for Research in Robotics and Artificial Intelligence (NARRAI) in the year 2018 to investigate how Artificial Intelligence can be utilized for the economic growth and national development of the country (Thomas & Gambari, 2021).

ChatGPT is a powerful artificial intelligence technology that runs on both web and mobile devices. It holds significant potential for contributing to national development across various sectors. In education, ChatGPT can enhance learning experiences by providing personalized tutoring, assisting with research, and promoting digital literacy (Lozano & Fontao, 2023). In healthcare, it can aid in medical research, support mental health initiatives, and offer health-related advice (Spatharous, Hieronimus & Jenking 2020). Moreover, in business and innovation, ChatGPT can optimize customer service, streamline operations, and foster creativity. Additionally, it can aid disaster management in areas like climate change by analysing data, predicting trends, and offering real-time assistance during crises. Overall, integrating ChatGPT into various sectors can significantly advance a nation's development and foster progress.

It is in view of these ideas that this study expects that with the increasing popularity of ChatGPT, which has completely altered the communication industry on the global scene, the Nigerian government would have been head-on to fully implement its digital literacy plan. More so, in a public tertiary institution like the University of Maiduguri and the Kashim Ibrahim University, one would question the level of adoption of the new technology in enhancing learning and research for community development in a post-conflict environment. Especially one that is facing many social developmental threats, such as climate change, gender inequality, out-of-school children, and food security. These are caused by the unprecedented urbanization of Maiduguri, the state's capital, due to the influx of Internally Displaced Persons (IDPs), who have made available resources to be overstretched.

Knowledge of ChatGPT
Recent advancements in information and communication technologies have changed how students seek information globally. Pertinently, the advent of AI has revolutionized students' engagement in the pursuit of knowledge by offering new ways of accessing information, conducting research, and generating ideas in a faster way (Zhai, 2023). Students' knowledge about ChatGPT has rapidly

expanded in recent years (Bonsu & Baffour-Koduah, 2023). Social media is one of the main sources of knowledge on ChatGPT among students in Nigeria. As students interact with ChatGPT, they gain insights into its capabilities and limitations. They also learn that while ChatGPT can provide valuable information and guidance, it is essential to critically evaluate the generated content for accuracy and reliability. Furthermore, students recognize the ethical implications of AI, discussing issues such as biases present in the training data and potential misuse of AI-generated content.

With the technological advancements in the 21st century, there is great potential for the use of AI in education. Innovations will soon emerge, and the concerns about their mode of usage will equally grow. But such concerns can be answered by continued research and development to enhance students' knowledge about the application of AI, if they succeed. The availability of more information about the uses and challenges of AI in the education sector would provide knowledge on better ways to use the tool against known ethical problems, such as bias, inaccuracy, and plagiarism. Students need to be trained on how best to use ChatGPT for academic purposes and national development.

Application of ChatGPT
Students are increasingly using ChatGPT for various purposes, including academic assistance, creative writing, coding help, language learning/editing, and generating ideas. The application of ChatGPT in education by students around the globe has revealed many opportunities for students in higher education and enhanced their performance (Shihab, Sultana, & Samad, 2023). ChatGPT promotes collaboration between students who form discussion or research groups to work on projects and assignments together (Lewis, 2022). Bonsu and Baffour-Koduah (2023) aver that there may be an increased chance of ChatGPT usage in Ghana based on the fact that it improves academic activities among students. It also gives access to a wide amount of information, simplicity, and the ability to generate ideas for research. Similarly, Cotton, Cotton, and Shipway (2023) observed that ChatGPT, when applied in education, can also suggest ideas and create personalized content for individual students, thereby improving the students' learning experiences and communication skills.

The application of ChatGPT by University students in Borno state for academic purposes is expected to equip the students with the skills to solve societal problems through research and innovation. This will further help them develop their entrepreneurship skills in creating AI content, coding, and programming. Pertinently, to ensure effective use of the ChatGPT, there is a need to guide and train students on how to use the AI tool (Pavlik, 2023) to generate academic

papers, write assignments, and conduct research (Rahman, Terano, Rahman, Salamzadeh & Rahman, 2023).

Zhai (2023) notes that AI can be useful in education in three ways: personalized learning, automating administrative tasks, and tutoring and mentorship

a. Personalized learning: this is the potential of AI to generate educational resources for individual students based on the students' experience. This can be done through various ways, such as adaptive learning, which centres on students' performance to adjust the learning experience to generate personalized content to assist the student improve his/her performance and learning outcomes. Personalized recommendation is another way AI is used in education. It helps students to discover new ideas and materials that are tailored to their individual needs. This is achieved by analysing students' learning style, their research pattern, and writing skills. Also, AI provides individualized instructions to students based on their needs and abilities.

b. Automating administrative tasks: AI can be used in administrative tasks in the education sector for some activities such as the enrolment and registration of students, students' records and management, grading and assessment, course scheduling, and much more.

c. Tutoring and mentorship: this refers to the use of AI to identify students' special needs and challenges and to respond to these challenges by providing feedback and instructions to enhance the learning process (Shihab, Sultana & Samad, 2023). It also involves the creation of a learning plan for students and supporting learning activities in a typical classroom setting.

Theoretical Framework
This study is guided by the Technological Acceptance Model (TAM), which was developed in 1989 by Davis, Bagozzi, and Warshaw. The Model revolves around two pivotal variables: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). However, TAM has evolved through revisions and enhancements since its inception. This model is widely recognized in the field of information systems and technology adoption. In the case of this study, the Model has been adopted to understand how and why university students in Borno State adopt or reject ChatGPT as a new generative AI technology for academic purposes. ChatGPT is one of the Generative AIs that has received acceptance globally because of its ability to generate human-like content on different subjects. The chatbot is

accessed on different devices such as laptops, phones, iPads, etc., and these devices are used by students most time for their academic purposes. The model is important in explaining students' knowledge and acceptance of ChatGPT. The information model encompasses both software and hardware technologies.

In light of this study, the key components of TAM were discussed in relation to the research problems. On the perceived usefulness (PU), university students in Borno state are more likely to accept and use ChatGPT AI if they perceive the chatbot as a useful tool for academic tasks, such as research, writing, or studying. On perceived ease of use (PEU), this component explores the ease with which university students in Borno State can learn and use ChatGPT and how this perception influences their adoption of the chatbot. On Behavioural Intention (BI), this component explains how students' intention to use ChatGPT is a crucial predictor of their actual usage. On the Actual Use (AI), TAM emphasized that students' actual use of any technology, like ChatGPT, is influenced by intention and perception. In line with the model, the study examines the knowledge and adoption of ChatGPT for academic tasks. It also ascertains the factors that determine their usage patterns. While it is important to note that other factors, such as individual differences and social status, could affect the use and adoption of ChatGPT for academic tasks, knowledge of the chatbot is the foundation that can lead a student to accept or reject the chatbot.

METHODOLOGY

The study is an explorative and quantitative research. A survey research method was employed to examine the knowledge and application of ChatGPT for academic purposes among university students in Borno State, Nigeria. Borno State has four universities, namely, University of Maiduguri, Kashim Ibrahim University, Nigeria Army University Biu, and one private University, Al-Ansar University. The study examined students from the University of Maiduguri and Kashim Ibrahim University. These universities are the two major universities in the state, owned by the federal and state governments. The University of Maiduguri has a population of about 75, 000 students (Federal Ministry of Education 2021), while the Kashim Ibrahim University has about 6,102 students (Borno State Examination and Records Unit, November 11, 2023). Out of the total population of the two universities (81,102), 278 students were conveniently sampled based on their availability, ownership of smartphones, and the willingness to participate in the study. A convenient or accidental research technique is a non-probability sampling method where samples are selected because they are the easiest for the researchers to access. This can be due to the geographic proximity at a given time or the willingness to participate in the study (Nikolopoulou, 2023). A questionnaire was developed and administered to

only undergraduate students at the University of Maiduguri and Kashim Ibrahim University. The questionnaire was divided into two sections: Section A (demographic information of respondents) and Section B (research objectives).

Presentation of Findings
Table 1: Socio-demographic characteristics of respondents

Variables	Frequency	Percentage (%)
Gender:		
• **Male**	• 177	• 63.7
• **Female**	• 101	• 36.3
Age:		
• **15-20 years**	• 80	• 28.8
• **21-25 years**	• 161	• 57.9
• **26-30 years**	• 35	• 12.6
• **31-35 years**	• 1	• 0.4
• **35 and above**	• 1	• 0.4
University:		
• **University of Maiduguri**	• 97	• 34.9
• **Kashim Ibrahim University**	• 181	• 65.1
Educational Level:		
• **100 Level**	• 104	• 37.4
• **200 Level**	• 77	• 27.7
• **300 Level**	• 41	• 14.7
• **400 Level**	• 48	• 17.3
• **500 Level**	• 8	• 2.9
• **600 Level**	• 0	• 0.0

The table above shows the demographic characteristics of the respondents in the study. The demographic data revealed that the majority of the respondents are male, 63.7% while female respondents stood at 36.3. % majority of the respondents, which constitutes 57.9% fall under the 21-25 age bracket. The majority of the respondents (65.1%) were from Kashim Ibrahim University with 100-level students having the highest number of respondents. The data clearly showed that female students in the selected universities were reluctant to participate in the survey compared to their male counterparts. This could be tied to socio-cultural issues, as women are expected to be reserved. Since students in the 100 level are considered novices, the desire to participate in university

activities to get a better understanding of the workings and activities of higher education must have been the motivation.
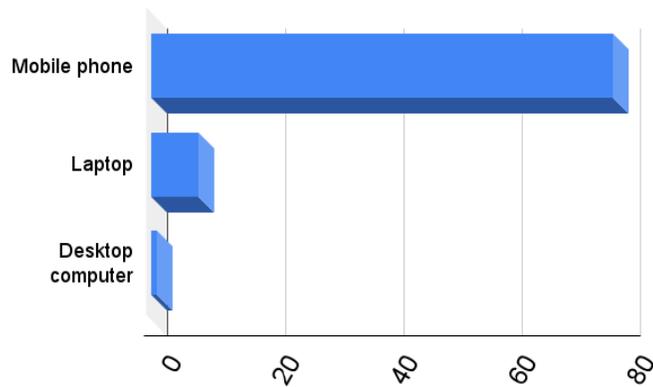
Figure 1: Awareness and use of ChatGPT?
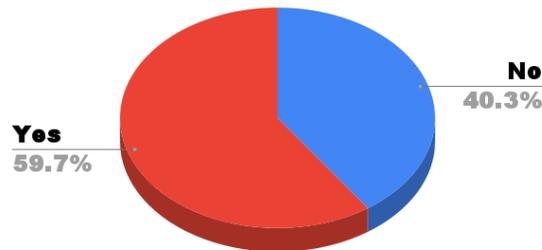
The data in Figure 1 above show the level of awareness of ChatGPT. Findings from the study revealed that out of the 278 university students in Borno State, 166 (59.7%) are aware of ChatGPT, while 112 (40.3%) are unaware of ChatGPT. Furthermore, out of 278 students who voluntarily participated in the study, 88 (53%) had used ChatGPT before, while 78 (47%) had never used ChatGPT before. The high level of awareness of ChatGPT could be a result of the trend in generative AI and other chatbots that have been included in social media platforms and websites. Additionally, the poor usage of ChatGPT by the university students in Borno State could be a result of the novelty of the chatbot, and that the students are yet to understand the workings of ChatGPT.

Further findings also revealed that out of the 166 (59.7%) university students that are aware of ChatGPT, the majority 78 (88.6%) of them got the information about ChatGPT through their phones, followed by Family and friends which stood at 24 (14.5%) with the mass media (TV Radio and Newspaper) being the least 18 (10.5%) sources of information on ChatGPT among university students. The high use of mobile phones by students to get information on different issues, including ChatGPT, is connected to the fact that these youths are netizens and mobile phones have been part of their everyday life compared to the mass media they least subscribe to.

Figure 2: Devices used by students to ChatGPT

The data in Figure 2 above revealed the devices used by university students in Borno State to access ChatGPT. Findings from the study revealed that out of the 88 students who used ChatGPT for academic purposes, 78 (88.6%) of the students used their mobile phones, 8 (9.1%) used laptops, and 1 (1.1%) student used a desktop computer. The portability of mobile phones and the capabilities of these mobile phones have received acceptance among university students who prefer to access ChatGPT for their academic work instead of using their laptops and desktops, which are bulky to carry around.
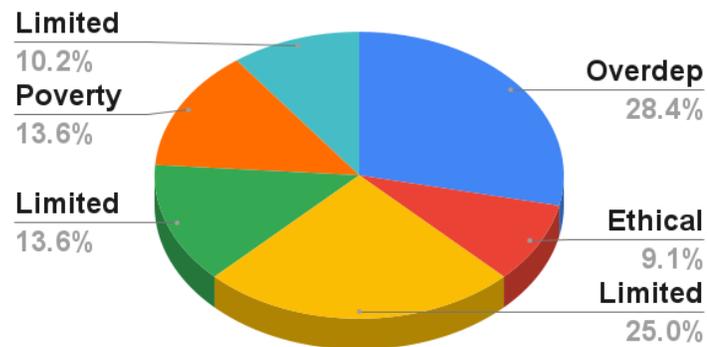
Figure 3: Areas of application of ChatGPT for academic purposes
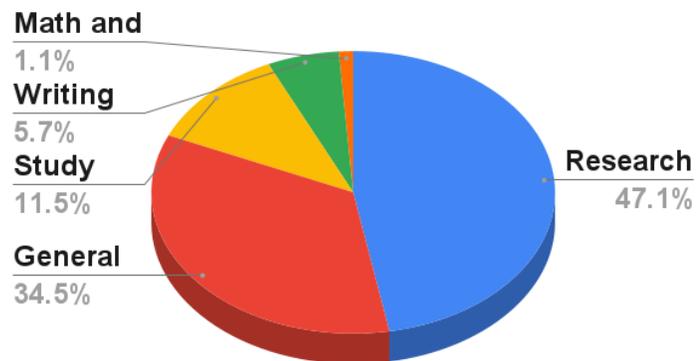
The data in Figure 3 above show the areas of application of ChatGPT for academic purposes by university students in Borno State. Findings from the study show that out of the 88 participants who use ChatGPT, the majority of the students, 42 (47.1%), used ChatGPT as research assistance, followed by the use of ChatGPT for general knowledge and questions, 31 (34.5%). Students who use

ChatGPT as a study aid stood at 10 (11.2%), writing and editing stood at 5 (5.6%), and mathematics and science support stood at 1 (1.1%). This reveals that the students used ChatGPT mainly as a research assistant to help them in doing their assignments and other academic activities. This implies that they leverage this new technology to resolve complex academic issues.

Figure 4: Challenges to the use of ChatGPT for Academic Purposes

The data in Figure 4 above show the challenges faced by university students in Borno State in the use of ChatGPT for academic purposes. Findings from the study revealed that out of the 88 participants of the study, 88 respondents claimed to be using ChatGPT, 25 (28.4%) students stated that the major challenges they faced were overdependence on ChatGPT. This was closely followed by 22 (25%) students who had a limited understanding of the context produced by ChatGPT. The major challenge of overdependence and the limited understanding of context by ChatGPT could be a result of the novelty of the chatbot to the students. Furthermore, the overdependence of students on this chatbot could also be because of the novelty and potential of the chatbot. Students are trying to understand and explore how an AI tool can generate text like humans, which has never been experienced before.

Discussion of Findings
This explorative study on the knowledge and application of ChatGPT for academic purposes among university students in Borno State, Nigeria, revealed a high level of awareness but poor adoption of the novel generative chatbot, ChatGPT, for academic purposes in Borno State. The high level of awareness of ChatGPT among university students in Borno State is due to their involvement in social media. University students use smartphones to communicate on social media; they belong to different social media groups designed for academic

purposes, and students are bound to receive information on ChatGPT, solicited or unsolicited, due to the potential and capabilities of the chatbot. Borno State is the epicentre of violent conflict caused by Boko Haram. Although relative peace is finally coming back to Borno State, one of the social institutions that has been heavily affected by the decade-long violent conflict is education. Leveraging frontier technology like ChatGPT will enhance the learning experience of students. The findings from the study revealed that more than half of university students in Borno State are aware of ChatGPT, and the internet was their source of information on ChatGPT. Additionally, they mostly used mobile phones to interact with ChatGPT. These findings are supported by the empirical exposition of Zhai (2023) and Bonsu & Baffour-Koduah (2023), who revealed that new technologies such as ChatGPT have changed the ways students now seek information globally.

The findings from the study also revealed that while the knowledge of university students in Borno State on ChatGPT is above average, this knowledge did not translate to the adoption or use of the chatbot for academic purposes. In fact, the level of adoption of ChatGPT for academic purposes is low. These could be a result of the novelty of the AI tool; students are yet to understand how to navigate this technology and the capabilities of the tool for academic purposes. Furthermore, the study revealed that a few (31%) of students who use ChatGPT mostly use it as a research assistant. However, this finding can be connected to the fact that research is a core activity that all students, irrespective of discipline, must undertake. These findings are further supported by the works of Lewis (2022) and Zhai (2023), who revealed that students use ChatGPT to promote collaboration – they form discussion or research groups to work on projects and assignments. This has further transformed how students engage with fellow students in relation to how they engage with ChatGPT for accessing information, conducting research, and generating new ideas instantly.

Furthermore, findings from this study revealed that university students in Borno State are faced with a plethora of challenges in the adoption and use of ChatGPT for academic purposes. The major challenge they faced was the overdependence on ChatGPT and the limited understanding of context by ChatGPT. These findings are supported by Sanusi, Olaleye, Oyelere, and Dixon (2022), who argued that AI tools like ChatGPT do not recognise the contextual and cultural values in the African society. This limitation of ChatGPT and other chatbots to understand cultural nuances is one of the limitations that OpenAI and other AI companies, such as Google, have acknowledged and have promised to train these chatbots on larger and more diverse datasets, as well as develop new algorithms that can help ChatGPT and other chatbots understand cultural contexts. This will help to

promote digital inclusion, bridge the digital divide, and help reduce errors that may have arisen due to the lack of a contextual understanding of the cultural diversity of these chatbots, especially in Africa.

Conclusion

This study explored the knowledge and application of ChatGPT for academic purposes among university students in Borno State, Nigeria. The study found that university students in Borno State are aware of ChatGPT, but only a few of them have used ChatGPT for academic purposes. Furthermore, the study found that university students mostly used ChatGPT as a research tool, and the major challenge they encountered was overdependence on the chatbot and the limited understanding of contexts by ChatGPT. Considering how ChatGPT is reshaping the way knowledge is acquired and processed by university students in Borno State, the study suggests that OpenAI should enhance the capabilities of ChatGPT in understanding local contexts to capture socio-cultural diversity in Africa. This will further help in closing the digital divide and bring about inclusion. Further research should focus on lecturers' knowledge application of ChatGPT in the classroom.

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Author's Contributions

Jude Moses initiated the idea of this paper and wrote the first draft. He also did the proofreading. Michael Mingyi coordinated the data gathering and analysis. He also reworked the paper based on the comments from the reviewers.

Declaration of Conflict of Interest

We the authors – Michael B. Mingyi and Jude M. Moses, hereby declared that there was no conflict of interest with any sources or persons from the beginning to the end of the processes of this paper.

Ethical clearance

The authors kindly sought and duly got ethical clearance from the respondents who provided the data used for this paper. The authors also promised confidentiality and anonymity to each of the respondents and the promise was kept throughout the paper.

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