



Use of Artificial Intelligence Tools and Academic Performance of Undergraduates at Nasarawa State University, Keffi

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Abstract

This study examined the use of artificial intelligence (AI) tools among undergraduate students at Nasarawa State University, Keffi. The study was anchored on the Diffusion of Innovations Theory. A quantitative research design employing a descriptive survey was adopted. The study population comprised 12,450 undergraduate students, from which a sample of 400 respondents was selected using a multistage sampling technique. Of the questionnaires administered, 386 were validly completed and analysed using descriptive statistics. The findings revealed that ChatGPT, Grammarly and QuillBot were the AI tools most commonly used by students for academic activities. The study also found that most respondents used AI tools regularly and perceived them as supporting learning by improving access to information, academic writing, research and understanding of course content. However, poor internet connectivity, high data costs, limited digital literacy and inadequate access to digital devices were identified as the major challenges affecting the effective use of AI tools. The study concludes that AI has become an important learning-support technology among undergraduate students, although its effective use depends on access to digital infrastructure, AI literacy and responsible use. It recommends that universities strengthen digital infrastructure, integrate AI literacy into the curriculum and develop institutional guidelines to promote the ethical and effective use of AI tools for academic activities.

Keywords: artificial intelligence, AI tools, academic performance, digital learning

Introduction

Artificial intelligence (AI) has become an important part of higher education, changing how students learn, conduct research and complete academic tasks. Artificial intelligence refers to computer systems that are designed to perform tasks that normally require human intelligence, such as learning, reasoning, problem-solving, language processing and decision-making (Elegunde & Shotunde, 2024). AI tools such as ChatGPT, QuillBot, Grammarly and Gemini help students generate ideas, summarise information, improve writing and understand difficult concepts. As the use of these technologies continues to increase, researchers and educators are becoming more interested in their influence on students' academic activities and learning outcomes (Kasneji et al., 2023). AI tools also help students generate ideas, summarise information, improve writing and understand difficult concepts. As the use of these technologies continues to increase, researchers and educators are becoming more interested in their influence on students' academic performance (Mogaji & Nguyen, 2022).

Traditionally, students relied on textbooks, libraries and independent research to complete assignments and other academic activities. While this approach helped develop critical thinking and research skills, it was often limited by time, access to learning resources and students' research abilities (Ambrose et al., 2010). AI tools now provide faster access to information and academic support, making it easier for students to complete academic tasks more efficiently (Utami et al.,



2023; Aljuaid, 2024). Studies have shown that AI can improve learning by helping students organise ideas, enhance writing quality, summarise academic materials and understand complex topics (Efebeh et al., 2024; Alshater, 2022). However, concerns have also been raised about students becoming overly dependent on AI, which may reduce critical thinking and independent learning. Other challenges include poor internet access, high data costs, limited digital skills, and concerns about plagiarism and academic integrity (Zawacki-Richter et al., 2019; Howard et al., 2021). Therefore, this study examines the use of artificial intelligence tools and academic performance among undergraduates at Nasarawa State University, Keffi.

Statement of the Problem

Artificial intelligence (AI) tools are expected to improve teaching and learning by helping students access information quickly, develop ideas, improve academic writing and complete research tasks more effectively. When properly used, AI applications such as ChatGPT, Grammarly and QuillBot can enhance students' learning experiences and contribute to better academic performance. Despite these benefits, many undergraduate students in Nigerian public universities face challenges that limit the effective use of AI tools. Poor internet connectivity, high data costs, limited access to digital devices and inadequate digital skills reduce students' ability to use these technologies for academic purposes. In addition, concerns about overdependence on AI, academic integrity and the inappropriate use of AI-generated content have raised questions about whether the increasing use of AI actually improves students' academic performance (Howard et al., 2022). Although previous studies have examined the use of AI in teaching, learning, academic writing and research (Akkureddy, 2024; Idris & Umar, 2024; Uno et al., 2024; Efebeh et al., 2024), there is limited empirical evidence on how undergraduate students in Nigerian public universities use AI tools and how such use relates to their academic performance.

Specifically, little is known about the extent of AI use, the benefits students derive, the challenges they face and the influence of AI tools on the academic performance of undergraduates at Nasarawa State University, Keffi. This gap in knowledge makes it difficult for university administrators, lecturers and policymakers to develop appropriate strategies and guidelines for the effective and responsible use of AI in higher education. Therefore, this study examines the use of artificial intelligence tools and their influence on the academic performance of undergraduates at Nasarawa State University, Keffi, with the aim of providing evidence that will support informed decision-making and contribute to the growing literature on AI in higher education.

Objectives of the Study

This study is guided by the following objectives:

1. Identify the artificial intelligence (AI) tools commonly used by undergraduate students for academic activities at Nasarawa State University, Keffi.
2. Examine the extent of artificial intelligence (AI) tool usage among undergraduate students at Nasarawa State University, Keffi.
3. Assess the perceived influence of artificial intelligence (AI) tool usage on the academic activities of undergraduate students at Nasarawa State University, Keffi.
4. Identify the challenges associated with the use of artificial intelligence (AI) tools in the academic activities of undergraduate students at Nasarawa State University, Keffi.



Review of Literature

Concept of Artificial Intelligence in Higher Education

Artificial intelligence (AI) has become an important technology in higher education because it is changing the way students learn, conduct research and complete academic tasks. The development of generative AI tools has moved AI beyond automation to providing intelligent support (Iliyasu et al., 2024). Today, university students use AI to search for information, explain difficult concepts, generate ideas, improve writing, summarise academic materials and solve problems. As a result, AI is increasingly being viewed as a learning support tool rather than simply a technological innovation (Kasneci et al., 2023). Scholars generally agree that AI is designed to support human intelligence, although they emphasise different aspects of its application. Russell and Norvig (2021) describe AI as systems that perform tasks requiring human intelligence, while Aiyebilehin et al. (2025) argue that AI should complement rather than replace human thinking. Similarly, Kaplan and Haenlein (2019) note that AI enables machines to learn from data and make intelligent decisions with minimal human intervention. These views suggest that AI is valuable because it improves human productivity and learning instead of replacing human effort.

The use of AI in higher education has increased rapidly with the availability of tools such as ChatGPT, Grammarly, QuillBot, Google Gemini, Microsoft Copilot and Perplexity AI. These tools support different academic activities. For example, ChatGPT and Gemini help students understand difficult concepts, generate ideas, answer academic questions and prepare assignments (Efebeh et al., 2024). Grammarly improves grammar, spelling and writing style, while QuillBot assists with paraphrasing and summarising academic texts. Perplexity AI combines AI with web-based information retrieval, making it useful for research and literature searches. Although these tools perform different functions, they all aim to improve students' learning and academic productivity (Pattnaik & Raman, 2024).

Studies show that AI has become part of students' everyday academic activities. International evidence indicates that AI helps students complete assignments more efficiently, improves academic writing, supports independent learning and provides personalised learning experiences (Kasneci et al., 2023). Similarly, Idris and Umar (2024) and Abubakar et al. (2024) found that many university students use AI tools for information searching, assignment writing, research, editing and examination preparation. These studies suggest that AI can improve students' academic activities when used responsibly.

Review of Empirical Studies

Recent studies show that artificial intelligence (AI) tools are becoming an important part of higher education, although their impact depends on how students use them and the support available within their institutions. For example, Musa and Hashim (2025) reported that AI applications improved students' engagement, learning efficiency and academic outcomes when they were actively involved in the learning process. Similarly, Guga and Binjaku (2024) found that students who used ChatGPT during learning activities demonstrated better understanding and knowledge retention than before using the tool. Although these studies used different research designs, they reached a similar conclusion: AI can improve learning when it is integrated effectively into teaching and learning.

Other studies argue that the benefits of AI depend largely on students' digital competence. Tinkel (2025) found that students with higher AI literacy produced better AI-assisted academic work, showed greater confidence in using AI tools and achieved better learning outcomes than



students with lower AI literacy. Likewise, Musa and Hashim (2025) emphasised that AI alone does not improve learning; students also need appropriate training and guidance to use these tools effectively. These findings suggest that AI literacy is an important factor influencing the successful use of AI in higher education.

Evidence from Nigeria presents a similar pattern but highlights additional challenges. Adetunji et al. (2023) reported that undergraduate students frequently used AI tools such as ChatGPT, Grammarly and Turnitin for assignments, academic writing and research. However, the study found that poor internet access, limited digital skills and inadequate technological infrastructure reduced the effective use of these tools. Similar findings were reported by Efebeh et al. (2024) and Idris and Umar (2024), who observed that while Nigerian students increasingly recognise the value of AI for academic activities, access to digital resources and AI skills remains a major challenge.

Although the reviewed studies generally agree that AI supports students' academic activities, they differ in their explanations of what drives its effectiveness. Some researchers attribute improved learning mainly to the availability and use of AI tools, while others argue that AI literacy, student engagement and institutional support are more important than the technology itself. These differences suggest that the influence of AI cannot be explained by technology alone but by a combination of student, institutional and technological factors. Furthermore, most existing studies have focused on students' awareness, acceptance or adoption of AI tools, with relatively few examining the specific AI tools students use, the extent of their usage, the purposes for which they are used, their perceived influence on academic activities and the challenges students experience within individual Nigerian public universities. This gap is particularly evident in Nasarawa State University, Keffi, where empirical evidence remains limited. Therefore, this study seeks to provide context-specific evidence by examining the AI tools commonly used by undergraduate students, the extent and purposes of their use, their perceived influence on academic activities and the challenges associated with their use.

Theoretical Framework

This study is anchored on the Diffusion of Innovations (DOI) theory, developed by Everett Rogers (1962) and later refined in the fifth edition of his work (Rogers, 2003). The theory explains how new ideas, technologies or innovations are introduced, adopted and spread within a social system over time. DOI has been widely applied in education, information systems and technology adoption studies because it helps explain why some individuals adopt new technologies quickly, while others are slower or choose not to adopt them (Rogers, 2003; Greenhalgh et al., 2004). According to DOI, the adoption of an innovation depends on five key characteristics: relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003). Relative advantage refers to the extent to which an innovation is perceived to be better than existing alternatives. Compatibility describes how well the innovation fits users' needs and existing practices, while complexity refers to how easy or difficult it is to understand and use. Trialability allows users to test an innovation before fully adopting it, whereas observability refers to the visibility of the innovation's benefits to others. The theory has been widely used to explain the adoption of educational technologies because it recognises that technology adoption is influenced by both individual perceptions and social interactions. In higher education, students are more likely to adopt AI tools when they perceive them as useful, easy to use and relevant to their academic activities. In addition, students' decisions are often influenced by lecturers, classmates and other



early adopters who demonstrate the benefits of these technologies (Greenhalgh et al., 2004; Dwivedi et al., 2023). This makes DOI particularly suitable for explaining the increasing use of AI tools such as ChatGPT, Grammarly, QuillBot, Google Gemini and Microsoft Copilot among university students.

The theory is relevant to this study because it explains the factors influencing undergraduate students' adoption of AI tools for academic activities at Nasarawa State University, Keffi. Students who perceive AI tools as useful, easy to use and compatible with their learning needs are more likely to adopt them. Likewise, students may be encouraged to use AI tools after observing their classmates successfully using applications such as ChatGPT, Grammarly and QuillBot for assignments, research and academic writing. Therefore, DOI provides an appropriate theoretical foundation for examining the AI tools commonly used by students, the extent and purpose of their use, their perceived influence on academic activities and the challenges associated with their adoption.

Methodology

Research Design

This study adopted a quantitative research design using a descriptive survey approach. The design was considered appropriate because it enabled the researcher to collect quantitative data from undergraduate students on their use of Artificial Intelligence (AI) tools for academic activities. The descriptive survey design also facilitated the systematic collection and analysis of data on the types of AI tools used, the extent of their use, students' perceived influence of AI on academic activities, and the challenges associated with AI use at Nasarawa State University, Keffi.

Population of the Study

The study population comprised 12,450 undergraduate students enrolled at Nasarawa State University, Keffi (NSUK), during the 2024/2025 academic session. This population was considered suitable because undergraduate students are the primary users of AI tools for learning, assignments, research, and other academic activities.

Sample Size and Sampling Technique

A sample size of 387 respondents was determined using Taro Yamane's (1967) formula at a 5% margin of error. A multi-stage sampling technique was adopted to ensure adequate representation of the study population. First, Nasarawa State University, Keffi, was purposively selected because of its growing use of digital technologies in teaching and learning. Second, proportional sampling was used to allocate the sample across the selected faculties based on their student population. Finally, simple random sampling was employed to select the respondents from each faculty.

Instrumentation

Data were collected using a structured questionnaire. The questionnaire obtained information on respondents' demographic characteristics, AI tools used, extent of AI usage, purposes of AI use, perceived influence of AI on academic activities, and challenges associated with AI use. The interview guide was used to obtain detailed information on participants' experiences, opinions, and perceptions regarding AI-assisted learning. Secondary data were obtained from journal articles, books, university records, and other relevant publications on Artificial Intelligence in higher education. The research instruments were subjected to face and content validity through expert review by specialists in educational research and measurement. Reliability of the questionnaire was established through a pilot study involving 20 undergraduate

students from a university outside the study area. The pilot data were analysed using Cronbach's Alpha, which produced a reliability coefficient of 0.72, indicating that the instrument had acceptable internal consistency for the study.

Method of Data Analysis

Data were analysed using descriptive statistics, including frequencies, percentages, means, and standard deviations, to summarise respondents' characteristics and address the research objectives.

Data Presentation

A total of 400 copies of the questionnaire were administered to undergraduate students at Nasarawa State University, Keffi. Of these, 386 were correctly completed and returned, representing a 96.5% response rate. The remaining 14 questionnaires were excluded because they were either not returned or contained incomplete responses. Consequently, the analysis was based on the 386 validly completed copies.

Table 1. Showing Demographic Characteristics of Respondents

Category	Frequency (n=386)	Percentage (%)
Gender		
Male	201	52.1
Female	185	47.9
Age		
Below 18 years	22	5.7
18–22 years	198	51.3
23–27 years	121	31.4
28 years and above	45	11.6
Level of Study		
100 Level	78	20.2
200 Level	92	23.8
300 Level	96	24.9
400 Level	88	22.8
500 Level	32	8.3
Faculty		
Administration	64	16.6
Arts	58	15.0
Education	70	18.1
Environmental Sciences	52	13.5
Natural and Applied Sciences	82	21.2
Social Sciences	60	15.6

Table 1 presents the demographic characteristics of the respondents. The distribution shows a fairly balanced representation of male and female students. Most respondents were aged 18–22 years, indicating that the study captured the views of students within the typical undergraduate age range. The respondents were also well distributed across all levels of study, with a slightly higher representation of students in the 200 and 300 levels. Furthermore, students were drawn from different faculties, providing broad representation across the university. This diversity enhances the credibility of the findings, as it reflects the experiences and perspectives of undergraduate students from different academic disciplines.

Table 2. Showing Artificial Intelligence (AI) Tools Commonly Used by Undergraduate Students

AI Tool	Frequency	Percentage (%)
ChatGPT	168	43.5
Grammarly	82	21.2
QuillBot	61	15.8
Google Gemini	39	10.1
Microsoft Copilot	22	5.7
Perplexity AI	14	3.7
Total	386	100.0

The results in the table above show that ChatGPT is the most commonly used AI tool among undergraduate students, followed by Grammarly and QuillBot. This pattern indicates that students prefer AI applications that support information retrieval, academic writing, and assignment preparation. The lower use of tools such as Microsoft Copilot and Perplexity AI may reflect lower awareness or familiarity among students.

Table 3. Showing Extent of AI Tool Usage for Academic Activities

Response	Frequency	Percentage (%)
Daily	102	26.4
Weekly	134	34.7
Occasionally	96	24.9
Rarely	38	9.8
Never	16	4.2
Total	386	100.0

The results show that AI tools are regularly used by most respondents, with 61.1% reporting daily or weekly use. This indicates that AI has become part of the routine academic activities of many undergraduate students. However, the small proportion of students who rarely or never use AI suggests that barriers to adoption still exist.

Table 4. Perceived Influence of AI Tools on Academic Activities

Response	Frequency	Percentage (%)
Greatly improved	98	25.4
Improved	157	40.7
No noticeable change	89	23.1
Declined	28	7.3
Greatly declined	14	3.5
Total	386	100.0

Most respondents (66.1%) perceived that AI tools improved their academic activities. This finding suggests that students believe AI contributes positively to learning, assignment completion, and access to academic information. However, about one-quarter of the respondents perceived no noticeable improvement, indicating that the benefits of AI may depend on how effectively the tools are used.



Table 5. Challenges Associated with the Use of AI Tools

Challenge	Frequency	Percentage (%)
Poor internet connectivity	124	32.1
High cost of data subscription	96	24.9
Lack of adequate knowledge of AI tools	68	17.6
Fear of academic misconduct/plagiarism	54	14.0
Limited access to digital devices	44	11.4
Total	386	100.0

Poor internet connectivity (32.1%) and the high cost of data subscriptions (24.9%) were identified as the major barriers to AI use. These findings suggest that infrastructural and financial constraints continue to limit students' effective use of AI tools despite their increasing importance in higher education.

Discussion of Findings

This section discusses the findings of the study according to the research questions. The discussion links the findings to previous studies and highlights their relevance to the use of AI tools in academic activities among undergraduates. The study found that ChatGPT, Grammarly and QuillBot were the most commonly used AI tools among undergraduate students at Nasarawa State University, Keffi. This suggests that students prefer AI applications that support information retrieval, academic writing, paraphrasing, grammar correction and learning support. The popularity of these tools reflects the increasing integration of generative AI into students' academic activities, where they are used to improve productivity and the quality of academic work. This finding is consistent with Kasneci et al. (2023), who observed that generative AI tools have become valuable learning resources in higher education because they provide immediate academic support and personalised assistance. Similarly, Efebeh et al. (2024) and Idris and Umar (2024) reported that Nigerian university students increasingly use AI tools, particularly ChatGPT and Grammarly, to support academic writing, research and learning. However, UNESCO (2023) cautions that while these tools provide significant educational benefits, their effective use depends on students' digital literacy and responsible use. From the perspective of the Diffusion of Innovations theory (Rogers, 2003), the widespread use of these AI tools suggests that students perceive them as useful, easy to use and compatible with their academic needs, thereby encouraging their adoption within the university environment.

The study further found that AI contributes positively to students' academic activities, as most respondents perceived improvements in their learning after adopting AI tools. This finding agrees with Holmes et al. (2019), Guga and Binjaku (2024), and Abubakar et al. (2024), who concluded that AI supports students' academic engagement, writing and independent learning. Nevertheless, Kasneci et al. (2023) caution that excessive dependence on AI may weaken critical thinking and independent problem-solving if students rely on AI-generated responses without proper evaluation. Therefore, the educational value of AI depends not only on access to the technology but also on responsible use and institutional guidance.

The findings also reveal that poor internet connectivity, high data costs, inadequate knowledge of AI tools and limited access to digital devices remain major barriers to AI use. These challenges are consistent with the findings of Zawacki-Richter et al. (2019), Idris and Umar (2024), and Bali et al. (2024), who identified digital infrastructure and technological skills as key factors influencing AI adoption in higher education. These challenges are particularly relevant in Nigerian



public universities, where unstable internet services, limited digital infrastructure and financial constraints often reduce students' access to emerging technologies. Addressing these barriers would enhance students' ability to use AI effectively for academic purposes. The findings are consistent with the Diffusion of Innovations theory (Rogers, 2003), which explains that the adoption of new technologies depends on users' perceptions of their usefulness, compatibility with existing practices and ease of use. The widespread use of AI tools among the respondents suggests that students perceive these technologies as beneficial for their academic activities. At the same time, the identified challenges demonstrate that the adoption of AI is influenced not only by students' willingness to use the technology but also by environmental factors such as internet access, digital skills and institutional support. This confirms the relevance of the theory in explaining the adoption and use of AI tools among undergraduate students at Nasarawa State University, Keffi.

Conclusion

This study examined the use of artificial intelligence (AI) tools among undergraduate students at Nasarawa State University, Keffi. The findings show that AI tools have become an important part of students' academic activities, with applications such as ChatGPT, Grammarly and QuillBot being widely used to support learning, academic writing, research and other coursework. Students also perceived that AI tools enhanced their academic activities by improving access to information, understanding of course content and the completion of academic tasks. However, the effective use of these technologies is constrained by challenges such as poor internet connectivity, high data costs, limited digital skills and inadequate access to digital devices. The study contributes to existing knowledge by providing empirical evidence on the AI tools commonly used by undergraduate students, the extent of their use, students' perceived influence of AI on academic activities and the challenges affecting AI adoption within a Nigerian public university. The findings also support the Diffusion of Innovations theory by demonstrating that students are more likely to adopt AI tools when they perceive them as useful and relevant to their academic needs, although environmental and institutional factors also influence adoption. From a practical and policy perspective, the findings highlight the need for universities to strengthen digital infrastructure, improve internet access, promote AI literacy and develop institutional guidelines that encourage the ethical and responsible use of AI in teaching and learning. Such measures will enable students to maximise the educational benefits of AI while reducing the risks associated with inappropriate use.

Recommendations

Based on the study findings, the following four recommendations are proposed:

1. Since the study found that undergraduate students widely use AI tools such as ChatGPT, Grammarly and QuillBot for academic activities, Nasarawa State University should integrate AI literacy and digital skills training into the curriculum to enable students to use these tools effectively, critically and ethically.
2. As poor internet connectivity and the high cost of data were identified as major barriers to AI use, the university and relevant government agencies should improve internet access on campus and provide affordable digital infrastructure to support students' academic use of AI.
3. Given that students perceived AI tools as beneficial for learning and academic activities, the university should develop clear institutional guidelines on the responsible use of AI to



promote academic integrity while encouraging AI as a complementary learning tool rather than a substitute for independent learning.

4. Since limited knowledge of AI tools and inadequate access to digital devices also constrained their use, the university should organise regular awareness programmes, workshops and hands-on training on AI applications, while providing access to campus digital facilities to ensure that more students can benefit from AI-supported learning.

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AI Use Declaration:

ChatGPT and Grammarly were used in preparing this work to improve grammar, spelling, clarity, and the overall presentation of ideas. AI tools were not used to create or fabricate research data, findings, or references. All AI-assisted content was reviewed and checked by the author. The author takes full responsibility for the accuracy, analysis, interpretation, and conclusions presented in this work.
