



Chat GPT in Nigerian educational system: Ethical concerns, barriers and strategies for effective application

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Abstract

This study examined the application of ChatGPT in the Nigerian educational system with particular attention to its ethical concerns, barriers and strategies for effective application. ChatGPT has emerged as a widely used generative artificial intelligence tool that supports teaching, learning, academic writing, lesson preparation, assessment development and research activities in universities, colleges of education, polytechnics and other tertiary institutions. Students use the technology for independent learning, assignment preparation, examination revision and academic writing, while lecturers employ it to develop instructional materials, generate classroom exercises and support curriculum delivery. Despite these educational benefits, the study identified several ethical and institutional concerns associated with its adoption. Major ethical issues include plagiarism, academic dishonesty, fabrication of references, misinformation, algorithmic bias, privacy and data protection challenges, and excessive dependence on AI-generated content. The review also revealed important barriers affecting effective implementation in Nigeria, including inadequate digital infrastructure, unstable electricity supply, poor internet connectivity, limited artificial intelligence literacy among lecturers and students, insufficient institutional policies, resistance to technological change and concerns regarding the reliability of AI-generated information. These challenges have implications for academic integrity, critical thinking, independent learning and educational quality. To promote responsible application, the study recommends the development of comprehensive national and institutional AI policies, continuous professional development for educators, AI literacy programmes for students, improved digital infrastructure, stronger academic integrity regulations, verification of AI-generated information using credible scholarly sources and the redesign of assessment methods to promote originality and higher-order thinking. The study concludes that ChatGPT should function as a complementary educational resource rather than a substitute for lecturers, independent scholarship or established academic practices. Its successful integration depends on ethical governance, institutional preparedness and continuous evaluation of emerging artificial intelligence technologies.

Keywords: Chat GPT, Artificial Intelligence, Nigerian educational system, higher education, ethical concerns, educational technology

Introduction

Artificial intelligence refers to computer-based systems designed to perform tasks that normally require human reasoning, language use, perception and decision processes. It draws on algorithmic methods and statistical learning models that process large volumes of data and produce outputs in text, images, predictions, or decisions (Sarker, 2022; Korteling *et al.*, 2021). The development of artificial intelligence began in the mid-twentieth century, following early academic efforts that framed machine intelligence as a field of study. Early discussions at the Dartmouth Summer Research Project on AI marked an early stage of formal inquiry into machine reasoning (McCarthy *et al.*, 2006). Later developments introduced machine learning methods, neural network models and evolutionary computation techniques that enabled machines to improve task performance through repeated exposure to data (Jordan & Mitchell, 2015). Artificial intelligence has advanced into applications involving language processing, prediction systems and automated reasoning. Language-based models form part of this development, where systems interpret and generate human language through computational methods. Natural language processing supports this function by enabling machines to interpret text and produce responses based on input patterns (Kareem, 2024) [7]. Machine learning also contributes by allowing systems to adjust

outputs based on training data rather than fixed programming instructions (Kareem, 2024) [3]. These developments support tasks such as translation, text generation, question answering and content creation (Xu *et al.*, 2024) [7].

Generative artificial intelligence forms a category of systems designed to produce new content from learned datasets. This includes text, images and audio outputs generated from prompts supplied by users. ChatGPT, developed by OpenAI, belongs to this category and is based on large language model architecture trained on large text corpora (OpenAI, 2023; Brown *et al.*, 2020) [10]. The model generates responses through pattern recognition and probabilistic language prediction methods. It supports tasks involving writing, explanation, coding and conversational interaction (Zhu, 2023) [71]. The introduction of ChatGPT in November 2022 [57] marked a major point in public attention toward generative artificial intelligence. The system gained rapid adoption due to its conversational design and ability to produce human-like text responses. Reports indicate that it reached millions of users shortly after release (Totlis *et al.*, 2023) [65]. Interest in the system relates to its capacity to support academic writing, programming tasks and instructional activities (Karaköse, 2023) [18]. Its design allows users to interact through natural language prompts, which increases accessibility for various categories of users.

Education systems have experienced changes linked to digital tools that support teaching and learning processes. Artificial intelligence forms part of these tools through applications that support content creation, assessment generation and learner feedback. Generative models support learning by producing responses to academic questions and offering explanations for subject content (Arroyo-Bello *et al.*, 2025) ^[4]. These tools also assist teachers in preparing lesson materials and structuring assessments for students. Adaptive learning functions allow systems to adjust content based on learner input and performance patterns (Arroyo-Bello *et al.*, 2025) ^[4]. Interest in artificial intelligence in education is linked to changes in digital systems used for communication and learning. The expansion of internet-based tools and digital platforms has altered how information is accessed and shared. Artificial intelligence systems now form part of instructional environments through automated tutoring, feedback systems and learning support tools (van Dis *et al.*, 2023) ^[66]. Universities and training institutions have begun to adopt systems that support personalised learning pathways, automated grading and administrative tasks (van Dis *et al.*, 2023) ^[66]. Generative artificial intelligence also supports creative and academic tasks such as summarisation, translation and content generation. These tools allow users to generate text responses based on prompts that reflect academic or professional needs (Strzelecki, 2023) ^[62].

In higher education, adoption relates to the need for flexible learning systems that support individual student requirements and instructional planning. Artificial intelligence tools also support accessibility in learning environments by providing alternative formats of content. Ethical considerations form part of discussions on artificial intelligence uses in education. Concerns relate to data use, academic integrity, bias in algorithmic systems and accuracy of generated content. Issues of privacy also arise due to data requirements used for model training and system improvement (Yang *et al.*, 2021) ^[68]. Ethical discussions also focus on responsibility in use, especially in academic settings where generated outputs may be used without verification (Rahman *et al.*, 2023) ^[49]. Guidance for responsible use has been suggested to support proper integration of these systems in education and research environments (Suleman *et al.*, 2023) ^[30]. In developing countries, artificial intelligence adoption in education faces structural and institutional barriers. Nigeria presents a context where digital transformation is progressing, yet limitations exist in infrastructure, funding and training capacity. Educational institutions in Nigeria also operate under policy environments that are still adapting to emerging technologies. Curriculum development and teaching practices require adaptation to include digital literacy and artificial intelligence tools. Faculty training and access to technological resources remain part of ongoing challenges in implementation processes (FMEN, 2023) ^[32]. These conditions influence the pace at which artificial intelligence systems are integrated into academic training environments.

Digital transformation in Nigeria also relates to broader global changes in education systems. Artificial intelligence tools are gradually introduced into teaching environments, yet adoption varies between institutions. Exposure to artificial intelligence tools among students and educators

depends on availability of infrastructure and institutional support systems. This creates differences in learning experiences and access to digital tools in higher education institutions. The emergence of ChatGPT and related generative artificial intelligence systems continues to shape discussions on teaching and learning. These systems support academic writing, learning and communication tasks, while also introducing concerns related to ethical use and reliability. The expansion of these technologies has led to ongoing examination of their role in education systems, particularly in settings where digital resources remain uneven. The aim of this study is to examine ChatGPT in Nigerian education with attention to opportunities, challenges and ethical issues.

Overview of ChatGPT

ChatGPT is an artificial intelligence chatbot developed by OpenAI and released for public use on 30 November 2022. The system attracted exceptional public attention shortly after its introduction, reaching more than one million users during its first week and later exceeding one hundred million users within a short period of time (Farrokhnia & Wals, 2024; Heng, 2023) ^[20, 29]. Its rapid acceptance reflects growing interest in language-based artificial intelligence capable of responding to questions, producing written material, supporting problem-solving activities and assisting users in different professional and educational settings. The release of ChatGPT marked a new stage in the public use of generative artificial intelligence because it enabled ordinary users to interact with a large language model through natural conversation rather than through specialised programming tools (Mahmud *et al.*, 2024) ^[3]. ChatGPT belongs to the family of Generative Pre-trained Transformer (GPT) models created by OpenAI. The term "Chat" refers to conversational interaction, while "GPT" describes a transformer-based language model trained before deployment through exposure to large volumes of text collected from books, journal articles, web pages and other written sources (Al-Abdullatif & Alsubaie, 2024; Scharth, 2022) ^[2, 57]. This training process enables the model to recognise relationships among words, sentence structures and patterns of language use. During user interaction, the model predicts the next sequence of words from learned statistical relationships rather than retrieving fixed answers from a stored database (Brown *et al.*, 2020; Hamad *et al.*, 2024) ^[10, 28].

The public version of ChatGPT was built upon earlier progress in the GPT series. GPT-1, introduced in 2018, demonstrated that transformer-based language models could generate coherent text after large-scale pre-training. GPT-2 followed in 2019 with stronger text generation capability and attracted attention because of its improved fluency. GPT-3, released in 2020, expanded the model to approximately 175 billion parameters, leading to marked improvements in language generation and reasoning tasks. ChatGPT, introduced in 2022 on the GPT-3.5 model, adapted these advances for conversational interaction. Later versions incorporated GPT-4 and GPT-4o, bringing stronger reasoning ability together with support for images, voice interaction, document processing and other multimodal capabilities (Bai *et al.*, 2023; Bakker *et al.*, 2024; George, George, & Martin, 2023) ^[5, 7, 27]. The development of ChatGPT reflects the broader progression of artificial

intelligence from rule-based systems to machine learning and deep learning. Earlier artificial intelligence applications depended on predefined rules prepared by programmers. Such systems produced satisfactory results only when user input matched previously programmed instructions. Machine learning shifted this approach by enabling computer systems to identify patterns from data rather than relying solely on manually written rules. Deep learning extended this capability through artificial neural networks consisting of multiple processing layers that learn increasingly sophisticated language representations from very large datasets (George, George, & Martin, 2023) ^[27]. These advances created the conditions required for large language models capable of producing coherent and context-sensitive text.

Transformer architecture is central to ChatGPT. Unlike earlier sequence-processing models, transformers analyse relationships among words through an attention mechanism that assigns different levels of importance to each word in relation to others appearing within the same text. This design enables the model to preserve contextual relationships even when processing lengthy passages, thereby improving coherence and continuity in generated responses (Brown *et al.*, 2020) ^[10]. Attention mechanisms also enable the model to recognise how meaning changes according to surrounding words, producing responses that correspond more closely to the user's request. Before public deployment, ChatGPT undergoes large-scale pre-training using extensive collections of written material drawn from different subject areas and writing styles. Exposure to diverse language sources enables the model to learn grammar, vocabulary, sentence organisation and semantic relationships without direct supervision for every possible task (Scharth, 2022) ^[57]. After completion of pre-training, the model enters a fine-tuning stage where responses are adjusted for instruction-following behaviour. Human reviewers evaluate alternative outputs, rank their quality and provide corrective feedback. This process, known as reinforcement learning from human feedback, improves the quality, relevance and conversational appropriateness of later responses (OpenAI, 2023; Mann, 2023) ^[5, 39].

ChatGPT generates responses through probabilistic prediction. User input is divided into smaller language units called tokens. The model analyses these tokens together with the surrounding context before predicting the most suitable sequence of subsequent tokens. Each generated token influences the next stage of prediction until a complete response is produced (Hamad *et al.*, 2024) ^[28]. This method enables the system to produce original text for different requests rather than reproducing identical passages from its training material. During conversation, the model also considers earlier exchanges within the same session, allowing later responses to remain connected with previous questions and answers. Such contextual continuity supports extended dialogue, clarification of earlier statements and sustained interaction over multiple conversational turns (Hamad *et al.*, 2024; Shuo Liu, 2025) ^[28, 60]. ChatGPT supports many language-related tasks through natural language processing. Users employ the system to answer questions, explain unfamiliar ideas, prepare summaries, rewrite existing text, translate material between languages and organise written information into different formats (Strzelecki, 2023) ^[62]. Academic activities form a large part

of its use because the model can assist with drafting essays, preparing reports, editing manuscripts and improving written expression without restricting interaction to one subject area (Karaköse, 2023) ^[18]. Responses are produced almost immediately after a prompt is submitted, making the system suitable for situations where users require timely access to information or writing support (Baidoo-Anu & Ansah, 2023) ^[6]. Training on multilingual text also enables interaction in different languages, extending its usefulness to users from diverse linguistic backgrounds (Ibrahim Adeshola & Adeola Praise Adepoju, 2023) ^[30].

Education has become one of the areas where ChatGPT receives sustained attention. Students use the chatbot to obtain explanations for unfamiliar concepts, clarify difficult topics and receive guidance while studying. The system can present information in simple language, provide definitions, suggest references and reorganise ideas into forms that are easier to understand (Chevose, 2023; Heng, 2023) ^[55]. Such support enables learners to revisit difficult topics repeatedly without limitations imposed by classroom schedules. Since the platform remains accessible throughout the day, students may continue learning outside formal teaching hours, making it a useful companion during independent study (Rudolph *et al.*, 2023) ^[55]. Personalised learning represents another feature associated with ChatGPT. Responses are shaped by the wording and context of user prompts, allowing explanations to differ according to individual requests. Learners who require introductory explanations may request simplified descriptions, while those seeking advanced discussion may ask for greater detail. This flexibility enables learning activities to reflect differences in educational background, academic level and preferred learning approach (Mahmud *et al.*, 2024) ^[38]. The conversational nature of the interaction also encourages students to ask follow-up questions until satisfactory clarification is obtained.

Academic writing has become another area where ChatGPT receives considerable attention. The system assists users during idea generation, preparation of outlines, organisation of literature, drafting of manuscripts and revision of written material (Karaköse, 2023) ^[18]. Researchers may employ the chatbot to identify possible research directions, organise discussion points or improve sentence construction during manuscript preparation. Kumar (2023) ^[33] reported that ChatGPT could generate a text of approximately 300-500 words within two minutes, illustrating its capacity to support writing tasks where time is limited. Such speed reduces the time required to prepare preliminary drafts, although careful human review remains necessary before academic submission. Teachers also apply ChatGPT while preparing instructional materials. The chatbot can generate lesson plans, classroom exercises, quizzes and discussion questions based on instructions supplied by the user (Zhai, 2022) ^[69]. Teaching materials may be adapted for different educational levels by modifying the prompt used during interaction. For less experienced teachers, generated lesson outlines may provide useful starting points before further revision and adaptation to local classroom needs. ChatGPT has also been used to prepare examples, explain technical concepts and produce practice questions that encourage classroom participation (Mahmud *et al.*, 2024) ^[38].

Feedback generation represents another educational application discussed in the literature. During writing

instruction, ChatGPT can evaluate essays and produce comments that differ according to the prompts supplied by the user. Noroozi *et al.* (2012) and Latifi *et al.* (2021) ^[34, 42] observed that prompts requesting supportive feedback produced encouraging responses, while prompts requesting critical evaluation generated more analytical comments. These findings indicate that the wording of prompts influences the style of feedback produced by the chatbot. Teachers using the system for educational purposes should therefore review generated feedback before sharing it with learners. Outside education, ChatGPT has found application in business, healthcare and content development. Marketing professionals employ the system during content preparation, idea generation and market communication. Healthcare practitioners have explored its use in patient education, medical documentation and information support, while recognising the need for professional verification before clinical application (Al-Abdullatif & Alsubaie, 2024; Cascella *et al.*, 2023) ^[2, 11]. Customer service organisations also employ conversational systems derived from similar language models to respond to routine enquiries and assist clients through automated communication channels.

Despite its broad range of applications, ChatGPT has recognised limitations. Responses depend on patterns learned during training rather than genuine understanding or personal experience. Incorrect, incomplete or outdated training material may influence generated output and lead to factual errors (Deng & Lin, 2023) ^[16]. The model predicts probable sequences of words rather than reasoning in the same manner as a human expert. Users should therefore verify factual statements with reliable academic or professional sources before relying on generated information for research or decision-making (Zhai, 2022) ^[69]. Bias also remains an area of concern. Since language models learn from existing textual material, biased or unbalanced information contained within training data may influence generated responses (Weidinger *et al.*, 2021) ^[67]. Long conversations may also present challenges because misunderstanding accumulated context can produce responses that do not correspond fully with user intentions (Arroyo-Bello *et al.*, 2025) ^[4]. These limitations reinforce the need for careful human judgement during use, particularly in academic and professional environments where accuracy is essential.

Ethical issues surrounding ChatGPT continue to receive attention in educational research. Concerns include inappropriate use during examinations, submission of machine-generated assignments as original student work, spread of inaccurate information and excessive dependence on automated writing support (Frye, 2022; Qadir *et al.*, 2022). Ma *et al.* (2024) ^[7, 24, 48] argued that ChatGPT literacy has become necessary so that learners and educators understand responsible use, academic integrity and appropriate boundaries for artificial intelligence within educational practice. Responsible use requires transparency, critical evaluation of generated content and continued development of students' independent thinking and writing abilities. The continuing development of ChatGPT reflects sustained progress in artificial intelligence, natural language processing and neural network research. Improvements introduced through successive GPT models have expanded conversational ability, multilingual communication, document processing and multimodal interaction involving

text, images and speech (Bai *et al.*, 2023; Bakker *et al.*, 2024) ^[5, 7]. Current evidence portrays ChatGPT as a language technology with substantial educational and research value when used under appropriate academic guidance and supported by careful human evaluation of every generated output.

The growing acceptance of ChatGPT in higher education has stimulated discussion about its place within teaching, learning and research. Universities and other tertiary institutions have begun to examine how conversational artificial intelligence can be incorporated into academic practice without weakening learning outcomes or academic integrity. Madunić and Sovulj (2024) ^[37] reported that higher education institutions have developed guidance on the acceptable use of ChatGPT in teaching, learning, administration and community engagement. Such guidance reflects recognition that artificial intelligence is likely to remain part of the educational environment and should be managed through clear institutional expectations rather than complete prohibition. Student acceptance of ChatGPT has been linked to its ability to simplify access to information. Traditional online searches often require users to examine multiple websites before identifying relevant material. ChatGPT differs because it produces direct responses that combine explanation, summarisation and clarification within a single interaction (Cascella *et al.*, 2023) ^[11]. This feature reduces the time spent locating introductory information and enables students to devote greater attention to reading source materials and evaluating evidence. Such use does not remove the need to consult scholarly publications; instead, it may assist learners during the early stages of information gathering and topic familiarisation.

Another characteristic associated with ChatGPT is its conversational style. Unlike conventional search engines that return lists of web pages, the chatbot accepts follow-up questions, requests for clarification and changes in direction during the same discussion. Earlier responses are considered while generating later ones, allowing users to refine ideas gradually instead of beginning a new search after every question (Hamad *et al.*, 2024; Shuo Liu, 2025) ^[28, 60]. This pattern of interaction resembles dialogue and encourages users to explore topics through continuous questioning. The adaptability of ChatGPT has also attracted attention in language education. The chatbot can adjust vocabulary, sentence length and explanation according to the wording of user prompts. Learners may request simplified descriptions, examples, alternative explanations or translations into another language. Such flexibility makes the system useful for users with different educational backgrounds and varying levels of language proficiency (Ibrahim Adeshola & Adeola Praise Adepoju, 2023) ^[30]. Responses may also be presented in different writing formats such as paragraphs, outlines, tables or question-and-answer structures depending on user requests.

Interest in ChatGPT extends beyond student learning to academic research. Researchers employ the chatbot while identifying possible research topics, preparing preliminary outlines, refining research questions and improving the organisation of manuscripts (Karaköse, 2023) ^[32]. During literature development, the system may assist with drafting summaries or reorganising information supplied by the researcher. Such assistance can reduce time devoted to routine writing activities, although responsibility for

interpretation, critical analysis and verification remains with the researcher. The usefulness of ChatGPT depends partly on the quality of user prompts. Clear and specific instructions generally produce responses that correspond more closely with user expectations than broad or ambiguous requests. During educational activities, teachers and students who understand prompt construction are more likely to obtain responses suited to their learning objectives. This relationship between prompt quality and response quality explains why effective use of ChatGPT involves user skill as well as technological capability (Latifi *et al.*, 2021) ^[34].

Rapid growth in the use of ChatGPT has encouraged discussion about artificial intelligence literacy. Ma *et al.* (2024) ^[3] described ChatGPT literacy as knowledge and skills required for responsible interaction with conversational artificial intelligence. Such literacy includes recognising the strengths and limitations of generated content, evaluating factual accuracy, acknowledging assistance received from artificial intelligence where required and maintaining accepted standards of academic honesty. These abilities are becoming increasingly relevant as artificial intelligence tools become more accessible to students and researchers. The literature also recognises that ChatGPT should not replace independent intellectual effort. The chatbot predicts language patterns from previous training rather than producing knowledge through personal judgement or lived experience (Zhai, 2022) ^[69]. Academic tasks requiring critical evaluation, interpretation of evidence and original argument remain dependent on human reasoning. Users who rely exclusively on automatically generated responses risk accepting inaccurate information or overlooking important scholarly debates. Verification through authoritative academic sources remains necessary before generated content is incorporated into research or classroom activities (Rahman *et al.*, 2023) ^[49].

Ethical questions continue to accompany the growth of generative artificial intelligence in education. Concerns raised in the literature include plagiarism, fabrication of references, production of misleading information, privacy issues and excessive dependence on automated writing support (Frye, 2022; Qadir *et al.*, 2022) ^[24, 48]. Educational institutions have responded by reviewing assessment methods, updating academic integrity policies and encouraging responsible use of artificial intelligence. Such responses seek to balance the educational value of emerging technologies with the need to preserve originality, accountability and independent scholarship. Development of ChatGPT continues through improvements in language models, training methods and multimodal capabilities. Successive GPT versions have expanded the system from text generation to processing images, documents and voice interactions while improving conversational quality and contextual understanding (Bai *et al.*, 2023; Bakker *et al.*, 2024) ^[7, 55].

Applications and Ethical Issues of ChatGPT in Nigerian Education

ChatGPT has attracted attention in Nigerian education because of its capacity to support teaching, learning and academic work. Universities, colleges of education and other tertiary institutions use the technology for lesson preparation, explanation of difficult topics, academic

writing support and access to learning materials. The system responds to questions in natural language and gives immediate explanations that students can read repeatedly until concepts become clearer. This feature creates another source of academic support outside the classroom and extends learning beyond scheduled lectures (Zhai, 2023; Rahman & Watanobe, 2023; Rane *et al.*, 2024a) ^[30, 50, 55]. Students apply ChatGPT during personal study, assignment preparation and examination revision. Learners who experience difficulty with unfamiliar concepts can request simplified explanations, worked examples and alternative descriptions suited to their level of understanding. Such interaction encourages independent learning because assistance is available whenever required rather than only during contact hours with lecturers. Students also use the platform to organize ideas for reports, seminar presentations and research activities, while lecturers employ it as a supporting resource during course preparation and classroom delivery (Lo, 2023).

Teaching staff also benefit from the technology in routine academic duties. Preparing lecture notes, drafting learning activities, producing quiz questions and generating classroom examples require considerable time. ChatGPT assists lecturers by producing preliminary teaching materials that can later be reviewed, corrected and adapted to course objectives. It also assists in preparing formative assessment questions and giving sample explanations that may be modified before classroom use. Time saved from repetitive tasks allows lecturers to devote greater attention to student interaction, classroom discussion and curriculum improvement (Zhai, 2022; Elbanna & Armstrong, 2024) ^[19, 69]. The growing use of ChatGPT has also generated ethical concerns for Nigerian educational institutions. Academic honesty remains one of the most discussed issues. Students may submit AI-generated assignments, seminar papers or project drafts as personal work without acknowledging the source of assistance. Such practice weakens the purpose of assessment because grades may no longer reflect a student's own knowledge and writing ability. Dwivedi *et al.* (2023) ^[18] examined concerns surrounding academic honesty associated with generative artificial intelligence in higher education. Suleman *et al.* (2023) ^[70] identified plagiarism, examination malpractice and declining originality as risks associated with unrestricted use of AI writing tools. Crawford *et al.* (2023) ^[15] also questioned the authenticity of student submissions produced with generative artificial intelligence.

Evidence from recent studies also links favourable attitudes toward ChatGPT with dishonest academic behaviour. Ofem *et al.* (2024) ^[44] reported that students who viewed ChatGPT positively displayed stronger tendencies toward unethical academic practices. Ogwo *et al.* (2024) associated dependence on AI writing systems with increased plagiarism, while Hamad *et al.* (2024) ^[28] described academic honesty as a basic expectation that educational institutions must preserve through clear rules and effective supervision. Dependence on artificial intelligence raises another concern for learning quality. Students who rely heavily on generated responses may spend less time reading scholarly materials, evaluating evidence or developing original arguments. Such dependence may weaken reasoning, creativity and academic writing skills developed through sustained study. Ahmad *et al.* (2024) ^[1] connected

excessive reliance on generative artificial intelligence with weaker reasoning ability and reduced creative expression. Suleman *et al.* (2023) ^[39] also reported declining critical engagement among learners who depended extensively on AI-generated responses.

Privacy and data protection remain unresolved issues because users may enter personal or academic information while interacting with ChatGPT. Yang *et al.* (2021) ^[68] explained that artificial intelligence systems process extensive datasets that may contain sensitive information. Sebastian (2023) ^[58] discussed risks associated with storage and processing of learner data, while Ali *et al.* (2024) ^[3] examined concerns relating to confidentiality and ethical management of information handled by artificial intelligence systems. Questions also surround the reliability of AI-generated content. ChatGPT may produce inaccurate explanations, fabricated references or outdated information that students may accept without verification. Jang *et al.* (2021) ^[31] linked these errors to limitations associated with training data. Segbenya *et al.* (2024) ^[59] reported that misinformation generated by artificial intelligence may reduce academic quality when users fail to verify outputs with credible sources. Bias presents another challenge because language models reflect patterns contained in the data used during development. Weidinger *et al.* (2021) and Ray (2023) ^[52, 67] discussed the influence of bias on fairness and representation in AI-generated content. Rudin (2019) ^[54] also described the difficulty created when automated systems do not explain how particular responses are produced. Hasan *et al.* (2024) ^[7] recommended guidance and formal policies to support responsible use of artificial intelligence in educational institutions.

Challenges of ChatGPT Application in Nigerian Educational System

1. ChatGPT generates responses by recognising language patterns rather than understanding ideas in the way human learners do. Although it produces fluent and coherent text, it does not possess genuine comprehension of the concepts it discusses (Gao *et al.*, 2023) ^[25]. This limitation becomes apparent when users require interpretation, contextual judgement or discipline-specific reasoning. In such situations, responses may appear convincing but lack sufficient conceptual depth (Dimitrov, 2023) ^[17]. The limitation is particularly relevant in education, where learning depends on interpretation, analysis and application of knowledge. ChatGPT may produce incomplete, superficial or irrelevant explanations when addressing specialised academic topics because its responses are generated from learned language patterns rather than conceptual reasoning (Dimitrov, 2023) ^[17]. Students who rely on these responses without verification may develop misconceptions or shallow understanding of course content. Evidence from pathology education supports this concern. Sinha *et al.* (2023) ^[61] reported that ChatGPT generated acceptable answers to pathology questions, yet many responses lacked adequate understanding of the underlying theoretical concepts. This finding suggests that correct wording does not always reflect sound academic reasoning. In Nigerian education, effective use of ChatGPT requires lecturer supervision and verification of AI-generated

content to ensure that students develop genuine understanding rather than depending on automatically generated explanations (Gao *et al.*, 2023; Sinha *et al.*, 2023) ^[55, 61].

2. A recurring concern is the accuracy of ChatGPT-generated responses. The model cannot independently verify the credibility of the information used during training, making it susceptible to producing inaccurate or misleading content (Sallam, 2023) ^[56]. Knowledge limitations may also result in outdated responses, while requests for recent references can lead to fabricated citations that appear authentic but do not correspond to existing publications (Choi *et al.*, 2022) ^[13]. Such errors present risks in educational settings where factual accuracy and credible evidence are essential.
3. ChatGPT may reproduce social and cultural biases contained in its training data. Since AI systems learn from existing datasets, biased information can influence the responses they generate (Zhai, 2022). Barocas and Selbst (2016) ^[9, 69] observed that biased datasets can produce biased outcomes, while O'Neil (2017) ^[43] argued that algorithmic decisions may reinforce existing inequalities when fairness receives little attention during model development. Such responses may affect balanced learning and expose students to distorted or unfair representations of knowledge.
4. Learning activities that require analysis, evaluation and critical judgement remain difficult for ChatGPT. The model lacks human reasoning, contextual awareness and emotional understanding that support advanced cognitive tasks (Dimitrov, 2023; Bakpayev *et al.*, 2022). Rudolph *et al.* (2023) ^[8, 55] reported that ChatGPT performs less effectively when tasks demand higher-order thinking, while Sun and Hoelscher (2023) ^[64] found limitations in generating questions that promote critical reasoning. Dependence on such responses may weaken students' analytical skills and independent judgement.
5. Academic integrity remains one of the major concerns surrounding ChatGPT in education. The model can generate well-written assignments, essays and examination responses that students may submit as their own work (Garg & Goel, 2022) ^[26]. Evidence also shows that ChatGPT performs well on assessment questions in medicine and law (Choi *et al.*, 2022), while Fijačko *et al.* (2023) ^[13, 23] reported high-quality responses in university life-support examinations. Such capabilities increase concerns about plagiarism, unauthorised academic assistance and difficulties in distinguishing original student work from AI-generated content (Rane *et al.*, 2024) ^[50].
6. Frequent dependence on ChatGPT may reduce students' willingness to engage with textbooks, scholarly articles and other academic resources. Roig (2015) ^[53] associated such dependence with reduced synthesis, evaluation and critical engagement during learning. Continued reliance on AI-generated responses may also weaken writing ability, creativity and independent problem-solving skills (Arroyo-Bello *et al.*, 2025) ^[4]. Students may gradually replace personal effort with automated responses, limiting opportunities for intellectual growth.
7. The effective use of ChatGPT depends on reliable digital facilities that remain inadequate in many

- Nigerian educational institutions. Unstable electricity supply, poor internet connectivity and limited access to digital technologies restrict consistent use of AI-supported learning tools (NERC, 2022; NCC, 2023). Ogbonna, Ibezim and Obi (2022) ^[22, 45] noted disparities between urban and rural institutions, creating unequal opportunities for students and lecturers to benefit from emerging educational technologies.
8. Successful integration of ChatGPT requires educators who possess adequate digital skills. Many lecturers have limited experience with AI applications and may encounter difficulties incorporating such tools into teaching activities (Owoeye *et al.*, 2025) ^[47]. Resistance to new technologies also persists among educators accustomed to conventional instructional methods (Fashola & Adesanya, 2023) ^[21]. These conditions slow the adoption of responsible AI practices in Nigerian classrooms.
 9. The educational use of ChatGPT raises ethical questions beyond plagiarism. AI-generated responses may contain inaccurate or culturally biased information because of limitations in training data (Segbenya *et al.*, 2024) ^[59]. Students also express concerns regarding the collection, storage and use of personal information by AI platforms (Combrinck, 2024) ^[14]. These issues call for careful attention to fairness, transparency and responsible data management in educational environments.
 10. Excessive reliance on ChatGPT may weaken students' confidence in their own academic abilities. Although the tool can support idea generation and writing tasks, continuous dependence may discourage independent learning and sustained mental effort (Rane, 2024b) ^[50]. The literature also associates ChatGPT with risks such as false information, biased responses, weak emotional understanding, inaccurate learning assessment and reduced engagement in learning activities (Baidoo-Anu & Ansah, 2023; Karaköse, 2023; Zhai, 2022 ^[6, 69]; Deng *et al.*, 2025). For this reason, ChatGPT functions best as a learning aid rather than a substitute for independent study and lecturer guidance.
- that expose lecturers to prompt design, verification of AI-generated information, ethical classroom use and appropriate assessment practices. Continuous training will improve lecturers' confidence while reducing inappropriate dependence on AI-generated materials.
3. Students should receive formal instruction on the responsible use of ChatGPT before applying it to academic activities. Academic departments, lecturers, university libraries and student affairs units should introduce AI literacy through orientation programmes and study skills courses. Training should focus on fact-checking, critical evaluation of AI-generated responses, proper citation practices and the importance of independent learning so that ChatGPT functions as a learning aid rather than a replacement for academic effort.
 4. Assessment methods should be redesigned to reduce opportunities for inappropriate use of ChatGPT during academic work. Academic boards, examination committees and lecturers should increase the use of oral examinations, supervised tests, practical exercises, presentations, project-based learning and reflective assignments that require students to explain their reasoning and apply knowledge to real situations. Such assessment methods make it easier to evaluate students' original understanding and reduce excessive dependence on AI-generated responses.
 5. Successful application of ChatGPT depends on reliable digital infrastructure that remains inadequate in many Nigerian educational institutions. Federal and State Governments, educational institutions, ICT agencies and telecommunications providers should invest in stable electricity, affordable internet services, campus wireless networks, computer laboratories and digital learning facilities. Priority should also be given to institutions in underserved communities to reduce inequalities in access to AI-supported education.
 6. Information produced by ChatGPT should be subjected to academic verification before it is used for teaching, learning or research. Lecturers, librarians, supervisors and quality assurance units should require users to compare AI-generated materials with textbooks, peer-reviewed journals and other credible scholarly sources. Such verification reduces the likelihood of using inaccurate information, fabricated references and unsupported academic claims.
 7. Educational institutions should establish clear rules governing the acceptable use of ChatGPT in coursework, assignments and examinations. Institutional management, examination units, disciplinary committees and lecturers should revise academic integrity policies to define acceptable AI use, disclosure requirements and penalties for academic misconduct. Regular awareness programmes should educate students about plagiarism, responsible AI use and the importance of producing original academic work.
 8. Educational institutions should safeguard personal and institutional information when using AI applications. Institutional management, ICT directorates and data protection officers should develop policies that discourage the submission of confidential documents to public AI platforms while educating staff and students

Strategies for Effective ChatGPT Application in Nigerian Educational System

1. The effective application of ChatGPT in Nigerian education requires clear national guidelines that define acceptable use in teaching, learning, assessment and research. The Federal Ministry of Education, the National Universities Commission, the National Commission for Colleges of Education and the National Board for Technical Education should collaborate with educational institutions to develop policies covering academic integrity, ethical use, data protection and assessment practices. Universities, polytechnics and colleges of education should adapt these policies into institutional regulations, staff handbooks and student codes of conduct, with periodic review to reflect developments in artificial intelligence.
2. Lecturers require adequate knowledge and practical skills to use ChatGPT effectively in teaching, research and assessment. Universities, colleges of education, polytechnics and teacher training institutions should organise regular professional development programmes

on responsible data handling practices. Such measures will reduce privacy risks and promote responsible use of digital technologies.

9. ChatGPT should complement rather than replace lecturers and conventional learning resources. Lecturers should encourage students to compare AI-generated responses with textbooks, scholarly literature and classroom instruction before accepting any information as accurate. Learning activities should require students to justify their conclusions with credible evidence and demonstrate independent reasoning. This approach strengthens analytical ability while reducing unquestioning acceptance of AI-generated content.
10. The rapid development of artificial intelligence requires continuous evaluation of its educational implications. Universities, research institutes, educational regulators and government agencies should support empirical studies on ChatGPT use in Nigerian education and periodically review existing policies, curriculum content and teaching practices based on emerging research findings. Regular monitoring will enable institutions to respond to new opportunities and challenges while maintaining educational quality and academic standards.

Conclusion

The use of ChatGPT in Nigerian education presents opportunities for improving access to information, supporting lesson preparation, assisting academic writing and encouraging digital learning. Its value, however, depends on careful use by lecturers and students. The review identified several concerns that require attention, including limited understanding of subject content, inaccurate responses, fabricated references, bias, weak support for critical thinking, academic dishonesty, declining student independence, inadequate digital facilities, limited AI competence among educators, privacy concerns and excessive dependence on automated responses. These issues show that ChatGPT cannot replace classroom teaching, academic supervision or established learning resources. Human judgement remains necessary when evaluating AI-generated content before it is applied to teaching, learning or research. Nigerian educational institutions have a responsibility to establish ethical rules, strengthen academic integrity, improve digital facilities and build the capacity of lecturers and students to use AI responsibly. Learning activities should continue to encourage reading, critical thinking, discussion, practical engagement and independent inquiry rather than dependence on automatically generated answers. Assessment methods also require adjustment so that they measure students' knowledge, reasoning and originality instead of their ability to obtain AI-generated responses. Educational regulators, institutional leaders, lecturers, students and technology providers share responsibility for creating a learning environment where artificial intelligence supports educational quality without weakening academic values. Continued review of AI policies, classroom practices and technological developments will help educational institutions respond to emerging challenges while preserving honesty, originality and intellectual growth. ChatGPT should remain a supporting educational resource whose outputs are examined carefully, verified with credible academic sources

and guided by professional judgement before they influence teaching, assessment or scholarly work.

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