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The Role of ChatGPT in Supporting Teacher Training and Lesson Preparation in Northern Nigerian Colleges of Education

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Abstract

This paper examines the emerging role of Artificial Intelligence (AI), specifically ChatGPT, in enhancing teacher training and lesson preparation in Northern Nigerian Colleges of Education. With the growing integration of digital pedagogies in higher education, AI tools offer opportunities for personalized instruction, intelligent tutoring, and improved curriculum design. The study adopts a conceptual approach supported by a review of recent literature and observations from the Nigerian teacher education context. Findings reveal that while awareness of ChatGPT and other AI tools is increasing, practical utilization remains minimal due to infrastructural, digital literacy, and policy challenges. The paper concludes that ChatGPT has strong potential to support pre-service and in-service teachers in developing lesson notes, generating instructional materials, and improving English language communication. It recommends targeted capacity building, improved internet infrastructure, and policy integration of AI tools into teacher education programs across Northern Nigeria.

Keywords: Artificial Intelligence, ChatGPT, Digital Pedagogy, Teacher Education, Northern Nigeria

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1. Introduction

The rapid advancement of digital technologies has significantly transformed educational systems across the world. In recent years, Artificial Intelligence (AI) has emerged as one of the most influential innovations shaping teaching, learning, research, and educational administration. AI refers to computer systems designed to perform tasks that typically require human intelligence, including reasoning, problem-solving, language understanding, and decision-making. The growing adoption of AI technologies in education has created new opportunities for improving instructional delivery, enhancing learner engagement, and supporting professional development among educators (Holmes et al., 2019).

One of the most notable developments in the field of AI is the emergence of generative AI tools such as ChatGPT. Developed by OpenAI, ChatGPT is a conversational AI system capable of generating human-like responses, answering questions, creating educational content, summarizing information, and supporting problem-solving activities. Since its public release, ChatGPT has attracted significant attention from educators, researchers, and policymakers due to its potential applications in teaching and learning environments. Studies have shown that ChatGPT can assist teachers in developing lesson plans, generating instructional materials, designing assessments, and improving classroom communication (van den Berg & du Plessis, 2023).

Globally, educational institutions are increasingly exploring the integration of generative AI into instructional practices. According to UNESCO (2023), AI technologies have the potential to support personalized learning, improve access to educational resources, and enhance teaching effectiveness when implemented responsibly. UNESCO further emphasizes that AI should be utilized as a complementary tool that supports educators rather than replacing the professional roles of teachers. The organization also highlights the need for ethical guidelines, digital literacy development, and institutional policies to ensure the responsible use of AI in education.

The introduction of ChatGPT has generated considerable interest within teacher education programs because of its capacity to assist both pre-service and in-service teachers in various instructional tasks. Research indicates that generative AI tools can support lesson planning, content development, critical thinking activities, and curriculum design while reducing the time required for instructional preparation (Su & Yang, 2023; van den Berg & du Plessis, 2023). Furthermore, ChatGPT provides opportunities for teachers to access educational resources, receive explanations of complex concepts, and generate innovative classroom activities that enhance student engagement.

In Nigeria, the integration of digital technologies into education has gained increasing attention as stakeholders seek innovative approaches to improve teaching quality and learning outcomes. The National Policy on Education encourages the adoption of information and communication technologies (ICT) to strengthen educational delivery and teacher development. However, despite these efforts, many teacher education institutions continue to face challenges such as inadequate instructional materials, limited digital infrastructure, poor internet connectivity, and insufficient professional development opportunities. These challenges are particularly evident in many Colleges of Education across Northern Nigeria, where resource limitations often affect the effectiveness of teacher preparation programs.

Northern Nigerian Colleges of Education play a crucial role in producing qualified teachers for primary and junior secondary schools. These institutions are expected to equip future teachers with both pedagogical knowledge and technological competencies

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necessary for modern classroom environments. Nevertheless, many teacher trainees and educators experience difficulties in accessing up-to-date teaching resources and innovative instructional support systems. Consequently, there is a growing need to explore emerging technologies that can strengthen teacher preparation and improve instructional effectiveness.

The emergence of ChatGPT presents a potentially valuable solution to some of these challenges. Through its ability to generate lesson notes, instructional content, classroom activities, assessment items, and educational explanations, ChatGPT can support teachers in improving the quality and efficiency of lesson preparation. Additionally, the technology can enhance academic writing, communication skills, research activities, and professional learning among teacher educators and student teachers. Recent studies suggest that AI-powered educational tools can contribute significantly to improving teacher productivity and expanding access to educational knowledge (UNESCO, 2023).

Despite the growing global interest in AI-assisted teaching and learning, evidence regarding the practical use of ChatGPT within Nigerian teacher education institutions remains limited. Many educators are still unfamiliar with the effective application of generative AI tools, while concerns relating to ethical usage, academic integrity, digital literacy, and technological infrastructure continue to influence adoption rates. Understanding the potential contributions and challenges associated with ChatGPT is therefore essential for developing strategies that promote its responsible integration into teacher education programs.

Against this background, this paper examines the role of ChatGPT in supporting teacher training and lesson preparation in Northern Nigerian Colleges of Education. The paper explores the educational benefits of ChatGPT, its applications in teacher preparation and instructional planning, the challenges affecting its adoption, and practical recommendations for effective implementation within the teacher education sector. By contributing to ongoing discussions on AI in education, the study seeks to provide insights that can assist policymakers, teacher educators, and educational institutions in leveraging emerging technologies to improve the quality of teacher education in Northern Nigeria.

2. Literature Review

2.1 Artificial Intelligence in Education

Artificial Intelligence (AI) has emerged as one of the most transformative technologies in education. AI-powered systems provide personalized learning experiences, automate administrative tasks, and support instructional decision-making. The integration of AI into educational environments has expanded rapidly since the introduction of generative AI tools such as ChatGPT. According to UNESCO (2023), generative AI has the potential to improve access to educational resources, support teachers in instructional design, and enhance learning outcomes when implemented responsibly. However, UNESCO also emphasizes the need for ethical guidelines, teacher training, and institutional policies to ensure responsible adoption of AI technologies in education (UNESCO, 2023).

Recent systematic reviews indicate that ChatGPT is increasingly being used in higher education for content generation, lesson planning, assessment design, academic writing support, and personalized tutoring (Ali et al., 2024; Tlili et al., 2024). Studies suggest that AI tools can significantly reduce teachers' workload while improving the quality and accessibility of instructional materials.

2.2 ChatGPT and Teacher Education

Teacher education institutions worldwide are exploring the potential of ChatGPT in preparing future educators. Van den Berg and Du Plessis (2023) argue that ChatGPT can support lesson planning, critical thinking development, and pedagogical innovation among teacher trainees. The authors emphasize that AI should function as a support tool rather than a replacement for professional teacher judgment.

Similarly, Lee and Zhai (2024) found that pre-service teachers successfully integrated ChatGPT into science lesson planning activities. Their study revealed that AI-assisted lesson plans demonstrated strong pedagogical alignment and instructional creativity, although concerns about accuracy and overreliance on AI remained.

Research conducted in higher education institutions further demonstrates that ChatGPT can assist educators in generating lesson plans, assessment tasks, learning activities, and instructional resources. Nevertheless, researchers caution that AI-generated content should always be reviewed by teachers to ensure pedagogical appropriateness and factual accuracy.

2.3 AI Adoption in Nigerian Higher Education

The adoption of AI technologies in Nigerian higher education is gradually increasing. A recent study by Eleje et al. (2025) reported growing awareness and positive perceptions of AI tools among Nigerian lecturers. The study found that lecturers generally believe AI can improve teaching effectiveness, research productivity, and student engagement, although concerns regarding digital infrastructure and training remain significant barriers. The digital pedagogy remains unevenly distributed, with more adoption in urban centers and universities compared to Colleges of Education in the North. Scholars (Audu et al., 2021) have noted that teacher education institutions in Northern Nigeria still depend largely on traditional, face-to-face instruction. Consequently, integrating AI tools such as ChatGPT could serve as a low-cost, accessible innovation to improve instructional design and delivery.

However, challenges persist. These include unreliable electricity supply, poor internet penetration, and limited policy frameworks for AI integration in education. Despite these limitations, the growing availability of smartphones and increasing awareness of digital learning platforms offer an opportunity for gradual adoption.

Evidence from Nigeria also suggests that AI-powered tutoring systems can significantly improve learning outcomes. Reports from pilot studies conducted in 2024 demonstrated substantial gains in English language learning and digital skills when students interacted with AI-based learning assistants under teacher supervision. These findings highlight the potential of generative AI to support educational development in resource-constrained environments.

2.4 Technology Acceptance Theory

This paper is anchored on the Technology Acceptance Model (TAM), developed by Davis (1989). TAM proposes that users' acceptance of a technology is influenced by two primary factors:

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perceived usefulness and perceived ease of use. In the context of teacher education, educators are more likely to adopt ChatGPT if they believe it improves lesson preparation, teaching effectiveness, and professional productivity while remaining easy to use.

3. Approach and Context

This paper adopts a conceptual and descriptive research approach to examine the role of ChatGPT in supporting teacher training and lesson preparation in Northern Nigerian Colleges of Education. The study is based on a review and synthesis of existing literature on Artificial Intelligence (AI), ChatGPT, digital pedagogy, and teacher education. Relevant scholarly articles, conference papers, policy documents, books, and reports published between 2019 and 2025 were consulted to provide current insights into the application of generative AI in educational settings.

The choice of a conceptual approach is appropriate because the adoption of ChatGPT in teacher education within Northern Nigerian Colleges of Education is still emerging, and limited empirical studies currently exist in this specific context. Consequently, the paper seeks to analyze existing knowledge, identify potential opportunities, examine implementation challenges, and propose practical recommendations for stakeholders in teacher education.

The context of the study is Northern Nigerian Colleges of Education, which play a critical role in preparing teachers for primary and junior secondary schools. These institutions operate within diverse socio-economic and technological environments characterized by varying levels of digital infrastructure, internet connectivity, ICT resources, and technological literacy among staff and students. Such contextual factors influence the adoption and effective utilization of emerging technologies, including Artificial Intelligence tools such as ChatGPT.

To achieve the objectives of the paper, relevant literature was reviewed under four major themes: (i) Artificial Intelligence in education, (ii) ChatGPT and teacher training, (iii) ChatGPT in lesson preparation and instructional design, and (iv) challenges and opportunities associated with AI adoption in Nigerian educational institutions. Information obtained from these sources was critically analyzed and synthesized to develop a comprehensive understanding of how ChatGPT can contribute to improving teacher preparation and instructional practices in Northern Nigerian Colleges of Education.

The study is guided by the Technology Acceptance Model (TAM) developed by Davis (1989), which explains how users come to accept and use new technologies. According to the model, perceived usefulness and perceived ease of use are the primary factors influencing technology adoption. In the context of this study, teacher educators and student teachers are more likely to adopt ChatGPT if they perceive it as useful for lesson preparation, instructional support, professional development, and educational productivity.

Although this study does not involve primary data collection, it provides valuable insights into the potential applications of ChatGPT in teacher education and offers recommendations for policymakers, educational administrators, teacher educators, and researchers interested in the integration of Artificial Intelligence into Nigerian educational institutions.

Conceptual Framework

The conceptual framework of this study illustrates the relationship between ChatGPT adoption and improved teacher education outcomes.

ChatGPT Adoption
↓
Lesson Planning Support
↓
Instructional Material Development
↓
Assessment Design
↓
Professional Development
↓
Improved Teacher Effectiveness and Quality of Teacher Education

Source: Adapted from Davis (1989), UNESCO (2023), and Holmes et al. (2019).

4. Discussion

This section discusses the implications of the reviewed literature on the role of ChatGPT in teacher training and lesson preparation within Northern Nigerian Colleges of Education. The discussion focuses on how ChatGPT can enhance professional development, improve instructional planning, support research and academic writing, and promote digital literacy among teacher trainees. It also examines the opportunities and challenges associated with the adoption of AI-powered educational tools in the context of teacher education. The discussion is based on insights drawn from existing studies and their relevance to the educational realities of Northern Nigeria.

5. The Role of ChatGPT in Teacher Training

The integration of Artificial Intelligence (AI) technologies into teacher education has created new opportunities for improving the quality and effectiveness of teacher preparation programs. Among these technologies, ChatGPT has emerged as a valuable educational tool capable of supporting both pre-service and in-service teachers in various aspects of professional development. As teacher education institutions seek innovative approaches to prepare educators for the demands of the twenty-first-century classroom, ChatGPT offers significant potential for enhancing teaching competencies, instructional planning, research skills, and lifelong learning (UNESCO, 2023).

Teacher training involves equipping prospective teachers with the pedagogical knowledge, subject matter expertise, classroom management skills, and professional competencies required for effective teaching. ChatGPT can support this process by providing instant access to educational information, facilitating personalized learning experiences, and assisting teacher trainees in completing various academic and professional tasks (Holmes et al., 2019).

5.1 Supporting Professional Development

Continuous professional development is essential for maintaining teaching effectiveness and adapting to changing educational practices. ChatGPT serves as a virtual learning assistant that can provide explanations of educational theories, teaching methodologies, curriculum concepts, and classroom management techniques. Teacher educators and student teachers can engage with the system to obtain clarification on difficult concepts, explore innovative teaching strategies, and access relevant educational resources.

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For example, a teacher trainee preparing for a micro-teaching session can use ChatGPT to obtain information about learner-centered teaching methods, classroom questioning techniques, and effective lesson delivery strategies. Such support contributes to self-directed learning and continuous professional growth (van den Berg & du Plessis, 2023).

5.2 Enhancing Pedagogical Knowledge

Pedagogical knowledge forms the foundation of effective teaching. ChatGPT can help teacher trainees understand various instructional approaches, including cooperative learning, inquiry-based learning, problem-based learning, differentiated instruction, and competency-based education. Through interactive conversations, teachers can explore practical applications of these approaches and identify strategies suitable for different classroom situations.

Furthermore, ChatGPT can provide examples of teaching scenarios and classroom case studies that enable teacher trainees to connect theoretical knowledge with practical teaching experiences. This enhances their understanding of instructional decision-making and classroom practice (Zawacki-Richter et al., 2019).

5.3 Improving Research and Academic Writing Skills

Research competence is an important component of teacher education programs. Teacher trainees are often required to conduct research projects, prepare assignments, write seminar papers, and complete final-year projects. ChatGPT can assist students in identifying research topics, generating research questions, developing conceptual frameworks, and understanding research methodologies.

Additionally, the technology can support academic writing by improving grammar, sentence structure, coherence, and organization of ideas. It can also help students summarize scholarly literature and develop outlines for research reports. However, educators must ensure that students use AI tools ethically and avoid plagiarism by properly citing sources and critically evaluating AI-generated content (Akgun & Greenhow, 2022).

5.4 Facilitating Personalized Learning

Teacher trainees possess diverse learning needs, backgrounds, and levels of academic preparedness. Traditional teacher education programs sometimes struggle to provide individualized support for all learners. ChatGPT addresses this challenge by offering personalized learning experiences based on users' specific questions and learning requirements.

Students can request explanations at different levels of complexity, seek clarification on difficult concepts, and receive immediate feedback on their learning activities. This flexibility promotes independent learning and allows teacher trainees to progress at their own pace. Personalized support can be particularly beneficial in large classes where direct interaction with lecturers may be limited (Luckin, 2018).

5.5 Strengthening Digital Literacy and Technological Competence

The modern teaching profession increasingly requires educators to possess digital literacy skills and the ability to integrate technology into instructional practice. Exposure to ChatGPT and other AI tools during teacher preparation programs can enhance teachers' confidence in using educational technologies.

By interacting with AI-powered systems, teacher trainees develop skills related to information retrieval, digital communication, content creation, and technology-assisted learning. These competencies are essential for preparing future teachers who can effectively utilize digital tools to support teaching and learning in contemporary classrooms (UNESCO, 2023).

5.6 Supporting Reflective Practice

Reflective practice is widely recognized as an important aspect of teacher professional development. Effective teachers regularly evaluate their teaching experiences, identify strengths and weaknesses, and seek opportunities for improvement. ChatGPT can support reflective practice by providing prompts, reflective questions, and feedback that encourage critical analysis of teaching activities.

For instance, after completing a teaching practice exercise, a student teacher can use ChatGPT to reflect on classroom interactions, learner engagement, instructional strategies, and assessment methods. Such reflective activities contribute to professional growth and improved teaching effectiveness.

5.7 Promoting Innovation and Creativity in Teaching

Innovation and creativity are increasingly important in modern education. ChatGPT can assist teacher trainees in developing creative lesson ideas, project-based learning activities, educational games, collaborative learning exercises, and technology-enhanced instructional strategies. By generating diverse teaching suggestions, the technology encourages experimentation and innovation in classroom practice.

Moreover, ChatGPT can help educators adapt instructional materials to suit different learning styles and cultural contexts, thereby improving the relevance and effectiveness of teaching. This capability is particularly valuable in Northern Nigerian educational settings, where teachers often work with diverse student populations and varying resource conditions.

5.8 Implications for Northern Nigerian Colleges of Education

The potential benefits of ChatGPT are particularly relevant to Northern Nigerian Colleges of Education, where challenges such as inadequate instructional materials, limited access to professional development opportunities, and large student populations continue to affect teacher preparation. By providing accessible and cost-effective educational support, ChatGPT can complement existing teaching resources and contribute to improving the quality of teacher education.

However, successful implementation requires adequate internet connectivity, digital literacy training, institutional support, and ethical guidelines governing the use of AI technologies. Teacher education institutions must therefore adopt strategic approaches that promote responsible and effective utilization of ChatGPT while preserving the critical role of human educators in the teaching and learning process.

In summary, ChatGPT has considerable potential to support teacher training through professional development, pedagogical enhancement, research support, personalized learning, digital literacy development, reflective practice, and instructional innovation. When appropriately integrated into teacher education

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programs, the technology can contribute significantly to preparing competent and technologically proficient teachers for the twenty-first-century educational environment.

6. The Role of ChatGPT in Lesson Preparation

Lesson preparation is a fundamental aspect of effective teaching, as it enables educators to organize instructional activities, define learning objectives, select appropriate teaching strategies, and design assessment methods that facilitate meaningful learning. In contemporary educational environments, the increasing availability of Artificial Intelligence (AI) tools has created new opportunities for improving the quality and efficiency of lesson planning. Among these tools, ChatGPT has emerged as a valuable resource capable of assisting teachers in various stages of instructional preparation.

ChatGPT can support educators by generating lesson plans, developing instructional materials, creating assessment items, and suggesting innovative classroom activities tailored to specific learning objectives. By reducing the time and effort required for routine preparation tasks, the technology allows teachers to focus more on instructional delivery, learner engagement, and classroom interaction. For teacher trainees and practicing educators in Northern Nigerian Colleges of Education, ChatGPT offers a practical means of accessing educational resources and enhancing instructional effectiveness despite existing challenges related to limited teaching materials and technological infrastructure.

6.1 Development of Lesson Plans

Lesson planning is one of the most important responsibilities of teachers because it provides a structured framework for instructional delivery and learning assessment. A well-developed lesson plan outlines learning objectives, teaching methods, instructional materials, classroom activities, and evaluation procedures. However, preparing detailed lesson plans can be time-consuming, particularly for novice teachers and teacher trainees. ChatGPT offers a practical solution by assisting educators in generating comprehensive lesson plans that align with curriculum objectives and learner needs.

Through natural language processing capabilities, ChatGPT can generate lesson plans for different subjects, educational levels, and instructional contexts. Teachers can provide specific prompts relating to topics, learning outcomes, duration, and learner characteristics, and the system can produce structured lesson plans that include objectives, introduction, presentation, activities, evaluation, and conclusion. This capability reduces preparation time while enabling teachers to focus more on instructional effectiveness and learner engagement (van den Berg & du Plessis, 2023).

In teacher education programs, ChatGPT can support pre-service teachers in understanding lesson planning principles and developing competency in instructional design. By examining AI-generated lesson plans, student teachers can learn how to formulate measurable learning objectives, select appropriate teaching strategies, and organize classroom activities effectively. Nevertheless, educators should critically review AI-generated plans to ensure curriculum alignment, contextual relevance, and pedagogical appropriateness (UNESCO, 2023).

6.2 Generation of Instructional Materials

Instructional materials play a significant role in facilitating effective teaching and learning. These materials include lecture notes, handouts, worksheets, presentations, discussion questions, case studies, and learning activities designed to support instructional objectives. The development of quality instructional materials often requires substantial time, creativity, and expertise. ChatGPT can significantly simplify this process by assisting teachers in generating a wide range of educational resources.

The AI system can produce summaries of complex topics, create explanatory notes, generate examples, and develop classroom exercises tailored to specific learning outcomes. This capability is particularly valuable in contexts where access to educational resources may be limited. Teachers in Northern Nigerian Colleges of Education can utilize ChatGPT to supplement existing instructional materials and improve the quality of classroom instruction.

Furthermore, ChatGPT can support differentiated instruction by generating materials suitable for learners with varying academic abilities and learning styles. By providing alternative explanations, examples, and activities, the technology helps educators accommodate diverse learner needs and promote inclusive education (Holmes et al., 2019). The ability to rapidly generate instructional content also enables teachers to update learning materials in response to curriculum changes and emerging educational trends.

6.3 Assessment Design

Assessment is a critical component of the teaching and learning process because it provides information about learner achievement and instructional effectiveness. Effective assessment practices require teachers to develop valid, reliable, and curriculum-aligned evaluation instruments. However, designing assessment items can be a demanding task, particularly when teachers must prepare multiple forms of evaluation within limited timeframes.

ChatGPT can assist educators in developing various assessment tools, including multiple-choice questions, short-answer questions, essay questions, quizzes, assignments, and marking guides. The system can generate questions based on specified learning objectives, cognitive levels, and subject content. This capability enables teachers to create assessments that measure different aspects of student learning, including knowledge, comprehension, application, analysis, and evaluation.

In teacher training programs, ChatGPT can help prospective teachers understand principles of educational assessment by demonstrating how assessment items are constructed and aligned with instructional objectives. Additionally, the technology can assist in developing formative assessment activities that provide timely feedback and support continuous learning. Despite these advantages, teachers must verify the accuracy, relevance, and fairness of AI-generated assessment items before classroom use to maintain assessment quality and academic integrity (Akgun & Greenhow, 2022).

6.4 Adaptation of Content

One of the major challenges in education is addressing the diverse learning needs, backgrounds, and abilities of students. Effective teaching requires the adaptation of instructional content to ensure that learners can understand and engage with educational materials. ChatGPT offers significant support in this regard by enabling

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teachers to modify and customize content according to learner characteristics and instructional contexts.

For example, ChatGPT can simplify complex concepts for beginners, provide more detailed explanations for advanced learners, and generate examples that are relevant to specific cultural or educational settings. Teachers can also use the technology to translate or rephrase content into simpler language, thereby improving accessibility and comprehension. Such flexibility promotes learner-centered instruction and supports differentiated teaching practices.

In Northern Nigerian Colleges of Education, where students may come from diverse linguistic and socio-cultural backgrounds, content adaptation can enhance understanding and improve learning outcomes. ChatGPT can assist teacher trainees in developing skills related to instructional differentiation and inclusive education by providing alternative approaches to presenting information and engaging learners (Luckin, 2018). Consequently, the technology contributes to creating more responsive and effective learning environments.

6.5 Creativity and Innovation

Creativity and innovation are increasingly recognized as essential competencies for educators in the twenty-first century. Effective teaching requires the ability to design engaging learning experiences, employ diverse instructional strategies, and adapt to changing educational demands. ChatGPT can serve as a valuable tool for fostering creativity and innovation in lesson preparation and instructional delivery.

The technology can generate ideas for classroom discussions, project-based learning activities, educational games, collaborative exercises, simulations, and problem-solving tasks. These suggestions can help teachers create interactive learning environments that encourage student participation and critical thinking. By providing multiple instructional alternatives, ChatGPT enables educators to experiment with innovative teaching approaches and explore new pedagogical possibilities.

Moreover, ChatGPT can support interdisciplinary learning by suggesting connections between different subject areas and helping teachers design integrated learning experiences. Such approaches promote deeper understanding and encourage students to apply knowledge across various contexts. For teacher trainees, exposure to AI-assisted creativity tools can enhance instructional design skills and prepare them for technology-rich educational environments (Holmes et al., 2019).

Despite its creative potential, ChatGPT should be viewed as a supportive tool rather than a substitute for teacher expertise. Human judgment, professional experience, and contextual understanding remain essential for selecting, adapting, and implementing innovative teaching practices. When used responsibly, ChatGPT can complement teachers' creativity and contribute to more engaging, effective, and learner-centered educational experiences (UNESCO, 2023).

7. Benefits of ChatGPT in Northern Nigerian Colleges of Education

The adoption of ChatGPT in teacher education offers numerous benefits that can contribute to improving teaching effectiveness, learning outcomes, and professional development among educators. As Northern Nigerian Colleges of Education continue to embrace digital transformation, ChatGPT provides an innovative and accessible tool that can support both teacher trainees and teacher educators in addressing various educational challenges. The technology has the potential to enhance instructional efficiency, improve access to educational resources, and promote the development of digital competencies required in modern educational environments.

7.1 Improved Efficiency in Lesson Preparation

One of the most significant benefits of ChatGPT is its ability to reduce the time and effort required for lesson preparation. Teachers can quickly generate lesson plans, instructional notes, learning activities, and assessment items by providing simple prompts. This allows educators to devote more time to classroom interaction, learner support, and instructional improvement rather than spending excessive hours on routine preparation tasks (van den Berg & du Plessis, 2023).

7.2 Enhanced Access to Educational Resources

Many Colleges of Education in Northern Nigeria face challenges related to limited access to current instructional materials and academic resources. ChatGPT provides immediate access to a wide range of educational information, explanations, examples, and learning materials. This can help bridge resource gaps and support teachers in obtaining relevant content for classroom instruction and professional development (UNESCO, 2023).

7.3 Support for Professional Development

Continuous professional development is essential for improving teaching quality and maintaining professional competence. ChatGPT serves as a virtual learning assistant that can provide explanations of educational theories, teaching strategies, curriculum concepts, and classroom management techniques. Through regular interaction with the technology, teachers can update their knowledge and develop new pedagogical skills that enhance instructional effectiveness (Holmes et al., 2019).

7.4 Improved Academic Writing and Research Skills

Teacher trainees and lecturers frequently engage in academic writing, research projects, seminar presentations, and report preparation. ChatGPT can assist users in generating research ideas, organizing academic content, improving grammar, summarizing literature, and refining written communication. These capabilities can contribute to improved research productivity and stronger academic performance among students and educators (Akgun & Greenhow, 2022).

7.5 Promotion of Digital Literacy

The integration of ChatGPT into teacher education programs can contribute significantly to the development of digital literacy skills. As teachers interact with AI-powered systems, they become more familiar with emerging technologies and develop competencies related to information management, digital communication, and technology-enhanced learning. Such skills are increasingly important in preparing educators for technology-driven educational environments (UNESCO, 2023).

7.6 Personalized Learning Support

ChatGPT can provide individualized assistance based on the specific learning needs of users. Teacher trainees can request explanations at different levels of complexity, seek clarification on

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difficult concepts, and obtain immediate feedback on their learning activities. This personalized support promotes self-directed learning and enables students to learn at their own pace, thereby improving understanding and knowledge retention (Luckin, 2018).

7.7 Increased Creativity and Innovation

The technology can stimulate creativity by generating innovative teaching ideas, classroom activities, project-based learning tasks, educational games, and collaborative exercises. Such support encourages teachers to adopt more engaging and learner-centered instructional approaches. By exposing teacher trainees to innovative educational practices, ChatGPT can contribute to the development of creative and adaptable educators capable of meeting the diverse needs of learners (Holmes et al., 2019).

7.8 Cost-Effective Educational Support

Compared with many educational technologies that require substantial financial investment, ChatGPT offers a relatively affordable means of accessing educational support and instructional resources. For institutions operating under budget constraints, the technology can provide valuable assistance without requiring significant expenditure on additional learning materials or professional development programs.

7.9 Improved Communication Skills

Effective communication is a fundamental teaching competency. ChatGPT can assist teacher trainees in improving their English language proficiency, grammar, vocabulary, and writing skills. Through continuous interaction with the technology, users can develop stronger communication abilities that enhance classroom instruction, academic writing, and professional interactions.

7.10 Bridging Educational Resource Gaps

Many educational institutions in Northern Nigeria face shortages of textbooks, instructional materials, and specialized teaching resources. ChatGPT can help bridge these gaps by generating educational content that supports teaching and learning activities. While the technology should not replace conventional educational resources, it can serve as a supplementary tool that enhances access to knowledge and instructional support.

Overall, the adoption of ChatGPT in Northern Nigerian Colleges of Education has the potential to improve teaching quality, strengthen teacher preparation, promote digital transformation, and enhance educational outcomes. However, these benefits can only be fully realized when accompanied by adequate infrastructure, digital literacy training, institutional support, and ethical guidelines governing the responsible use of Artificial Intelligence in education.

8. Challenges of Using ChatGPT in Teacher Education

Despite the numerous benefits associated with the use of ChatGPT in teacher education, several challenges may hinder its effective adoption and utilization within Northern Nigerian Colleges of Education. These challenges range from technological and infrastructural limitations to ethical, pedagogical, and policy-related concerns. Understanding these challenges is essential for developing appropriate strategies that can facilitate the responsible integration of Artificial Intelligence (AI) into teacher education programs.

8.1 Limited Internet Connectivity

One of the major barriers to the effective use of ChatGPT in Northern Nigerian Colleges of Education is inadequate internet access. Since ChatGPT primarily operates through online platforms, reliable internet connectivity is necessary for accessing its services. However, many institutions, particularly those located in rural and semi-urban areas, continue to experience poor internet coverage, low bandwidth, and unstable network services. These challenges can limit the ability of lecturers and student teachers to effectively utilize AI-powered educational tools (UNESCO, 2023).

Furthermore, the high cost of internet data subscriptions may discourage frequent use of ChatGPT among students and educators. As a result, the educational benefits of AI technologies may not be equally accessible to all users.

8.2 Inadequate Digital Literacy Skills

Effective utilization of ChatGPT requires a certain level of digital literacy and technological competence. Many teacher educators and student teachers may lack the skills necessary to interact effectively with AI systems, formulate appropriate prompts, evaluate generated content, and integrate AI tools into teaching and learning activities.

Research suggests that insufficient digital skills remain a significant obstacle to technology adoption in many developing countries (Holmes et al., 2019). Without adequate training and capacity-building programs, educators may struggle to maximize the benefits of ChatGPT in lesson preparation, instructional delivery, and professional development.

8.3 Accuracy and Reliability Concerns

Although ChatGPT can generate useful educational content, the information provided may occasionally contain inaccuracies, outdated information, or fabricated references. This phenomenon, commonly referred to as "AI hallucination," occurs when AI systems generate responses that appear credible but are factually incorrect.

In teacher education, reliance on inaccurate information can negatively affect lesson quality and student learning outcomes. Therefore, educators must critically evaluate and verify AI-generated content before using it for instructional purposes. Human oversight remains essential to ensure the accuracy, relevance, and reliability of educational materials produced by ChatGPT (OpenAI, 2023).

8.4 Ethical and Academic Integrity Issues

The increasing use of ChatGPT in education has raised concerns regarding academic integrity and ethical practices. Students may misuse AI tools to complete assignments, write essays, or generate research reports without demonstrating their own understanding of the subject matter. Such practices can undermine learning objectives and compromise academic standards.

Additionally, excessive dependence on AI-generated content may discourage critical thinking, creativity, and independent problem-solving skills among learners. Educational institutions must therefore establish clear ethical guidelines that define acceptable and responsible uses of AI technologies in academic environments (Akgun & Greenhow, 2022).

8.5 Lack of Institutional Policies and Guidelines

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Many Colleges of Education in Nigeria currently lack formal policies governing the use of Artificial Intelligence in teaching, learning, and assessment. The absence of institutional guidelines creates uncertainty regarding appropriate AI usage, data privacy, intellectual property rights, and academic accountability.

Without clear policies, educators and students may adopt inconsistent practices that could lead to misuse or misunderstanding of AI technologies. Developing comprehensive institutional frameworks is therefore essential for promoting responsible AI integration within teacher education programs (UNESCO, 2023).

8.6 Inadequate ICT Infrastructure

Successful implementation of AI-powered educational tools requires adequate technological infrastructure, including computers, smartphones, electricity supply, internet facilities, and digital learning environments. However, many Northern Nigerian Colleges of Education face significant infrastructural challenges that limit technology adoption.

Frequent power outages, insufficient computer laboratories, and inadequate ICT facilities can restrict access to ChatGPT and other educational technologies. These infrastructural deficiencies must be addressed if institutions are to fully benefit from AI-enhanced teaching and learning opportunities.

8.7 Data Privacy and Security Concerns

The use of AI applications often involves the collection and processing of user information. This raises concerns regarding data privacy, confidentiality, and cybersecurity. Educators and students may unknowingly share sensitive personal or institutional information while interacting with AI systems.

Consequently, institutions must educate users about safe AI practices and implement measures that protect personal data and institutional information. Awareness of digital privacy issues is increasingly important as educational institutions adopt AI technologies for teaching and administrative purposes.

8.8 Resistance to Technological Change

Resistance to innovation is a common challenge during the introduction of new technologies. Some educators may be reluctant to adopt ChatGPT due to concerns about its effectiveness, reliability, or perceived threat to traditional teaching practices. Others may fear that AI could reduce the role of human teachers in the educational process.

Such resistance can slow the adoption of beneficial technologies and limit opportunities for educational innovation. Continuous awareness campaigns, professional development programs, and demonstration of practical benefits can help reduce resistance and encourage positive attitudes toward AI adoption (Rogers, 2003).

8.9 Financial Constraints

Financial limitations represent another significant challenge to the implementation of AI technologies in educational institutions. Although some AI tools are freely available, advanced features often require paid subscriptions. Additionally, institutions may need to invest in internet infrastructure, digital devices, and staff training programs to support effective AI integration.

For many Colleges of Education operating under limited budgets, these costs may present barriers to large-scale implementation. Government support and partnerships with technology organizations may therefore be necessary to facilitate sustainable adoption.

8.10 Overdependence on Artificial Intelligence

While ChatGPT can provide valuable educational support, excessive reliance on AI tools may negatively affect the development of essential teaching competencies. Teachers may become overly dependent on automatically generated lesson plans, instructional materials, and assessment items, potentially reducing their ability to independently design and evaluate educational content.

Teacher education programs should therefore encourage balanced use of AI technologies by emphasizing that ChatGPT is a supportive tool rather than a replacement for professional expertise. Human creativity, pedagogical knowledge, critical thinking, and contextual understanding remain indispensable components of effective teaching.

In summary, the adoption of ChatGPT in teacher education presents several challenges relating to infrastructure, digital literacy, academic integrity, policy development, and responsible use. Addressing these challenges requires collaborative efforts among government agencies, educational institutions, teacher educators, and technology providers. With appropriate policies, training, and infrastructural support, many of these barriers can be mitigated, enabling Colleges of Education in Northern Nigeria to maximize the educational benefits of Artificial Intelligence technologies.

9. Recommendations

Based on the opportunities and challenges associated with the use of ChatGPT in teacher education, several recommendations are proposed to facilitate its effective and responsible integration into Northern Nigerian Colleges of Education. These recommendations are intended to guide policymakers, educational administrators, teacher educators, and other stakeholders in maximizing the benefits of Artificial Intelligence (AI) for teacher preparation and instructional development.

9.1 Strengthen Digital Infrastructure

Government agencies and educational institutions should invest in improving Information and Communication Technology (ICT) infrastructure across Colleges of Education. This includes providing reliable internet connectivity, adequate computer facilities, stable electricity supply, and access to digital learning resources. Improved infrastructure will create an enabling environment for the effective utilization of ChatGPT and other AI-powered educational technologies (UNESCO, 2023).

9.2 Promote AI and Digital Literacy Training

Regular training programs should be organized for lecturers, teacher educators, and student teachers to enhance their digital literacy and AI competencies. Such training should focus on effective use of ChatGPT, prompt engineering, evaluation of AI-generated content, digital ethics, and responsible technology integration. Building users' confidence and competence will increase the likelihood of successful AI adoption in teacher education programs (Holmes et al., 2019).

9.3 Integrate AI Education into Teacher Training Curricula

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Colleges of Education should incorporate AI-related topics into teacher education curricula. Courses and workshops on Artificial Intelligence, educational technology, digital pedagogy, and ethical AI use should be introduced to prepare future teachers for technology-enhanced teaching environments. This will ensure that graduates possess the knowledge and skills required to effectively utilize emerging technologies in their professional practice.

9.4 Develop Institutional Policies and Ethical Guidelines

Educational institutions should establish clear policies and guidelines governing the use of AI tools in teaching, learning, research, and assessment. These policies should address issues relating to academic integrity, plagiarism, data privacy, intellectual property rights, and ethical use of AI-generated content. Clear regulations will promote responsible usage while minimizing potential misuse of ChatGPT in educational settings (Akgun & Greenhow, 2022).

9.5 Encourage Human-AI Collaboration

Teacher educators should emphasize that ChatGPT is a support tool rather than a replacement for professional teaching expertise. Educators and students should be encouraged to use AI-generated content as a starting point for further analysis, modification, and improvement. Human judgment, creativity, critical thinking, and pedagogical knowledge should remain central to instructional decision-making and educational practice.

9.6 Support Research on AI in Education

Higher education institutions should encourage further research on the application of ChatGPT and other AI technologies in Nigerian educational contexts. Empirical studies should be conducted to examine the effectiveness, acceptance, challenges, and educational impact of AI-assisted teaching and learning. Such research will provide evidence-based insights that can inform policy development and implementation strategies.

9.7 Establish Partnerships with Technology Organizations

Government agencies, Colleges of Education, and educational stakeholders should collaborate with technology companies, research institutions, and development partners to support AI adoption initiatives. These partnerships can facilitate access to technological resources, professional training opportunities, technical support, and funding for AI-related educational projects.

9.8 Create Awareness on Responsible AI Use

Awareness campaigns should be conducted to educate lecturers and students about the benefits, limitations, and ethical implications of ChatGPT and similar technologies. Such initiatives will help users develop realistic expectations, avoid overdependence on AI tools, and understand the importance of verifying and critically evaluating AI-generated information before use.

9.9 Encourage Blended Approaches to Teaching and Learning

Educational institutions should adopt blended approaches that combine traditional teaching methods with AI-supported instructional practices. This approach will allow educators to benefit from the efficiency and innovation offered by ChatGPT while preserving the human interaction, mentorship, and contextual understanding that remain essential components of effective teaching and learning.

9.10 Provide Financial and Policy Support

Federal and state governments, educational agencies, and institutional management should allocate adequate funding to support AI integration initiatives in Colleges of Education. Financial support should cover infrastructure development, staff training, software access, and research activities. Additionally, national education policies should recognize the growing importance of AI and provide strategic guidance for its adoption in teacher education.

Implementing these recommendations will enhance the effective use of ChatGPT in teacher education and lesson preparation while addressing potential challenges associated with its adoption. Through coordinated efforts among stakeholders, Northern Nigerian Colleges of Education can leverage Artificial Intelligence technologies to improve teacher preparation, strengthen instructional quality, and promote digital transformation in education.

10. Conclusion

The emergence of Artificial Intelligence (AI) technologies has introduced new possibilities for improving teaching, learning, and professional development within educational institutions. Among these technologies, ChatGPT has demonstrated considerable potential as a supportive tool for teacher training and lesson preparation. This paper examined the role of ChatGPT in enhancing teacher education in Northern Nigerian Colleges of Education, with particular emphasis on its contributions to professional development, lesson planning, instructional material development, assessment design, content adaptation, and instructional innovation.

The review of relevant literature revealed that ChatGPT can significantly improve the efficiency and quality of instructional preparation by providing educators with quick access to educational resources, pedagogical guidance, and customized teaching materials. The technology also supports personalized learning, academic writing, research activities, and digital literacy development among both pre-service and in-service teachers. These capabilities make ChatGPT a valuable educational resource that can complement traditional teaching methods and contribute to improved teacher effectiveness.

Despite these potential benefits, the study also identified several challenges that may hinder the effective integration of ChatGPT into teacher education programs. These challenges include inadequate internet connectivity, limited digital literacy skills, insufficient ICT infrastructure, concerns regarding academic integrity, lack of institutional policies, data privacy issues, and resistance to technological change. Addressing these barriers is essential to ensuring that AI technologies are used responsibly and effectively within educational settings.

The paper therefore concludes that ChatGPT has the potential to play a transformative role in teacher education and lesson preparation in Northern Nigerian Colleges of Education when supported by appropriate infrastructure, training, policy frameworks, and ethical guidelines. Its successful adoption requires collaborative efforts among government agencies,

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educational institutions, teacher educators, and technology providers to create an enabling environment for AI integration.

Furthermore, the study emphasizes that ChatGPT should be viewed as a complementary tool that supports, rather than replaces, the professional expertise, creativity, and pedagogical judgment of teachers. Human educators remain central to the teaching and learning process, while AI serves as a resource for enhancing instructional effectiveness and educational innovation.

In conclusion, the responsible integration of ChatGPT into teacher education programs offers significant opportunities for improving the quality of teacher preparation, promoting digital transformation, and strengthening educational outcomes in Northern Nigeria. As AI technologies continue to evolve, Colleges of Education must proactively embrace innovation while ensuring that educational values, ethical standards, and learner-centered practices remain at the core of teaching and learning activities.

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