INTEGRATION OF AI TOOLS IN CURRICULUM DESIGN AND CONTENT DELIVERY

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Abstract
Artificial Intelligence (AI) tools are changing how teachers plan lessons and present information to students. This paper examined the integration of AI tools in curriculum design and content delivery within educational settings. The paper is anchored on the Technological Pedagogical Content Knowledge (TPACK) framework, which explains how technology, teaching methods, and subject matter work together. The paper adopted a qualitative, conceptual, and analytical research design, drawing on existing literature, policy documents, and practical examples from educational institutions. Particular attention is given to developing countries, with Nigeria used as a case study to illustrate opportunities and challenges. Findings show that AI tools help teachers personalize learning, automate routine tasks, and provide real-time feedback. However, challenges such as lack of infrastructure, insufficient teacher training, data privacy concerns, and the high cost of technology remain significant barriers. The paper argued that successful integration depends not on technology alone but on how teachers, school leaders, and policymakers work together to adapt AI tools to local contexts. The paper concluded that deliberate investment in teacher professional development, digital infrastructure, and ethical guidelines is essential for AI to improve curriculum design and content delivery.

Keywords: *Artificial Intelligence (AI), Content Delivery, Curriculum Design, Educational Technology*

Introduction
Curriculum design and content delivery are central to the quality of education in any society. Curriculum design refers to the process of deciding what students should learn, how learning should be organized, and how achievement should be assessed. Content delivery refers to the methods teachers use to present learning materials to students. For many years, these activities were done manually (Makgata, 2024). Teachers planned lessons using textbooks and personal experience, and they delivered content through lectures and blackboard explanations. This traditional approach worked well in stable environments, but it does not easily adjust to the different learning speeds and needs of individual students. It also places a heavy workload on teachers, who must prepare lessons, grade assignments, and track progress with limited support.

Artificial Intelligence (AI) refers to a broad range of technologies, including machine learning, natural language processing, robotics, computer vision, and automated decision-making systems, which enable machines to perform tasks that traditionally require human intelligence. In education, AI tools include intelligent tutoring systems, automated grading software, learning analytics platforms, and content generation tools such as ChatGPT. These technologies are increasingly being integrated into educational systems around the world, influencing how teachers

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design lessons, how students receive instruction, and how learning outcomes are measured. AI-powered systems are now applied in personalized learning, real-time feedback, administrative automation, and curriculum mapping (Holmes, Bialik, & Fadel, 2019).

In Nigeria, the education system faces serious challenges. Large class sizes, shortage of qualified teachers, limited learning materials, and poor infrastructure are common problems. According to the Federal Ministry of Education (2022), the student-to-teacher ratio in many public secondary schools exceeds 40 to one. This makes it very difficult for teachers to give individual attention to students. The curriculum is often rigid and does not reflect the needs of the modern economy. Content delivery remains largely teacher-centred, with limited use of digital tools. These problems call for new approaches, and AI tools offer one possible solution.

In an ideal situation, teachers would have enough time, resources, and support to design well-structured curricula that meet the needs of every student. They would also have access to modern teaching aids that make content delivery engaging, interactive, and responsive to individual differences. Students would learn at their own pace, receive immediate feedback, and have their weaknesses identified early. However, the reality in many Nigerian schools is different. Most teachers still design curricula using outdated methods. They rely on printed syllabi and write lesson notes by hand. Content delivery is largely lecture-based, with little use of digital tools. Teachers spend a great deal of time on routine tasks, reducing the time available for actual teaching. Student performance in national examinations remains poor. A report by the National Bureau of Statistics (2023) showed that less than 40% of students who sat for the West African Senior School Certificate Examination obtained credits in English and Mathematics.

The government has introduced several remedies. The Federal Ministry of Education launched the National Digital Learning Policy in 2020, which encourages the use of technology in schools. The Universal Basic Education Commission has provided computers to some schools and trained some teachers in basic digital skills. Private organizations and international donors have also supported technology integration projects. Despite these efforts, many schools, especially in rural areas, still lack computers and internet access. Teacher training programmes are often too short and do not cover AI tools specifically. Where AI tools are available, teachers do not know how to integrate them into their existing teaching methods. There is also no clear policy on ethical use of AI in education. Concerns about data privacy, algorithmic bias, and cost further slow down adoption. As a result, the gap between the ideal situation and reality continues to widen.

A major challenge associated with AI integration in education is the unequal distribution of benefits. Well-resourced urban schools and private institutions often gain the most from AI innovations, while rural public schools remain excluded. In Nigeria, where many teachers work without reliable electricity or internet, the introduction of AI tools may widen existing inequalities rather than reduce them. Enoghase and Ogbeide (2025) found that undergraduate students at Ambrose Alli University used ChatGPT for assignment help and content generation, but most lacked proper training on responsible use. Wagwu et al. (2023) reported that users in a Nigerian university library were generally satisfied with ChatGPT but desired improvements in local language support and context-specific responses. Furthermore, Westfall (2023) reported that 89% of students admitted to using ChatGPT for homework, raising concerns about plagiarism and academic integrity. Chan and Hu (2023) found that while students see benefits in generative AI, they also worry about over-reliance and loss of critical thinking skills.

It is against this background, this paper examined the integration of AI tools in curriculum design and content delivery. The paper has four main objectives. First, to explain how AI tools can be used in curriculum design, including lesson planning, learning objective

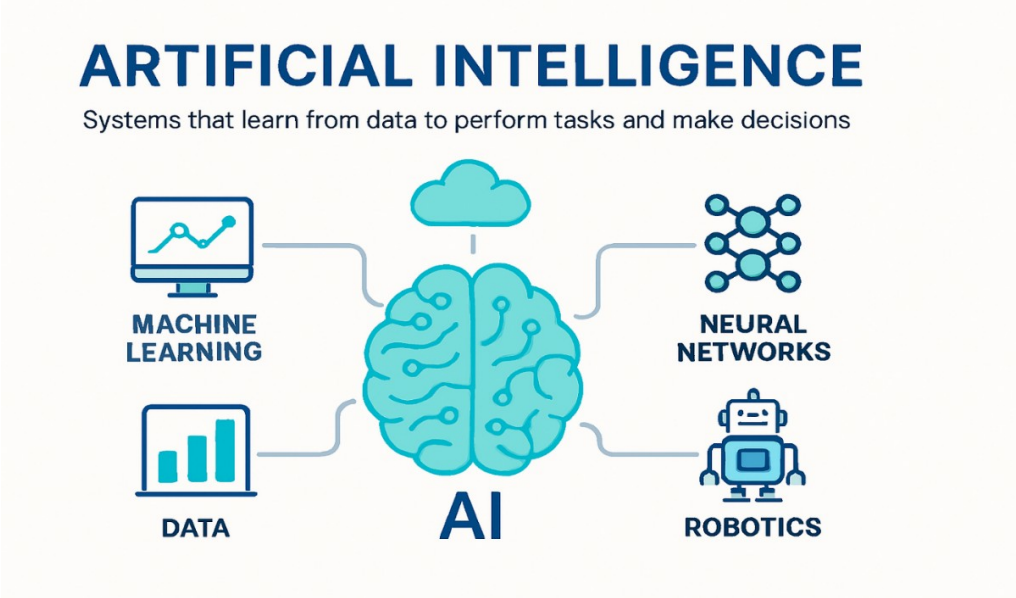
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formulation, and alignment of content with student needs. Second, to describe how AI tools can improve content delivery through personalization, real-time feedback, and adaptive learning systems. Third, to identify the challenges that limit the integration of AI tools in Nigerian schools, including infrastructure gaps, teacher readiness, and ethical concerns. Fourth, to propose practical recommendations for policymakers, school administrators, and teachers on how to integrate AI tools effectively.

To achieve these objectives, the study adopts a qualitative, conceptual, and analytical approach based entirely on secondary sources of data. Relevant information was obtained from scholarly journal articles, books, conference proceedings, policy documents, and reports published by reputable international organizations, including UNESCO, the World Bank, the International Telecommunication Union, and the Organization for Economic Co-operation and Development. Additional evidence relating to Nigeria was drawn from official publications and reports produced by national institutions such as the Federal Ministry of Education, National Universities Commission, Universal Basic Education Commission, and National Bureau of Statistics. Recent studies on AI use in Nigerian educational settings, including those by Ibrahim and Adepoju (2023); Wagwu et al. (2023), Opesemowo et al. (2024), Enoghase and Ogbeide (2025) were also reviewed. The study employs thematic analysis to examine existing literature and identify key patterns, opportunities, challenges, and debates relating to the integration of AI tools in curriculum design and content delivery. This approach provides a comprehensive understanding of how AI can support teachers and improve learning outcomes in Nigerian schools.

Concept of Artificial Intelligence (AI) in Education

Artificial Intelligence (AI) is one of the most important technological developments in modern education. Scholars have defined AI from different perspectives depending on whether emphasis is placed on machine intelligence, human thinking, problem-solving ability, or educational application.



Source: Stuart Russell and Peter Norvig (2021)

According to McCarthy (1956), Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs. This definition views AI as a scientific discipline concerned with designing computer systems that can perform tasks normally

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associated with human intelligence. McCarthy emphasized that machines can be programmed to think logically, learn from experience, and solve problems independently. In education, this means computers can be trained to recognize student learning patterns, understand written answers, generate practice questions, or make recommendations for further study based on student performance data.

In another influential definition, Russell and Norvig (2021) described Artificial Intelligence as the study of intelligent agents that perceive their environment and take actions that maximize the achievement of goals. This definition expands AI beyond simple automation by presenting intelligent systems as agents capable of observation, reasoning, and action. In the classroom context, AI systems can collect information about how a student solves a problem, analyze that information using programmed models, and then respond intelligently by offering a simpler explanation or a more challenging task. This makes AI a goal-oriented technology that can adapt to each student's learning pace.

Holmes et al. (2019) grouped AI tools in education into three types. The first type is learner-facing AI, which includes intelligent tutoring systems and adaptive learning platforms that interact directly with students. The second type is teacher-facing AI, which includes tools that help teachers plan lessons, grade assignments, and track student progress. The third type is system-facing AI, which helps school administrators manage schedules, resources, and reporting. These categories help educators understand where and how AI can be most useful in schools. Examples of AI tools used in education include ChatGPT for generating explanations and practice questions, Grammarly for writing assistance, Khan Academy's Khanmigo for tutoring, and platforms like Century Tech and Squirrel AI that offer adaptive learning (Enoghase & Ogbeide, 2025). These tools are not yet widely used in Nigerian schools, but they show what is possible.

Concept of Curriculum Design

Curriculum design is the process of deciding what students should learn, how learning should be organized, and how achievement should be measured. It is a central activity in any education system because it sets the direction for teaching and learning. According to Tyler (1949), curriculum design should answer four basic questions. First, what educational purposes should the school seek to attain? Second, what learning experiences are likely to achieve these purposes? Third, how can these learning experiences be organized effectively? Fourth, how can we determine whether the purposes are being attained? Tyler's framework remains relevant today because it emphasizes that curriculum must have clear objectives, appropriate content, logical sequencing, and proper assessment methods.

In the traditional approach, curriculum design is a manual, paper-based process. Teachers write lesson notes by hand or using word processors. They refer to textbooks and their own experience to decide what to teach and how to teach it. This process works, but it is slow and does not easily incorporate new information or adjust to individual student needs (Nieveen et al., 2023). It also does not make use of data from student performance to improve future lesson plans.

In contrast, AI-supported curriculum design uses data and algorithms to help teachers make better decisions. AI tools can analyze past examination results and identify topics where students struggled most (Russell & Norvig, 2021). They can suggest spending more time on those topics. They can also help align lesson plans with curriculum standards by automatically checking whether each learning objective is covered. This reduces errors and omissions, saving teachers time and improving the quality of the curriculum.

Concept of Content Delivery

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Content delivery refers to the methods and strategies teachers use to present learning materials to students. It includes how information is explained, how examples are given, how questions are asked, and how activities are organized. According to McNeill (2022), effective content delivery follows a sequence of events that support learning. These events include gaining attention, informing learners of objectives, stimulating recall of prior knowledge, presenting the content, providing guidance, eliciting performance, giving feedback, assessing performance, and enhancing retention and transfer. When teachers follow these steps, students are more likely to understand and remember what they have been taught.

In many Nigerian classrooms, content delivery is still largely teacher-centred. The teacher stands at the front of the class, talks, writes on the blackboard, and asks occasional questions. Students listen, take notes, and answer when called upon. This method works for some students but not for all. Students who learn best by doing, by discussing, or by seeing visual examples may struggle. Also, in large classes, many students do not get individual attention.AI-powered content delivery changes this by making instruction adaptive and personalized. An AI system can watch how a student interacts with a lesson and change the content in real time. If a student reads slowly or answers questions incorrectly, the system provides simpler explanations or breaks the content into smaller pieces. If a student is progressing quickly, the system offers enrichment activities. AI tools can also provide immediate feedback on assignments, convert speech to text, and translate content into local languages. These capabilities help teachers reach every student more effectively.

Theoretical Framework

This paper is anchored on the Technological Pedagogical Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006). TPACK is a theory that explains what teachers need to know to integrate technology effectively into their teaching. According to this framework, effective technology integration is not just about knowing how to use a tool. It requires three kinds of knowledge working together. The first is content knowledge, which is the teacher's understanding of the subject matter they teach, such as mathematics, English, or science. The second is pedagogical knowledge, which is the teacher's understanding of teaching methods, classroom management, and how students learn. The third is technological knowledge, which is the teacher's understanding of how to use digital tools and software.

The TPACK framework argues that the most effective teaching happens when these three kinds of knowledge overlap and interact. For example, a teacher who understands mathematics (content), knows how to explain difficult concepts step by step (pedagogy), and knows how to use an AI tutoring tool (technology) is better prepared than a teacher who only has one or two of these knowledge areas. The framework also recognizes that technology, pedagogy, and content are not separate. They influence each other. The introduction of a new AI tool may require the teacher to change how they teach (pedagogy) and even what content they focus on.

This theory is very useful for understanding AI integration in curriculum design and content delivery. It shows that buying computers or installing software is not enough. Teachers need training that builds all three knowledge areas simultaneously. They need to understand the subject they teach, they need to know how to teach it effectively, and they need to know how to use AI tools in ways that support both the subject and the teaching method. Ibrahim and Adepoju (2023) argued that human-AI collaboration in education requires reimagining the role of teachers, not replacing them. Teachers should become facilitators and guides, while AI handles routine tasks and data processing. Similarly, Kandlhofer et al. (2023) pointed out that large language models

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have great educational potential but also raise ethical challenges that must be addressed through training and guidelines.

The TPACK framework also helps explain why many technology integration projects fail. Often, teachers are given technology training that focuses only on how to operate the tool (technological knowledge). They are not shown how the tool connects to their subject (content) or how to change their teaching methods to make the best use of the tool (pedagogy). As a result, the tool sits unused or is used in ways that do not improve learning. This paper uses TPACK as a lens to analyze the challenges and opportunities of integrating AI tools in Nigerian schools.

Artificial Intelligence (AI) Tools and Curriculum Design

AI tools are changing the way teachers design curricula. Curriculum design involves deciding what students should learn, how topics should be ordered, and how learning should be assessed. Traditionally, teachers performed this work manually using textbooks, syllabi, and personal experience. This process is time-consuming and often results in gaps, overlaps, or misalignment between instruction and assessment. AI tools enable teachers to complete these tasks more efficiently and accurately. For example, an AI tool can scan a national syllabus in seconds and produce a structured list of learning objectives. This reduces time spent on administrative planning and allows teachers to focus on instructional quality. Holmes et al. (2019) noted that AI-supported curriculum mapping improves coherence and saves significant planning time.

One practical application of AI is the analysis of existing curriculum documents to identify gaps or overlaps. When a teacher uploads a syllabus into an AI tool, the tool can process each topic and subtopic, highlight repeated learning objectives, and flag missing essential content. The tool can also recommend time allocations for each objective based on topic complexity and historical student performance data. This analytical capability helps teachers detect imbalances, such as excessive time spent on simple concepts while difficult topics are rushed. By rebalancing the schedule, teachers can improve student comprehension. Studies from India and Kenya confirm that teachers using AI-supported curriculum design tools report reduced stress and increased confidence (UNESCO, 2022).

AI tools also assist in aligning lesson plans with assessment methods. When a teacher writes a learning objective, an AI tool can recommend suitable assessment formats, such as multiple-choice, short-answer, or project-based tasks. Some tools can generate draft questions directly from lesson content. This alignment ensures that what is taught is exactly what is tested, reducing mismatch errors. Opesemowo et al. (2024) found that lecturers showed positive attitudes toward using ChatGPT for instructional assessment, although they expressed concerns about accuracy and fairness. Using AI for assessment design can reduce the time teachers spend writing exam questions, allowing more time for marking and student feedback.

AI enables teachers to personalize curriculum materials for students with different ability levels. In any classroom, students vary in their prior knowledge and learning pace. Traditional curriculum design produces one lesson plan for the entire class, which may leave advanced students unchallenged and struggling students overwhelmed. AI tools can generate multiple versions of the same lesson: one for advanced learners with more complex questions, one for average learners with standard content, and one for struggling learners with additional examples and simplified language. This personalization would take hours manually but can be accomplished in minutes with AI. For instance, a primary school teacher can use ChatGPT to create differentiated reading comprehension worksheets for a large class, ensuring that each student works at an

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appropriate level. According to Ibrahim and Adepoju (2023), such personalization is one of the greatest benefits of AI in education.

In Nigeria, pilot projects in selected schools have demonstrated promising results. The National Universities Commission (2024) reported that lecturers in three federal universities who used AI tools for lesson planning reduced their preparation time by nearly 40%. These lecturers also produced more varied learning materials, including videos, quizzes, and interactive exercises. However, these benefits have not reached most schools. Enoghase and Ogbeide (2025) noted that while students at Ambrose Alli University used ChatGPT for academic work, many lacked proper training, which led to misuse and over-reliance. A lecturer using AI to redesign a course may discover that the course contains too many learning objectives for the available weeks and may remove less important topics. Such analytical use of AI can lead to improved curriculum structure, but AI tools alone are insufficient; teachers and students require guidance and training to use them responsibly.

Despite the clear benefits, many Nigerian schools cannot yet use AI for curriculum design. The main barriers are lack of computers, poor internet connectivity, and insufficient teacher training. In rural areas, some schools lack even basic electricity. Where devices exist, teachers often lack the knowledge to use AI tools effectively. A survey by the Universal Basic Education Commission (2023) found that less than 10% of primary and secondary school teachers had received any training on AI tools. To address this, governments must invest in infrastructure and teacher development. Schools can start with offline-capable AI tools that function on basic smartphones. Teachers can be trained through short, practical workshops focused on one or two tools at a time. Chan and Hu (2023) recommend that teacher training colleges include AI literacy as a compulsory subject. Without these steps, the gap between well-resourced and poorly resourced schools will continue to widen.

Artificial Intelligence (AI) and Content Delivery

In many Nigerian classrooms, content delivery follows a one-size-fits-all model. The teacher presents the same lesson to all students at the same pace. This method disadvantages both fast and slow learners: quick students become bored and disengaged, while slower students fall behind and lose confidence. Teachers cannot easily adjust the pace or difficulty of a lesson for forty or fifty different students simultaneously. AI tools address this limitation by adapting content to each student's level in real time. According to Kandlhofer et al. (2023), adaptive AI systems have significant educational potential, particularly in large classes with mixed ability levels.

Personalization is the most significant contribution of AI to content delivery. An adaptive learning platform typically begins by administering a few diagnostic questions to determine a student's current knowledge level. Based on the responses, the platform presents content that matches that level. When a student answers correctly, the platform introduces slightly harder material. When a student answers incorrectly, the platform provides explanations and easier practice questions. Over time, the platform constructs a unique learning path for each student. For example, a student struggling with fractions receives step-by-step video explanations and simple practice questions, while a peer who has already mastered fractions receives algebra puzzles. Both students progress at their own pace without waiting for the teacher. The general effectiveness of adaptive learning is well documented (UNESCO, 2022).

Another major improvement is immediate feedback. In traditional settings, students may wait days or weeks for graded assignments, by which time they may have forgotten the original task. Delayed feedback allows mistakes to become habitual. AI tools provide instant feedback.

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When a student enters an answer into an AI math tutor, the tool checks it immediately, indicates errors, and shows correct methods. For writing tasks, an AI writing assistant checks grammar, spelling, punctuation, and style while the student types. This immediate correction helps students learn from mistakes in real time. Opesemowo et al. (2024) found that lecturers appreciated AI's speed, though they expressed concerns about fairness when AI is used for high-stakes grading. A student using an AI grammar checker can see steady improvement in essay scores because errors are corrected promptly.

AI tools also improve content delivery efficiency by handling routine tasks. Speech recognition tools convert a teacher's spoken lesson into written notes that students can review later, benefiting absent students or those who learn better through reading. Presentation tools automatically generate slides from a teacher's outline, reducing preparation time from days to hours. Language translation tools help teachers explain concepts to students who speak different home languages. In a linguistically diverse classroom, a teacher can use an AI translator to display key terms in Yoruba, Igbo, and Hausa alongside English, making instruction more inclusive. Ibrahim and Adepoju (2023) emphasized that when AI handles routine tasks, teachers can focus on higher-level activities such as mentoring, critical thinking development, and emotional support.

In Nigeria, some private schools have adopted AI-powered content delivery platforms. The Nigerian Educational Research and Development Council (2023) noted that teachers using such platforms felt more confident because they had access to data on each student's strengths and weaknesses. However, in public schools, adoption remains very low. A survey by the Universal Basic Education Commission (2023) found that less than 10% of primary and secondary school teachers had received any training on AI tools. Wagwu et al. (2023) found that users in a Nigerian university library appreciated ChatGPT's speed and convenience but desired better local language support and more context-appropriate responses. Without devices, internet connectivity, and training, AI-powered content delivery cannot function in most public schools. The verifiable barriers are lack of infrastructure and inadequate teacher preparation.

AI tools are not replacements for teachers; they are assistants that handle routine and repetitive tasks, provide data-driven insights, and free teachers to perform uniquely human functions such as inspiring students, building relationships, and addressing emotional and social needs. A teacher who uses AI for grading and lesson planning can devote more time to individual student mentoring, creative project design, and personalized encouragement. Adeshola and Adepoju (2023) argued that the future of education lies in human-AI collaboration, not in replacing one with the other. For this to occur in Nigeria, governments must invest in infrastructure and training. Schools should begin with simple, offline-capable AI tools that work on basic smartphones. Teachers should receive incremental training focused on one tool at a time. Policymakers must develop clear ethical guidelines, particularly regarding data privacy and plagiarism. Westfall (2023) and Enoghase and Ogbeide (2025) reported that 65% to 89% of students admitted to using ChatGPT for homework, indicating that demand already exists. The task is to channel this demand into responsible, effective learning that benefits all students, not only those in well-resourced schools.

Challenges Limiting AI Integration in Nigerian Schools

Despite the clear benefits, several challenges limit the integration of AI tools in curriculum design and content delivery in Nigeria. The most significant challenge is infrastructure. Many schools, especially in rural areas, do not have electricity, computers, or internet access. Without these basic requirements, AI tools cannot function. The International Telecommunication

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Union (2023) reported that only about 45% of schools in Nigeria have access to electricity, and even fewer have reliable internet connectivity.

The second challenge is teacher readiness. Even where technology is available, many teachers do not know how to use AI tools. Teacher training programmes in Nigeria focus mostly on subject content and traditional teaching methods. Very few include training on AI or educational technology. A survey by the Universal Basic Education Commission (2023) found that less than 10% of primary and secondary school teachers had received any training on AI tools. This lack of knowledge makes teachers afraid to try new tools, and some teachers actively resist technology because they fear it will replace them. Opesemowo et al. (2024) noted that even lecturers who are aware of AI tools often lack confidence in using them for assessment.

The third challenge is cost. AI tools often require paid subscriptions, and the hardware needed to run them, such as tablets or laptops, is expensive. Many public schools operate on very small budgets and cannot afford these items. Even when donors provide devices, there is often no budget for maintenance, replacement, or software updates.

The fourth challenge is ethical and privacy concerns. AI tools collect large amounts of student data, including their answers, time spent on tasks, and even their typing patterns. If this data is not protected, it could be misused. There are also concerns about algorithmic bias. An AI tool trained on data from Western students may not work well for Nigerian students because the cultural context and language are different. Nigeria currently does not have a specific law or policy governing the use of AI in education. This creates uncertainty for schools and teachers. Westfall (2023) reported that 89% of students admitted to using ChatGPT for homework, raising serious concerns about plagiarism and academic integrity. Chan and Hu (2023) found that while students see benefits in generative AI, they also worry about over-reliance and loss of critical thinking skills. Kandlhofer et al. (2023) stressed that ethical frameworks must be developed alongside technological implementation.

The fifth challenge is language. Most AI tools operate in English. While English is the official language of instruction in Nigeria, many students in rural areas are more comfortable in their mother tongues. AI tools that cannot understand or produce local languages are less useful for these students. Developing AI tools for Nigerian languages requires investment that has not yet been made.

Strategies for Successful Integration

Given these challenges, what strategies can help Nigerian schools integrate AI tools effectively? The literature suggests several pathways. The first is investment in infrastructure. Government at all levels must prioritize providing electricity, internet connectivity, and devices to schools. This is expensive, but it is the foundation for everything else. Public-private partnerships can help share the cost. For example, telecommunications companies could provide free or low-cost internet to schools as part of their corporate social responsibility programmes.

The second strategy is teacher professional development. Training programmes must move beyond basic computer literacy. Teachers need to learn how to use AI tools specifically for curriculum design and content delivery. The TPACK framework shows that training must combine technology, pedagogy, and content. Teachers should not just learn how to operate a tool; they should learn when to use it, why to use it, and how to adapt it to their subject and their students. This training should be continuous, not one-time workshops. Ibrahim and Adepoju (2023) recommend that teacher education programmes include modules on AI literacy and ethical use.

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The third strategy is development of local AI tools. Instead of relying entirely on imported software, Nigeria should invest in developing AI tools that are designed for its own curriculum, languages, and cultural context. Universities and technology hubs can partner to build these tools. Local tools would be cheaper, more relevant, and easier to support. Wagwu et al. (2023) found that users in Nigerian university libraries desired improvements in local language support and context-specific responses, which local development could provide.

The fourth strategy is establishing ethical guidelines. The government should develop a policy on the use of AI in education. This policy should address data privacy, consent, algorithmic transparency, and accountability. It should also provide guidance on how to evaluate AI tools for bias and cultural appropriateness. Clear rules will help schools and teachers adopt AI tools with confidence. Kandlhofer et al. (2023) emphasized that ethical frameworks must be developed alongside technological implementation.

The fifth strategy is starting small and scaling up. Instead of trying to introduce AI tools in all schools at once, policymakers should identify pilot schools that have basic infrastructure and motivated teachers. These schools can test different tools and approaches. Lessons learned can then be shared with other schools. This approach reduces risk and allows for continuous improvement.

Conclusion

This paper examined the integration of AI tools in curriculum design and content delivery. The findings show that AI tools have significant potential to help teachers save time, personalize learning, and provide immediate feedback to students. In curriculum design, AI can assist with lesson planning, alignment of objectives with assessment, and generation of learning materials. In content delivery, AI can adapt instruction to each student's level, provide instant corrections, and support multiple languages and formats. However, the paper also found that many Nigerian schools face serious challenges that prevent the effective use of AI tools. These challenges include lack of electricity and internet, inadequate teacher training, high costs, ethical concerns, and language barriers. Despite these challenges, the paper concludes that integration is possible if deliberate and coordinated action is taken. The success of AI integration depends not on the technology alone, but on how teachers, school leaders, and policymakers work together to adapt these tools to local contexts. When teachers are properly trained, when infrastructure is provided, and when ethical guidelines are in place, AI tools can become valuable partners in education rather than sources of stress or inequality.

Suggestions

Based on the findings of this paper, the following recommendations are proposed:

1. The Federal Ministry of Education should develop a national policy on AI in education. This policy should include standards for data privacy, guidelines for evaluating AI tools, and a framework for teacher training. It should also encourage the development of locally designed AI tools that reflect Nigerian curricula and languages.
2. State and local governments should invest in digital infrastructure for schools. Priority should be given to providing reliable electricity, internet connectivity, and devices to public schools, especially those in rural areas. Public-private partnerships and donor support should be used to supplement government budgets.
3. Teacher training institutions should integrate AI literacy into pre-service and in-service programmes. Every teacher graduating from a college of education or university should

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understand how to use AI tools for curriculum design and content delivery. The TPACK framework should guide the design of these training programmes.

4. School administrators should create supportive environments for AI integration. This includes allowing teachers time to learn and experiment with AI tools, providing technical support, and recognizing teachers who successfully integrate AI into their work.
5. Researchers and technology developers should create affordable, offline-capable AI tools. Many Nigerian schools do not have reliable internet. AI tools that can work offline, or with very low bandwidth, will be more accessible. These tools should also support major Nigerian languages.
6. Pilot programmes should be expanded and evaluated. The government should fund pilot projects in selected schools across different states. These pilots should be rigorously evaluated to identify what works, what does not, and under what conditions. Lessons learned should be shared widely.

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