THE ROLE OF ARTIFICIAL INTELLIGENCE IN REDEFINING THE ACADEMIC ACHIEVEMENTS OF PRIMARY SCHOOL PUPILS IN NIGERIA

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Abstract
This paper examined the role of Artificial Intelligence (AI) in redefining the academic achievements of primary school pupils in Nigeria, addressing the problem of limited integration of AI tools in foundational education where traditional examination-based learning often dominates. The objective was to explore how AI-powered technologies can personalise instruction, provide timely feedback, and support effective teaching and learning with the role of teachers as facilitators in selecting age-appropriate, curriculum-aligned resources clearly stated. Through a review of existing literature as secondary source of data, the paper analysed AI tools such as Night Zookeepers, Kahoot!, Quizizz, and Story Bird, which promote personalised instruction, active engagement, and self-paced learning. Findings revealed that these tools enhance pupils' cognitive, affective, and social development, making learning more interactive, engaging and enjoyable, as well as significantly improving academic achievement beyond conventional methods. The study concluded that effective integration of AI in primary school education can transform learning into a more engaging and learner-centered process. The paper recommended continuous professional training and development programs for teachers to equip them with the necessary skills and ethical competencies required for the effective use of AI in primary school teaching and learning in Nigeria.
Keywords: Artificial Intelligence, Primary School, Academic Achievement, AI-Powered Learning Tools, Teacher.

Introduction

The rapid advancement of Artificial Intelligence (AI) has brought about a fundamental change in the global education system. In many developed countries, AI powered educational tools have become indispensable to teaching and learning processes, improving efficiency and learning outcomes. There is an increasing awareness in artificial intelligence (AI) use in education to maximize effective teaching and learning process. Studies show that with the use of AI, barriers that hinder effective learning outcomes like lack of qualified teachers and resources could be eliminated, and the capacity of educational outcomes could be maximized, (Ejjami, 2024). Empirical studies have verified these assumptions and reported that AI has a positive impact on pupils' learning outcomes, although the application of AI in primary education remains limited in most developing countries including Nigeria (Birma, Gora, & Zarma, 2025). In addition to the effect on pupils' academic achievement, AI is important in ensuring and achieving the sustainable development of the nation. The United Nations Education Scientific and Cultural Organization (UNESCO) stated that sustainable development of our society could be achieved by ensuring the "inclusive and equitable quality of education and promote lifelong learning opportunities for all. (Arkorful, Basiru, Anokye, et al 2020).

Artificial Intelligence being used in education is not an alternative but an imperative step to achieve educational goals especially in primary schools which is the foundation upon which other levels of education build on. AI technology is widely integrated into our daily lives and many workforces (e.g., transportation, games, manufacturing, medical services, agriculture, and finance) to enhance the outcome and productivity of human work. Poquet, and De Laat, (2021), defines Artificial Intelligence as a "technology that builds systems to think and act like humans with the ability to achieve goals. In another study, Garbuio and Lin, (2021) defines Artificial Intelligence as computers which perform cognitive tasks, usually associated with human minds, particularly learning and problem-solving.

Unlike traditional computer technologies, which provide a fixed sequence without giving consideration to individual's needs and knowledge, AI interprets patterns of collected information and makes reasonable decisions to provide the next tasks and maximize outcomes (Aldoseri, Al-Khalifa & Hamouda, 2023). A continuous learning and thinking process, AI evaluates prior strategies' outcomes and devises new ones. Thus, AI would positively impact pupils' academic achievement, creative thinking skills, and problem-solving abilities at the foundation level of formal education. (Hu, 2022)

One of the critical issues in the education is integrating AI into educational system in Nigeria. Several governments, institutions, and industries have invested a lot of money to facilitate the integration of AI in education to support teaching and learning. The World Bank estimated that the investment in AI use in education reached USD 1047 billion between 2008 and 2019. (Andrade, et al 2024). Additionally, many countries have revised their curriculum to integrate AI technology into school education Primary school education is the foundation of every nation's educational system, and pupils' academic performance at this stage often determines their later success in learning and life. This paper seeks to address the role of Artificial Intelligence in redefining the academic achievements of Primary Schools' Pupils in Nigeria.

Academic performance has been measured exclusively through summative assessments such as tests and examinations, often neglecting other dimensions of learning such as creativity, critical thinking, and problem-solving. AI technologies, however, offer a broader and more dynamic view of academic performance by integrating continuous, data-driven evaluation and feedback. According to Sari, Tumanggor, & Efron, (2024), AI-based systems assess learners'

progress not only by test scores but also by engagement patterns, skill acquisition, and adaptability to learning content. Similarly, Yasmeen, (2024) asserts that AI redefines learning outcomes by focusing on holistic growth rather than rote memorization. In this context, AI enables teachers and policymakers to measure performance in more comprehensive and meaningful ways that reflect true learning outcomes and also improves teaching, learning, and school management when used correctly. It helps teachers work cleverer, improves teaching and learning, and strengthens school efficiency.

Theoretical Framework

This study is underpinned by Constructivist Learning Theory Propounded by Jerome Bruner. Constructivist Learning Theory explains that learners build knowledge actively through interaction, exploration, and experience. AI tools such as adaptive learning apps, intelligent tutoring systems, and interactive learning games support the theory of constructivist learning because they enables pupils to learn by doing, experimenting, and receiving instant feedback. (Mercer, 2020). Constructivism values the teacher as a facilitator. AI handles routine tasks (marking, tracking progress), giving teachers more time to support learners emotionally and academically. Children who usually have difficulty with learning can now attain greater outcomes. This theory is relevant and significant to this study because Social constructionism focuses on the cooperative and social aspects of learning. The theory helps us understand how integrating technology into the classroom affects the learning environment and interactions between students, teachers, and communities in developing countries. It means that knowledge results from interactions between subjective and environmental factors. By connecting this theory to the topic of technology integration in Nigerian classrooms, learners can develop a comprehensive understanding of the factors influencing success. Also, Social Constructivism emphasizes the significance of interactive and collaborative learning environments.

Strategies on Effective ways of leveraging Artificial Intelligence to improve Pupils Academic Achievement

Personalised and adaptive learning for every child**:** AI can adjust lessons to meet each pupil's learning pace and ability with instant feedback on classwork, quizzes, and assignments. AI also assists pupils to correct mistakes quickly and assist teachers to identify learning gaps early. AI makes learning fun and interactive through games, quizzes, animations, virtual labs and reading assistant (Fitria, 2021).

AI also assists pupils with learning difficulties through AI tools which can help children with Dyslexia (reading struggles), speech difficulties, Attention-Deficit Hyperactivity Disorder **(**ADHD) This is a neurodevelopmental condition that affects a person's ability to pay attention or difficulty focusing or easily distracted, control impulses **(**acting without thinking**)** or regulate activity level (may be unusually active or restless) ADHD commonly appears in children, but it can continue into adolescence and adulthood. (Drechsler, et al 2020). AI also assist teachers save time by performing routine tasks like: marking assignments and examination, recording scores, preparing lesson notes and Send reports to parents AI develops and enhances critical thinking and creativity in pupils, with the use of AI tools can help young learners solve problems critically, explore ideas, create digital arts or write stories on their own through regular practice. Pupils could take part in practical activities, improved cognitive skills and learn with little supervision. These skills help pupils achieve beyond academics.

AI tools for writing and creativity to build grammar, storytelling, and creative skills include Night Zookeeper. This is highly valuable, it will enhance creative writing platform for children. Also, "Story Bird" (Köroğlu, 2023). AI tools assist children to create stories and illustrations based

on stimulates. 'Scribble Diffusion' also converts children's drawings into more refined images using Artificial Intelligence for classroom engagement, Kahoot!:, this is AI recommended for quiz generation. It assists teachers to generate quizzes instantly with AI support. (Nadeem, and Falig, 2020). . Pupils can use **q**uizlet, another AI tool to create flashcards and adaptive learning sets. When Quizziz or Edmodo are used, the AI scores ther work instantly and highlights specific mistakes giving immediate feedbacks (Yusof, Zaki,et al 2024). For example, if a pupil repeatedly misses questions related to fractions, the system alerts the teacher, who can then reteach that topic. This leads to faster correction of learning gaps. Blooket application can also be used in setting question sets and learning games. (Nasyifa, and Armin, 2025). Speechify is a tool text-to-speech reader that helps struggling readers. Microsoft Immersive Reader helps with word recognition, reading aloud, and translation. Ginger or Grammarly for Kids must be supervised by teacher, and also assists in spelling, grammar, and sentence correction (Puckett, 2024). 'Scratch' allows children to create animations, games, and stories, drag-and-drop coding where no typing needed that encourages creativity

Personalized Learning AI tools can adjust lessons to each child's pace and ability. Pupils who struggle get simpler explanations and more practice. Fast learners get advanced tasks so they do not get bored. Children receive instant feedback, helping them to improve faster and improved academic achievement. It boosts reading, writing, and numeracy skills, AI powered reading and numeracy application that make learning more effective. It also helps children to learn phonics, decoding, fluency, and comprehension. Assist in pupils to learn higher literacy and numeracy faster and accurately. It enhances physical activities and motivates children to learn better when learning with fun. Through quizzes, storytelling, and animations, young learners enjoy learning, increases their participation and better academic outcomes are achieved. Adaptive Learning Platforms like DreamBox, Smart Sparrow. (Dutta, et al 2024) These AI tools personalize learning content based on each child's pace, strengths, and learning gaps, which is helpful for children with ADHD and learning delays. AI tool like reading and literacy support Lexia Core5 Reading, Reading Assistant. These assist children improve phonics, vocabulary, fluency, and comprehension through guided practice and instant feedback.

In addition, AI makes learning more engaging through educational games and simulations**.** Gamified, another AI tool assists pupils to learn with fun redefining academic content into exciting challenges. For instance, pupils can learn spelling through AI-powered word games, or practice mathematics by solving puzzles that generate rewards. These games keep children motivated, especially those who struggle with traditional teaching methods. Social and Emotional Learning (SEL) AI tools assist in emotion-recognition and social-skills training These will help children, especially those with autism spectrum disorders, to recognize emotions and improve social interaction skills. (Zhang, et al. 2023).

The impacts of Teachers' Utilization of Artificial Intelligence on Pupils' Academic Achievements

Teachers play a central role in ensuring that Artificial Intelligence (AI) effectively enhances the academic achievements of primary school pupils in Nigeria. Teachers serve as facilitators and custodian of knowledge who guide and impart pupils with needed information and knowledge using AI-powered learning tools such as: Adaptive learning apps, digital tutors, and interactive educational games. Teachers are also responsible for selecting appropriate AI resources that match learners' developmental stages, age, learning ability, curriculum needs, and cognitive abilities. By integrating AI into planning lessons, teachers personalize learning experiences, support learners with diverse abilities, and monitor learners' progress through AI-generated

reports. Teachers also assist pupils develop digital literacy and responsible technology usage o AI tools by safeguarding they use AI safely and meaningfully. Teachers also interpret AI data information to identify learning gaps and provide necessary assistance and targeted interventions. They also collaborate with school administrators to create AI-friendly learning environments and participate in professional development to improve their competence in AI-based instruction.

Finally, teachers act as mediators between technology and learners, ensuring AI is used morally, effectively, and in ways that will bring out maximum academic results. Their influence goes beyond preparing pupils for examinations but also nurture well-rounded learners with relevant knowledge, skills, and values. Teachers design and deliver meaningful learning experiences using child-centered and activity-based teaching methods, these aid pupils to understand concepts better and apply what they learn to real-life situations. This approach encourages curiosity, creativity, and independent thinking. Teachers guide and motivate pupils through reinforcement, positive feedback, and motivational words, teachers will build pupils' confidence and interest in learning. When pupils feel supported, they are more likely to participate actively and strive for improvement. Also, Artificial Intelligence assist teachers to assess learning holistically and objectively, instead of relying only on tests and examinations, effective teachers use continuous assessment, observation, and project work to measure pupils' cognitive, affective, and psychomotor development. This certifies that academic achievement reflects true learning and growth.

Redefining pupils academic achievements using Artificial Intelligence

AI plays a crucial role in supporting children with learning difficulties as well. Some AI tools can analyze how pupils read aloud, write, or solve problems, and detect early signs of challenges such as dyslexia or numeracy disorders. A pupil who frequently reverses letters while typing may be flagged by the system, prompting the teacher to provide additional support. Early identification like this helps prevent long-term academic problems (Keller, Ruthruff, and Keller 2019).

Teachers also benefit greatly from AI, as it reduces administrative workload. Tools such as automated attendance systems, digital grade books, and performance dashboards help teachers manage their classrooms more efficiently (Santhosh, Harikrishnan, Gokulkannan, et al, 2025) For example, an AI platform can generate a weekly report showing which pupils need more attention in reading, writing skills or mathematics. When teachers have these insights, they can plan more effective lessons and offer targeted intervention, when learners develop cognitive, social and affective skills through the use of AI tools, it develop and build pupils' cognitive skills like retention rate, memory, problem-solving, critical thinking, affective skills like motivation, confidence, cooperation emotional regulation and psychomotor development through the use of AI-guided group tasks, communication practice

Furthermore, AI expands access to high-quality learning resources, even in rural areas with limited educational materials. Many AI-powered apps can run offline once downloaded, allowing pupils to learn at home or in schools without reliable internet. This supports equity in education and ensures that all children benefit from technology-enhanced learning regardless of location. Using AI in primary education helps pupils develop digital literacy skills **t**hat prepare them for the future (Yim and Su, 2025). Through age-appropriate coding apps, voice-based search tools, and digital storytelling platforms, pupils begin to understand how to use technology responsibly and creatively. These skills are essential for future careers and lifelong learning.

Teachers play a pivotal role in redefining pupils' academic achievement through the effective integration of Artificial Intelligence (AI) in the teaching and learning process. Rather

than serving as a replacement for teachers, AI functions as a supportive tool that enables educators to move beyond traditional, examination-oriented measures of achievement toward a more holistic, learner-centred conception of academic success. In this context, teachers act as instructional designers who thoughtfully embed AI-driven tools into classroom practice to enhance understanding, engagement, and skill development among pupils. Through the use of AI-supported learning platforms, teachers are able to personalize instruction and respond to the diverse learning needs of pupils. By interpreting data generated from AI systems, teachers can identify individual learning gaps, monitor progress in real time, and provide targeted interventions for slow learners, gifted pupils, and those with special educational needs. This personalized approach allows academic achievement to be re-conceptualized as individual growth and mastery of learning objectives rather than uniform performance based on standardized benchmarks.

In addition, teachers utilize AI to broaden assessment practices beyond conventional summative examinations. AI-assisted formative assessments enable continuous monitoring of pupils' cognitive development, while also capturing affective and social dimensions such as motivation, collaboration, and confidence. Through these expanded assessment strategies, teachers redefine academic achievement to include not only academic knowledge but also essential skills, creativity, and positive learning dispositions (Raj, Sabin, Impagliazzo, et al., 2021).

Teachers also play a critical role in ensuring the ethical and responsible use of AI in educational settings. They guide pupils in the appropriate use of digital technologies, safeguard learners' data privacy, and prevent excessive dependence on automated systems. By fostering digital literacy and ethical awareness, teachers contribute to a more responsible and meaningful integration of AI, thereby extending the notion of academic achievement to encompass responsible technology use.

Moreover, teachers remain central to the emotional and social development of pupils in AI-enhanced classrooms. While AI tools can facilitate learning experiences, teachers provide motivation, encouragement, and emotional support that technology cannot replace. Their role in nurturing pupils' self-esteem, resilience, and positive attitudes toward learning further broadens the understanding of academic achievement to include affective outcomes.

Finally, teachers serve as agents of innovation and inclusion by continually updating their professional competencies and advocating for equitable access to AI-supported learning opportunities. Through ongoing professional development and collaboration with parents and other stakeholders, teachers ensure that AI is used to bridge learning gaps rather than widen them. Consequently, teachers are instrumental in redefining pupils' academic achievement as a multidimensional construct that reflects intellectual development, social growth, ethical awareness, and lifelong learning skills within an AI-driven educational landscap**e.**

Conclusion

Artificial Intelligence can be used to achieve maximum results among primary school pupils in Nigeria. It enhances pupils' academic achievements by making learning more personalized, interactive, efficient, and engaging. AI-powered tools help teachers identify pupils' strengths and weaknesses, provide customized support, and improve overall learning outcomes. Integration of Artificial Intelligence into primary school education presents significant opportunities for redefining pupils' academic achievement beyond traditional examination-based outcomes. As examined by this paper, teachers remain central to this transformation, serving as facilitators, assessors, ethical guides, and motivators in AI-enhanced learning environments. Through adaptive learning systems, intelligent tutoring, and automated assessment, AI strengthens both teaching and learning processes in ways that match the developmental needs of young

learners. AI enables personalized and adaptive learning**,** meaning that each pupil receives instruction suited to their learning rates and ability level. Through the persistent and focused use of AI tools, teachers would be able to support personalized learning, inclusive education, continuous assessment, and the holistic development of pupils across cognitive, affective, and social domains. Despite the benefits of AI in education, its effectiveness largely depends on teachers' competence, professional judgment, and ethical practice. Without adequate guidance, AI tools may reinforce inequalities or promote superficial learning. Therefore, teachers' active involvement ensures that AI is used as a pedagogical support rather than a substitute for meaningful human interaction in the classroom. When appropriately combined with traditional methods of teaching, AI serves as a powerful complement to teachers' instructional practices, contributing to more equitable, engaging, and effective learning experiences for pupils.

Recommendations

Continuous professional training and development programmes should be organized to equip teachers with the up-to-date knowledge and skills required for the effective and ethical use of Artificial Intelligence in teaching and learning especially in primary school which is the foundation upon which other levels of education build on. Learners need to get used to AI at this foundational level. Educational policymakers and school administrators should provide adequate infrastructure, funding, and technical support to facilitate the integration of AI tools, particularly in public primary schools. Also, AI-based instructional tools should be carefully selected to align with instructional objectives, subject matter, pupils' developmental levels, and cultural contexts. Schools should promote effective and efficient AI use by establishing clear guidelines on data privacy, digital safety, uninterrupted power supply, proper monitoring and appropriate time for pupils. Finally, collaboration among teachers, parents, and educational stakeholders should be strengthened to support pupils' learning both in school and at home. These will enhance the role of teachers in leveraging AI to redefine pupils' academic achievement, and also promote adequate usage of technology contributes meaningfully to quality, inclusive, and sustainable primary education.

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