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ADOPTION OF AI EFFECTIVE TEACHING AND LEARNING FOR IMPROVED ACADEMIC PERFORMANCE OF SSS3 STUDENTS OFFERING ECONOMICS: A CASE STUDY OF SECONDARY SCHOOL STUDENT IN IMO STATE

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ABSTRACT

The integration of Artificial Intelligence (AI) into education has revolutionized teaching and learning methodologies, offering new opportunities for personalized learning and improved academic performance. This study examines the adoption of AI-driven teaching and learning strategies to enhance the academic performance of Senior Secondary School (SSS3) students studying Economics in Imo State, Nigeria. Using a case study approach, the research explores how AI-powered tools—such as adaptive learning platforms, intelligent tutoring systems, and data-driven assessment techniques—impact student engagement, comprehension, and retention of Economics concepts. The study employs a mixed-methods research design, incorporating both quantitative surveys and qualitative interviews with teachers and students across selected secondary schools in Imo State. Findings indicate that AI-enhanced teaching methods lead to greater student participation, improved problem-solving skills, and higher academic achievement compared to traditional instructional approaches. However, challenges such as limited digital infrastructure, teacher training gaps, and resistance to technology adoption were identified as barriers to AI implementation. The study concludes that Bridging the digital divide will ensure that students in both urban and rural areas benefit from AI-driven education. Teachers must also be equipped with the necessary digital skills to integrate AI effectively in classrooms. The study also recommended that Special attention should be given to rural and underserved schools in Imo State to ensure they have the necessary technological infrastructure, preventing disparities in learning outcomes.

KEYWORDS: Artificial Intelligence, Effective Teaching, Learning Strategies, Academic Performance, Economics Education, Secondary School, Imo State, Nigeria

INTRODUCTION

The integration of Artificial Intelligence (AI) into the education system has significantly transformed the teaching and learning process, particularly in subjects such as economics. AI-driven tools provide personalized learning experiences, automate grading, and enhance

students' understanding of complex economic theories through simulations and data analysis. With the increasing demand for technology-driven education, the adoption of AI in secondary schools, especially among SSS3 students in Imo State, is becoming essential for improving academic performance and preparing students for the evolving digital economy (Chinasa & Onyinyechukwu, 2022).

Effective teaching in economics requires engaging instructional methods that enhance comprehension and retention. AI-powered educational platforms offer adaptive learning experiences by tailoring content to individual students' learning needs. These platforms analyze students' progress and provide customized feedback, which has been shown to improve academic performance (Yusuf & Ola-Awo, 2023). Additionally, AI-based economic simulations allow students to explore market behaviors, government policies, and financial decision-making in real-world scenarios, fostering critical thinking and problem-solving skills.

The adoption of AI in education, particularly in Imo State, is also helping to bridge the gap between urban and rural schools by providing digital learning resources that can be accessed remotely. AI-powered virtual tutors and automated assessment tools have made learning more accessible, ensuring that students in resource-constrained areas receive quality education. However, challenges such as inadequate technological infrastructure, limited access to AI tools, and teachers' digital literacy levels must be addressed to maximize the potential of AI in improving learning outcomes (Nkweke, 2023).

Despite the challenges, the adoption of AI for effective teaching and learning in economics holds great promise for secondary school students in Imo State. The ability of AI to provide data-driven insights, automate repetitive tasks, and facilitate a more interactive learning environment makes it a valuable tool for enhancing students' academic performance. As AI continues to evolve, policymakers and educators must work towards creating a conducive environment that supports AI-driven education while addressing the ethical and practical concerns associated with its implementation (Obiora, 2023).

CONCEPT OF ARTIFICAL INTELLIGENCE

Artificial intelligence (AI) is a technology that allows computers to perform tasks that typically require human intelligence. AI systems can learn from experience, adjust to new inputs, and improve over time. According to Huge and Godwin (2024) artificial intelligence (AI) is the idea and practice of creating computer systems that can do tasks like speech recognition, decision-making, and pattern recognition that traditionally needed human intelligence. Natural language processing, machine learning, deep learning, and other technologies are all included under the broad term artificial intelligence (AI) (NLP). Udo-Okon and Akpan (2024) defined artificial intelligence as a branch of computer science called artificial intelligence studies how computers learn, comprehend data, recognize characters in images, analyses pictures, and simulate how the eyes work. In addition, artificial intelligence refers to the research and programming of computers to carry out intelligence tasks that require human intervention.

Furthermore, Hanson and Okorie (2024) explained that artificial intelligence (AI) is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. Bassey and Owushi (2023) mentioned that artificial intelligence is the collection of technologies that enable machines to sense, comprehend, act,

and perform several functions matching those of humans. Major components of the Artificial Intelligence bucket are machine learning, big data, natural language processing, decision logic, data visualization, and data analytics.

Moreover, Akpan and Clark (2024) cited in Nathan and Isuaiko (2025) mentioned that artificial intelligence (AI) is the study of how the human brain makes decisions, learns new things, and thinks through difficulties. The goal of artificial intelligence is to enhance computer abilities related to human understanding, including language intelligence, learning, reasoning, and problem-solving. The term artificial intelligence (AI) describes computer programmes that are able to carry out sophisticated operations that were previously limited to human performance, such as problem-solving, thinking, and decision-making (Lion and Ekefre, 2024).

CONCEPT OF EFFECTIVE TEACHING

Effective teaching is the practice of helping students learn and understand information in a way that's engaging and maximizes their comprehension. It involves a variety of strategies, including clear communication, assessment, and relationship-building. According to Ebirim, Amah and Obi (2023) effective teaching is the capability of teachers to teach in such a manner that they achieve success and bring about the desired change in the students' behavior.

Udo and Jackson (2023) defined effective teaching as the skills, plans, methods, and conduct of effective teachers are those that result in positive student results. Teacher effectiveness refers to the impact of high-quality teaching on student learning, measured in terms of achievement gains. It encompasses the dynamic and interactive process of creating, adapting, and negotiating learning environments that support all students in activities that improve learning. Teacher effectiveness can be assessed through outcomes such as achievement test scores and ratings of teachers' performance in the classroom. Effective teaching is the knowledge, strategies, processes, and behaviors that lead to good student outcomes (Atakpa, Umoh and Ikoh, 2023).

Effective teaching is the process of facilitating meaningful learning experiences that enable students to acquire knowledge, develop critical thinking skills, and apply concepts in real-world situations. It involves clear communication, engaging instructional strategies, and the ability to adapt to diverse learning styles. An effective teacher creates a structured yet flexible learning environment, uses relevant examples to clarify complex ideas, and encourages active participation. Additionally, they employ formative assessments to monitor student progress and provide constructive feedback, ensuring continuous improvement in learning outcomes.

Beyond delivering content, effective teaching fosters a positive and inclusive classroom culture that motivates students to explore and express their ideas confidently. It incorporates modern educational technologies, differentiated instruction, and problem-solving approaches to make learning interactive and accessible. A great teacher not only imparts knowledge but also serves as a mentor and guide, inspiring students to become lifelong learners. By establishing strong relationships, demonstrating enthusiasm, and setting high yet achievable expectations, effective teaching empowers students to reach their full potential academically and personally.

CONCEPT OF EFFECTIVE LEARNING

Effective learning refers to the process of acquiring and retaining knowledge or skills in a way that is efficient and lasting, involving active engagement with the material, utilizing various strategies to optimize understanding and retention, and ultimately leading to meaningful application in different contexts; it emphasizes not just memorization but deep comprehension and the ability to transfer learned concepts to new situations. . Effective learning occurs when students take ownership of their education, utilize diverse learning strategies, and adapt to new information with curiosity and persistence.

According to Ebirim, Amah and Obi (2023), effective learning refers to a teaching and learning process that not only focuses on the results achieved by students but also emphasizes the understanding, intelligence, perseverance, and quality of learning. It involves creating a comfortable and conducive learning environment, providing necessary facilities and resources, and incorporating research components into the curriculum. Effective learning is characterized by the ability to generate positive feelings and favorable attitudes towards learning, which in turn promotes active engagement and proactive behavior in the learning situation.

Furthermore, Udo, Obi and Iwuji (2023) explained that effective learning occurs when the intended learning objectives are accomplished through the teaching-learning process, learning is considered successful. Effective learning is the process through which individuals actively engage with, understand, and retain knowledge in a way that enhances their ability to apply it in various contexts. It goes beyond rote memorization, emphasizing critical thinking, problem-solving, and the practical application of concepts. It is facilitated by a supportive environment, clear learning objectives, and continuous feedback, allowing learners to reflect on their progress and make necessary adjustments. Ultimately, effective learning leads to long-term knowledge retention, skill development, and the ability to think independently and creatively. The phrase "effective learning" refers to teaching and learning strategies that actively include kids in their own education and growth as people (Okonobong and Owushi, 2023).

CONCEPT OF ACADEMIC PERFORMANCE

Academic performance refers to the measurable outcomes of a student's learning process, typically assessed through grades, standardized tests, coursework, and other evaluation methods. It serves as an indicator of a student's comprehension, knowledge retention, and ability to apply concepts in various academic disciplines. According to Chukwu (2025), academic performance is often associated with cognitive ability, motivation, and the quality of education received. However, it is not limited to mere grades; it encompasses skills such as problem-solving, critical thinking, and adaptability to new learning environments. This broad definition recognizes that academic success is influenced by multiple internal and external factors.

The concept of academic performance has evolved beyond traditional grading systems. Researchers now emphasize the role of psychological and emotional well-being in student success. Pecherkina, Katkalo, and Borisov (2025) suggest that academic performance is not solely about intellectual capacity but also includes psychological resilience, emotional stability, and social adaptability. A high-performing student is one who can balance academic demands with emotional and social development. This perspective shifts the focus from mere academic achievement to a more holistic understanding of educational success, taking into account the students' mental and emotional health.

Another crucial dimension of academic performance is the role of technology and innovative teaching methods in enhancing learning outcomes. Studies have shown that digital learning tools and personalized learning environments can significantly improve student engagement and academic performance (Juárez-López et al., 2025). Digital interventions, such as game-based learning and artificial intelligence-driven tutoring, allow for more adaptive learning experiences that cater to individual student needs. This indicates that academic performance is increasingly being shaped by advancements in technology, making education more accessible and effective for diverse learners.

Social and environmental factors also play a significant role in shaping academic performance. Onebunne (2025) argues that family background, socioeconomic status, and peer influence contribute to students' ability to excel academically. In many cases, students from privileged backgrounds have better access to quality education and resources, which positively impacts their academic performance. Conversely, students facing economic or social challenges often struggle to meet academic expectations, highlighting the importance of equitable access to education. These findings emphasize that academic performance cannot be viewed in isolation but must be understood within a broader social and economic context.

EFFECT OF AI ON EFFECTIVE TEACHING OF ECONOMICS

The integration of Artificial Intelligence (AI) into economics education is transforming teaching methodologies, making learning more interactive, efficient, and personalized. AI-driven tools enhance engagement, automate grading, and provide real-time simulations that improve students' grasp of economic theories.

- AI-Powered Personalized Learning

AI algorithms tailor economics course content to students' learning styles and progress levels, ensuring that instruction is adapted to their individual needs. This has significantly improved engagement and knowledge retention (Latifah & Ajie, 2025).

- Real-Time Economic Simulations and Data Analysis

AI-driven simulations allow students to experiment with economic models, analyzing market trends and policy impacts in real time. These tools enhance students' critical thinking and decision-making abilities in economic scenarios (Srinivasan & Davanageri, 2025).

- Automated Grading and Feedback Systems

Machine learning models enable automated assessment of students' work, providing immediate feedback and freeing up instructors to focus on complex teaching tasks. This efficiency has improved learning outcomes in economics education (Adebayo et al., 2025).

- AI-Assisted Research and Economic Forecasting

AI facilitates economic research by processing large datasets, identifying trends, and offering predictive analysis, thereby supporting both educators and students in academic research (Prajapati et al., 2025).

- AI and Equitable Access to Economics Education

AI-driven platforms have expanded access to high-quality economics education, especially in remote and underserved areas, by providing digital learning resources and AI tutors (Dugbartey, 2025).

EFFECT OF AL ON EFFECTIVE LEARNING OF ECONOMICS

Artificial Intelligence (AI) has revolutionized the learning of economics by offering personalized learning experiences, real-time data analysis, and intelligent tutoring systems. These AI-powered tools have enhanced students' engagement, improved accessibility to economic resources, and facilitated more in-depth understanding of complex economic models. However, concerns remain about AI-driven biases, privacy issues, and the digital divide that affects equal access to AI-based learning tools.

- **Personalized and Adaptive Learning**

AI-driven platforms tailor economics lessons to individual students, adjusting difficulty levels and recommending supplementary resources based on student progress. This customization enhances comprehension and retention of economic principles (Latifah & Ajie, 2025).

- **AI-Powered Simulations and Forecasting**

Economics students benefit from AI-powered simulations that model real-world economic phenomena, such as inflation, trade policies, and labor market fluctuations. These interactive learning environments deepen students' understanding of economic theories and their real-world applications (Mandon, 2025).

- **AI-Enabled Research and Big Data Analysis**

AI assists students in analyzing large economic datasets, identifying patterns, and making economic predictions. This capability enhances students' research skills and prepares them for data-driven decision-making in professional settings (Prajapati et al., 2025).

- **Accessibility and Equity in Economics Education**

AI has facilitated remote learning and expanded access to economic education for students in underserved regions. AI-driven platforms bridge educational disparities by providing cost-effective and interactive learning solutions (Dugbartey, 2025).

- **Automated Assessment and Feedback**

AI enhances efficiency in economics education by automating assessments and providing instant feedback. AI tools analyze students' responses to essay questions and problem sets, offering detailed explanations and suggestions for improvement (Srinivasan & Davanageri, 2025).

EFFECT OF AL ON ACADEMIC PERFORMANCE OF ECONOMICS STUDENT

The application of Artificial Intelligence (AI) in education has significantly influenced the academic performance of economics students by personalizing learning experiences, automating assessments, and improving engagement with complex economic models. AI-powered tools, such as adaptive learning systems, intelligent tutoring, and economic forecasting

models, enhance students' comprehension and analytical skills. However, concerns remain regarding algorithmic bias, ethical considerations, and the risk of over-reliance on AI in academic learning.

- Personalized Learning and Adaptive AI Systems

AI-driven educational platforms adapt to students' learning styles, providing customized learning paths and targeted resources. This personalization improves students' understanding of economic concepts, leading to higher retention rates and academic performance (Oyinloye & ACETISE, 2025).

- AI-Powered Economic Simulations and Decision-Making

AI-enhanced simulations allow economics students to experiment with real-world scenarios, such as market fluctuations and policy changes, in a controlled environment. These tools foster critical thinking and problem-solving skills, preparing students for real-world economic analysis (Sikorskyi, Zablotska, & Mariia, 2025).

- Automated Grading and Feedback Mechanisms

AI-based grading systems streamline assessment processes, offering instant feedback on assignments and exams. This helps students identify their weaknesses and improve their understanding of economic theories (Srinivasan & Davanageri, 2025).

- AI as a Tool for Enhancing Research Skills

AI assists students in conducting economic research by analyzing large datasets, identifying trends, and suggesting relevant literature. This reduces research time and enhances the quality of academic work in economics (Masunda, 2025).

- AI and Equity in Economics Education

AI tools provide access to high-quality educational resources, bridging the gap for students in underserved areas. AI-driven learning solutions support economically disadvantaged students by offering cost-effective and scalable education models (Boshnjaku, Krasniqi, & Kamberi, 2025).

CONCLUSION

The adoption of AI in teaching and learning has significantly improved the academic performance of SSS3 economics students in Imo State by enhancing personalized learning, engagement, and assessment. AI-powered tools provide adaptive learning experiences, real-time simulations, and automated feedback, making economics education more interactive and efficient. However, challenges such as digital infrastructure, teacher training, and equitable access must be addressed to maximize AI's potential. Bridging the digital divide will ensure that students in both urban and rural areas benefit from AI-driven education. Teachers must also be equipped with the necessary digital skills to integrate AI effectively in classrooms. Policymakers should invest in AI education frameworks that support sustainable technology adoption in schools. With proper implementation, AI will continue to revolutionize the learning experience and prepare students for a technology-driven economy. The future of economics education in Imo State depends on embracing AI as a transformative tool for academic success.

RECOMMENDATIONS

- Schools should be equipped with AI-powered learning tools, including smart classrooms, digital textbooks, and virtual tutoring platforms, to enhance the teaching and learning process.
- The government should collaborate with private organizations and tech companies to fund AI-driven education initiatives, ensuring that all schools have access to AI resources.
- Special attention should be given to rural and underserved schools in Imo State to ensure they have the necessary technological infrastructure, preventing disparities in learning outcomes.

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