



EFFECT OF ARTIFICIAL INTELLIGENCE ON TEACHING AND LEARNING OF ECONOMICS: A PANACEA FOR IMPROVED ACADEMIC PERFORMANCE OF SS2 STUDENTS IN IMO STATE

CHUKWUNYERE CHRISTIANNA¹

&

NJOKUKELECHI²

Department of Economics^{1&2},
Benjamin Uwajumogu (State) College of Education,
IhitteUboma,
Imo State, Nigeria.

Abstract

The study was conducted to assess the effect of artificial intelligence on teaching and learning of economics: a panacea for improved academic performance of SS2 students in Imo State. Expost-Facto design was adopted for this study. The study was carried out in Imo State. The targeted population for the study comprises all Economics teachers and students in secondary schools in Imo State which are 6855 and 289,132 respectively. A simple random sampling technique was used to select 30 economics teachers and 120 economics students which gave a sample size of 150 respondents for the study. The instrument for data collection was structured questionnaire titled “Artificial Intelligence for Effective Teaching and Learning Questionnaire (AIETLQ)”. Face and content validation of the instrument were carried out by an expert in test, measurement, and evaluation in order to ensure accuracy, appropriateness, and completeness of the instrument. The reliability of the instrument was established using, test-retest reliability on 40 people who were not part of the main study. The research questions were descriptively analyzed, while regression and independent t-test were used to test the null hypotheses. The results show the difference in adoption of AI for teaching and learning of economics between urban and rural economics teachers in Imo State, academic performance of economics students taught with AI and those taught without AI among others. Based on the findings, the study recommends the Integration of AI-powered tools in economics education to enhance student outcomes, among others

Keywords: Artificial Intelligence, teaching and learning, Economics, Academic Performance

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 SS2 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 available tool for enhancing students' academic performance. As AI continues to evolve, policy makers 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).

A study by Al-Manshaawi and Al-Rashidi (2022) at the University of Algiers found that students who utilized artificial intelligence (AI) tools demonstrated significantly better academic performance compared to their peers who did not. The research highlighted how AI applications in the learning process enhanced students' ability to understand and retain course content, suggesting that AI has the potential to revolutionize conventional teaching and learning approaches across various educational levels, including secondary education.

Similarly, the study titled "Adoption of Artificial Intelligence for Effective Teaching and Learning: A Panacea for Improved Academic Performance of Students Offering Economics" by Anthony and Chienyenwa (2025) reported that AI-powered tools significantly improved student engagement, enhanced access to educational resources, and facilitated deeper understanding of complex economic concepts.

This study is especially relevant to SS2 Economics students, as it confirms the potential of AI to simplify abstract economic theories and models, thereby supporting better academic outcomes. In the Nigerian context, the study by Nwokorie and Onichakwe (2024) titled "Assessing Artificial Intelligence Influence on Students' Academic Outcome at Imo State University, Owerri, Nigeria" found that AI tools had a substantial impact on students' reading culture and academic development. The findings emphasized that AI applications not only enhanced comprehension but also motivated students to engage with academic materials more consistently-a critical factor in improving performance among secondary school students studying Economics.

Further supporting this, Adewale, Azeta, Abayomi-Alli, and Sambo-Magaji (2024), in their systematic literature review titled "Impact of Artificial Intelligence Adoption on Students' Academic Performance in Open and Distance Learning", concluded that AI has redefined the educational landscape. Their review demonstrated that AI integration has transformed teaching methodologies and learning experiences, making them more personalized, efficient, and interactive. This shift is particularly beneficial for subjects like Economics, which require both conceptual understanding and real-world application. Moreover, Treve (2024) in his study titled "Integrating Artificial Intelligence in Education: Impacts on Student Learning and Innovation", revealed that AI-driven tools significantly increase student engagement. The research recorded notable improvements in average student engagement scores, suggesting that AI fosters a more stimulating and responsive learning environment-an essential factor in boosting the academic performance of SS2 students in Economics.

Finally, a comprehensive study conducted by Ngonso, Egielewa, Egenti, Uduehi, and Osemenge (2025) highlighted in their work that AI plays a transformative role in enhancing students' learning outcomes. Their findings indicated that AI improves students' comprehension of their subjects, strengthens their communication and speaking abilities, and simplifies complex course content-particularly



beneficial in technical and abstract subjects like Economics. By providing interactive and adaptive learning support, AI tools help SS2 Economics students grasp difficult concepts more quickly and effectively

Statement of Problem

Despite the growing availability of Artificial Intelligence (AI) tools in education, their adoption for teaching and learning Economics remains limited in many academic institutions. Traditional instructional methods often fail to cater to diverse learner needs and real-time feedback, contributing to suboptimal academic performance. The dynamic nature of Economics as a subject demands innovative teaching approaches that AI can facilitate. However, educators often lack the training or resources to integrate AI effectively into their teaching. Students, too, may be unaware of how AI can support their learning process. This gap hinders the potential of AI as a transformative educational tool. Therefore, investigating the adoption of AI for teaching Economics is crucial to enhancing students' academic outcomes

Objective of the Study

1. To find out the effect of AI-powered personalized learning on the academic performance of SS2 student in economics.
2. To examine the effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics.
3. To examine the effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics.
4. To determine the effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics.
5. To evaluate the effect of AI-equitable access to economics education on the academic performance of SS2 student in economics.

Research Questions

1. What is the effect of AI-powered personalized learning on the academic performance of SS2 student in economics?
2. What is the effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics?
3. What is the effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics?
4. What is the effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics?
5. What is the effect of AI-equitable access to economics education on the academic performance of SS2 student in economics?

Research Hypothesis

1. There is no significant effect of AI-powered personalized learning on the academic performance of SS2 student in economics.
2. There is no significant effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics.
3. There is no significant effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics.
4. There is no significant effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics.
5. There is no significant effect of AI-equitable access to economics education on the academic performance of SS2 student in economics.

Method

Research Design

In carrying out the study, Expost-Facto design was adopted because the phenomena for design studies have already occurred. Accordingly, the researcher does not have direct control of



independent variables because their earlier manifestations. The researcher cannot manipulate the effects but just obtain the effect on already existing natural course of events. Hence this design is relevant to the study

Study Area

The study is carried out in Imo State. *This state is one of the 36 states in Nigeria.* Imo State, nicknamed the "Eastern Heartland," was created on February 3, 1976, from the former East-Central State. It is one of the states in Nigeria's southeastern region. The state's name is derived from the Imo River, which flows through the region. A portion of Imo State was later carved out in 1991 to form Abia State, and another part became part of Ebonyi State. The major cities in Imo State are Owerri (the state capital), Orlu, and Okigwe. Imo State was carved out of the East-Central State on February 3, 1976. It is named after the Imo River, which forms a natural boundary with Abia State. In 1991, Abia State was created from part of Imo State, and part of it also became Ebonyi State.

Population of the Study

The targeted population for the study comprises all Economics teachers and students in secondary schools in Imo State. According to Ileuma and Olusegun (2023), there are 6855 economics teachers and 289,132 economics students in Imo State.

Sample and Sampling Technique

A simple random sampling technique was used to select 137 economics teachers and 715 economics students derived from 2% of the teachers' population and 0.2% of the economics students' population. These gave a sample size of 715 respondents for the study.

Instrumentation

The instrument used for data collection was a structured questionnaire entitled "Artificial Intelligence for Effective Teaching and Learning Questionnaire (AIETLQ)". The questionnaire was made up of the respondents' personal data and the variables of the research objectives such

as Artificial Intelligence, effective teaching of economics, effective learning of economics, improved academic performance, AI compliant school and non-compliant school.

Validation of the Research Instrument

Face and content validation of the instrument was carried out by the researcher and an expert in test, measurement, and evaluation. The items in the questionnaire were properly worded to meet the respondent's level of understanding and each variable was properly measured.

Reliability of the Instrument

In order to establish the reliability of the instrument, test-retest reliability analysis was carried out on the research instrument, using 50 people who were not part of the main work. This reliability test was meant to check the consistency of the items measuring the variables of the research objectives. The reliability coefficient of 0.87 was obtained. This value was high enough to justify the use of this instrument in the study.

Method of Data Collection

The researcher used a letter of introduction and permission to gain access into the schools. The researcher ensures that the instrument was properly filled by the respondents. For this to be achieved effective supervision was employed.

Method of Data Analysis

The data obtained were analyzed using a descriptive statistical to answer the research questions, while Regression and independent t-test analyses were used to test the hypotheses. The calculated values were compared with the critical values for test of significance of the result at 0.05 alpha levels.

Results

Hypothesis One

The null hypothesis states that there is no significant effect of AI-powered personalized learning on the academic performance of SS2 student in economics. In order to test the hypothesis simple regression analysis was performed on the data, (see table 4.1).

**TABLE 1: Simple Regression Analysis of the effect of AI-powered personalized learning on the academic performance of SS2 student in economics.**

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.91	0.84	0.84	0.76	0.84

***Significant at 0.05 level; df= 706; N= 708; critical R-value = 0.088.**

The above table 1 shows that the calculated R-value (0.91) was greater than the critical R-value of 0.088 at 0.05 alpha levels with 706 degrees of freedom. The R-Square value of 0.84 predicts 84% of the effect of AI-powered personalized learning on the academic performance of SS2 student in economics. This rate of percentage is highly positive and therefore means that there is significant effect of AI-powered personalized

learning on the academic performance of SS2 student in economics.

Hypothesis Two

The null hypothesis states that there is no significant effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics. In order to test the hypothesis simple regression analysis was performed on the data, (see table 2).

TABLE 2: Simple Regression Analysis of the effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics.

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.81	0.65	0.65	1.11	0.65

***Significant at 0.05 level; df= 706; N= 708; critical R value = 0.088.**

The above table 2 shows that the calculated R-value (0.81) was greater than the critical R-value of 0.088 at 0.05 alpha levels with 706 degrees of freedom. The R-Square value of 0.65 predicts 65% of the effect of AI real-time economic simulations and data analysis on the academic performance of SS2 student in economics. This rate of percentage is highly positive and therefore means that there is significant effect of AI real-time economic simulations and data analysis on

the academic performance of SS2 student in economics.

Hypothesis Three

The null hypothesis states that there is no significant effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics. In order to test the hypothesis simple regression analysis was performed on the data, (see table 3).

TABLE 3: Simple Regression Analysis of the effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics.

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.90	0.81	0.81	0.82	0.81

***Significant at 0.05 level; df= 706; N= 708; critical R-value = 0.088.**



The above table 4.3 shows that the calculated R-value (0.90) was greater than the critical R-value of 0.088 at 0.05 alpha levels with 706 degrees of freedom. The R-Square value of 0.81 predicts 81% of the effect of AI automated grading and feedback systems on the academic performance of SS2 student in economics. This rate of percentage is highly positive and therefore means that there is significant effect of AI automated grading and feedback systems on the

academic performance of SS2 student in economics.

Hypothesis Four

The null hypothesis states that there is no significant effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics. In order to test the hypothesis simple regression analysis was performed on the data, (see table.4).

TABLE 4: Simple Regression Analysis of the effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics.

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.92	0.85	0.85	0.72	0.81

***Significant at 0.05 level; df= 706; N= 708; critical R value = 0.088.**

The data on table 4, shows that the calculated R-value (0.92) was greater than the critical R-value of **0.0.088** at 0.05 alpha levels with 706 degrees of freedom. The R-Square value of 0.85 predicts 85% of the effect of AI-assisted research and economic forecasting on the academic performance of SS2 student in economics. This rate of percentage is highly positive and therefore means that there is significant effect of AI-assisted research and economic forecasting on

the academic performance of SS2 student in economics.

Hypothesis Five

The null hypothesis states that there is no significant effect of AI-equitable access to economics education on the academic performance of SS2 student in economics. In order to test the hypothesis simple regression analysis was performed on the data, (see table 5)

TABLE 5: Simple Regression Analysis of the effect of AI-equitable access to economics education on the academic performance of SS2 student in economics.

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.80	0.64	0.64	1.13	0.64

***Significant at 0.05 level; df= 706; N= 708; critical R value = 0.088.**

The above table 5 shows that the calculated R-value (0.80) was greater than the critical R-value of 0. 0.088 at 0.05 alpha levels with 706 degrees of freedom. The R-Square value of 0.64 predicts 64% of the effect of AI-equitable access to economics education on the academic performance of SS2 student in economics. This rate of percentage is highly positive and therefore means that there is significant effect of AI-

equitable access to economics education on the academic performance of SS2 student in economics.

Discussion

The findings of this study provide strong evidence for the effectiveness of Artificial Intelligence (AI) in enhancing the academic performance of SS2 students in economics. The



results presented in Tables 1 to 5 show that AI-powered personalized learning, AI real-time economic simulations and data analysis, AI automated grading and feedback systems, AI-assisted research and economic forecasting, and AI-equitable access to economics education all had a significant positive effect on the academic performance of SS2 students in economics.

The study found that AI-powered personalized learning had a significant effect on the academic performance of SS2 students in economics, with an R-Square value of 0.84 predicting 84% of the effect. This finding is consistent with previous research that suggests AI-powered personalized learning can improve student outcomes by providing tailored instruction and feedback.

Similarly, the study found that AI real-time economic simulations and data analysis had a significant effect on the academic performance of SS2 students in economics, with an R-Square value of 0.65 predicting 65% of the effect. This finding is consistent with previous research that suggests AI-powered simulations can enhance student understanding of complex economic concepts.

The study also found that AI automated grading and feedback systems had a significant effect on the academic performance of SS2 students in economics, with an R-Square value of 0.81 predicting 81% of the effect. This finding is consistent with previous research that suggests AI-powered grading and feedback systems can improve student outcomes by providing timely and accurate feedback. Furthermore, the study found that AI-assisted research and economic forecasting had a significant effect on the academic performance of SS2 students in economics, with an R-Square value of 0.85 predicting 85% of the effect. This finding is consistent with previous research that suggests AI-powered research tools can enhance student understanding of economic concepts and improve their research skills.

Finally, the study found that AI-equitable access to economics education had a significant effect on the academic performance of SS2 students in

economics, with an R-Square value of 0.64 predicting 64% of the effect. This finding is consistent with previous research that suggests AI-powered educational tools can improve student outcomes by providing equal access to quality education.

Conclusion

This study concludes that AI has a significant positive effect on the academic performance of SS2 students in economics. The findings suggest that AI-powered personalized learning, AI real-time economic simulations and data analysis, AI automated grading and feedback systems, AI-assisted research and economic forecasting, and AI-equitable access to economics education can all improve student outcomes in economics.

The study recommends that educators and policymakers consider integrating AI-powered tools into economics education to enhance student outcomes. Additionally, the study suggests that further research is needed to explore the long-term effects of AI on student outcomes and to identify the most effective ways to implement AI-powered tools in economics education.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Integration of AI-powered tools in economics education: Educators and policymakers should consider integrating AI-powered tools into economics education to enhance student outcomes.
2. Professional development for teachers: Teachers should receive professional development opportunities to learn how to effectively integrate AI-powered tools into their teaching practices.
3. Further research: Further research should be conducted to explore the long-term effects of AI on student outcomes and to identify the most effective ways to implement AI-powered tools in economics education.
4. Development of AI-powered educational resources: Educational resources and materials that incorporate AI-powered tools should be developed and made available to



economics educators to support their teaching practices.

5. Equal access to AI-powered educational tools: Efforts should be made to ensure that

all students have equal access to AI-powered educational tools, regardless of their location or socio-economic status.

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