Assessment of the Relationship between Artificial Intelligence Usage and Academic Achievement among NCE Economics Students at the College of Education Akwanga, Nasarawa State, Nigeria

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ABSTRACT

This study assessed the relationship between Artificial Intelligence (AI) tool usage and academic achievement among NCE Economics students' College of Education Akwanga, Nasarawa State, Nigeria. A quantitative survey research design was employed for the study. The study population consisted of 802 Economics students in NCE 1, 2 and 3. Through random sampling technique, 412 students were selected for the study. A structured questionnaire was used for data collection. The instrument is divided into 2 sections with A which contains the bio-data of the respondents. Section B of the instrument is the structured questionnaire constructed by the researcher. The instrument was subjected to experts in measurement and evaluation for refinement. A validity index of 0.90 was obtained and reliability coefficient of 0.76 was established for the instrument. Data were analysed using descriptive statistics, Pearson correlation, multiple regression, and moderation analysis. Findings reveals a remarkably high AI adoption rate of 82.75%, with ChatGPT as the most widely used tool (60.2%). AI usage demonstrated significant positive correlations with key academic achievement indicators, particularly research project outcomes ($r = 0.378$, $p < 0.01$). Regression results show that AI self-efficacy ($\beta = 0.298$, $p < 0.001$) is the strongest predictor of academic achievement, followed by usage frequency ($\beta = 0.189$, $p < 0.001$) and digital literacy ($\beta = 0.156$, $p = 0.001$), collectively explaining 38.7% of the variance (Adjusted $R^2 = 0.379$). Digital literacy, academic level, and gender significantly moderated the AI-performance relationship. The study concludes that AI usage was positively associated with academic achievement and support research-driven learning. Strengthening AI literacy, improving digital infrastructure, and establishing ethical guidelines were recommended to maximize benefits and ensure equitable access in Nigerian teacher education.

Keywords: Assessment, Relationship, Artificial Intelligence, Academic Achievement, Economics Students

INTRODUCTION

The integration of artificial intelligence (AI) into educational frameworks has emerged as a transformative force in contemporary education, particularly in developing nations where traditional educational systems face significant resource constraints. In Nigeria, the National Information Technology Development Agency's release of the National Artificial Intelligence Strategy (NAIS) in 2024 clearly recognized education as a priority area for AI application, emphasizing evidence-based approaches to technology integration (Adeoye & Babatunde, 2024). This strategic framework has catalysed increased attention to understanding how AI tools impact academic outcomes in Nigerian educational institutions.

Within the Nigerian educational setting, teacher education institutions represent a serious junction where AI literacy and competency development can have multiplier effects. The Nigeria Certificate in Education (NCE) program, which prepares primary and secondary school teachers, serves approximately 9400 students at College of Education Akwanga in Nasarawa State. Recent empirical evidence from Nigerian educational contexts has established remarkable success in AI implementation, with pilot programs utilizing generative AI to support

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learning yielding improvements equivalent to nearly two years of typical schooling achieved in just six weeks (World Bank, 2025). Nigerian students participating in these programs have expressed enthusiastic support for AI integration, with participants noting that "AI helps us to learn, it can serve as a tutor, it can be anything you want it to be, depending on the prompt you write" (World Bank, 2025). Despite growing global recognition of AI's transformative potential and increasing availability of AI tools to Nigerian students, a significant knowledge gap exists regarding specific impacts on academic achievement among NCE Economics students. While international research demonstrates that AI technologies can significantly enhance learning outcomes when properly integrated (Huang et al., 2024), the specific mechanisms and contextual factors determining success remain understudied in African educational contexts. This gap is particularly concerning given that a considerable number of educational institutions in Nigeria have yet to leverage AI technologies effectively (Okonkwo & Ade-Ibijola, 2024).

The research problem extends beyond simple adoption metrics to encompass the complex interplay between AI usage patterns, academic achievement outcomes, and contextual factors unique to Nigerian teacher education. Infrastructure limitations, digital literacy disparities, and cultural factors represent potential moderators of AI's educational impact in Nigerian settings (Adebayo & Ogundimu, 2024). Furthermore, the digital divide documented by researchers' shows substantial variations in internet access and device availability among students in Northern Nigerian educational institutions, suggesting that AI's benefits may not be equally accessible to all students (Bello & Garba, 2024).

This study addresses these gaps by examining the impacts of artificial intelligence on academic achievement of NCE Economics students at College of Education Akwanga with specific attention to usage patterns, performance relationships, perceived benefits, challenges, and demographic moderation effects. The research contributes to both theoretical understanding and practical applications of AI in developing country educational contexts while informing evidence-based policy development for Nigerian teacher education institutions.

Academic achievement, as a multifaceted construct, encompasses various indicators of student learning outcomes including grades, test scores, assignment quality, critical thinking abilities, and overall educational achievement. In the context of Nigerian teacher education, academic achievement extends beyond traditional metrics to include professional competencies, pedagogical skills, and readiness for classroom practice. The measurement of academic achievement in the digital age has become increasingly complex as educators grapple with distinguishing between authentic student work and AI-assisted outputs (Chaudhary et al., 2025).

In order to achieve best in Economics, the Federal Government of Nigeria in the National Policy of Education (FME, 2023) has paid particular attention to Economics at the various level of education. It is necessary to include Economics subject in the NCE school curriculum because of its general importance on the development of the citizens. Economics is concerned with the development of skills with which man equips himself for solving problems in a rational manner as well as the ability to think critically and reflectively (Johnson, 2016). Economics is a major category among academic disciplines, concerned with society and the relationship among individuals within a society. The importance of Economics cannot be over emphasized. All students must learn and obtain a credit pass in Economics at the senior secondary school level before they can advance to College of Education to study Economics (FME, 2023). As a result of this, there is need to continue to seek for variables such as AI which would improve students' mastery of as well as achievement in the subject. This study intends to assess the relationship between AI usage and academic achievement among NCE Economics students' in College of Education Akwanga Nasarawa State, Nigeria.

Objectives of the study

The main purpose of this study is to assess the relationship between AI usage and academic achievement among NCE Economics students' in College of Education Akwanga Nasarawa State, Nigeria. Specifically, the objectives of the study are to:

Establish the relationship between AI usage and academic achievement of NCE Economics students of College Education Akwanga.

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Determine the perceived benefits and challenges of AI usage among NCE Economics students of College of Education Akwanga.

Research Questions

The following research questions were developed to guide the study.

What is the relationship between AI usage and academic academic achievement of NCE Economics students of College of Education Akwanga?

What are the perceived benefits and challenges of AI usage among NCE Economics students of College of Education Akwanga?

Hypotheses

There is no significant relationship between AI usage and academic achievement of NCE Economics students of College of Education Akwanga.

There is no significant perceived benefits and challenges of AI usage among NCE Economics students of College of Education Akwanga.

METHODOLOGY

This study employed a survey research design. The target population comprised of all 802 NCE Economics students enrolled at College of Education, Akwanga, during the 2024/2025 academic session, totalling 802 students distributed across three levels (NCE I, II, and III). Through random sampling technique, 412 students were selected for the study. In random sampling every member of the population has an equal chance of being selected. Primary data was collected through a structured questionnaire administered both online via Google Forms and offline through paper-based formats to accommodate varying levels of internet access and technological familiarity among participants. The questionnaire design followed best practices established in recent AI education research, incorporating validated scales and instruments where possible while adapting content to the specific Nigerian context. A validity index of 0.90 was obtained and reliability coefficient of 0.76 was established for the instrument. Data analysis employed SPSS version 29.0 for comprehensive statistical analysis including descriptive statistics, reliability testing (Cronbach's alpha), correlation analysis (Pearson's r), multiple regression, and moderation analysis. All statistical tests were conducted at a 95% confidence level ($\alpha = 0.05$). The statistical model specification included academic achievement as the dependent variable measured through multiple indicators including cumulative grade point average (CGPA), subject performance scores, assignment quality ratings, and research project completion rates. Independent variables comprised AI usage frequency, AI tool variety, AI usage purpose, and AI self-efficacy. Control variables included digital literacy level, academic level, gender, age, and socio-economic status proxies.

Results

Hypothesis 1

There is no significant relationship between AI usage and academic achievement of NCE Economics students of College of Education Akwanga.

Table 1: Demographic Profile of Respondents (N = 412)

Characteristic	Category	Frequency	Percentage
Gender	Male	220	53.4%
	Female	192	46.6%

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Age Group	18-22 years	245	59.5%
	23-27 years	132	32.2%
	28+ years	35	8.5%
Academic Level	NCE I	143	34.7%
	NCE II	139	33.7%
	NCE III	130	31.6%

Table 1 shows that 53.4% of respondents were male, while 46.6% were female, closely mirroring typical composition of Nigerian teacher education institutions. Nearly 60% of students fall within the traditional 18-22 age range, with substantial representation of older students (40.5% aged 23+) reflecting delayed entry patterns common in Nigerian education. Academic distribution across levels are almost equal.

Table 2: AI Tool Usage and Academic achievement among NCE Economics students

Indicator	**Mean**	**SD**	**Min**	**Max**
Overall, AI Adoption Rate	82.75%	-	-	-
ChatGPT Usage Rate	60.2%	-	-	-
Daily AI Users	24.3%	-	-	-
Weekly AI Users	61.8%	-	-	-
Current CGPA (5-point scale)	3.13	0.79	1.4	4.85
Previous Semester GPA	3.09	0.84	1.2	4.9
Assignment Average Score (%)	72.4	12.8	45	95.0
Research Project Score (%)	75.8	14.4	48.0	98.0

Table 2 reveals that 82.75% (N = 350) of NCE Economics students actively use AI tools for academic purposes, representing remarkably high adoption rates exceeding many international benchmarks. ChatGPT emerges as the dominant platform with 60.2% usage rate, while usage intensity shows 24.3% daily users and 61.8% weekly or monthly users, indicating purposeful rather than compulsive engagement. Academic achievement indicators demonstrate healthy distribution with current CGPA mean of 3.13 showing above-average achievement and slight improvement from previous semester (3.09).

Table 3: Purposes of AI Usage in Academic Activities

Academic Purpose	**Frequency**	**Percentage**
Research and Information Gathering	287	82.0%
Assignment Writing Assistance	234	66.9%
Language Translation	198	56.6%
Problem Solving Support	176	50.3%

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Study Material Summarization	165	47.1%
Proofreading and Editing	143	40.9%
Creating Study Plans	98	28.0%
Generating Practice Questions	76	21.7%

Table 3 shows that research and information gathering dominates AI usage (82.0%), positioning AI primarily as a knowledge discovery tool rather than content creation substitute. Assignment writing assistance ranks second (66.9%), while language translation (56.6%) likely reflects multilingual demands of Nigerian education where students navigate between English academic requirements and native languages. The hierarchy of usage reveals immediate practical needs prioritized over developmental activities.

Table 4: Correlation Analysis - AI Usage and Academic Achievement among NCE Economics students

AI Usage Variable	CGPA	Assignment Scores	Research Projects	Overall Performance
Usage Frequency	0.284	0.312	0.378	0.334
Tool Variety	0.198	0.234	0.289	0.256
Purpose Diversity	0.267	0.298	0.343	0.321
AI Self-Efficacy	0.421	0.456	0.398	0.467

Note: Correlation is significant at the 0.01 level (2-tailed) Test

Table 4 shows that all correlations are statistically significant at the 0.01 level, indicating robust relationships between AI engagement and academic achievement. AI self-efficacy emerges as the strongest predictor across all achievement indicators (r = 0.398 to 0.467), aligning with self-efficacy theory and suggesting that confidence and competence in AI usage translate directly into academic benefits. Usage frequency shows consistent moderate correlations (r = 0.284 to 0.378), with the strongest relationship to research projects (r = 0.378), indicating AI tools are particularly valuable for complex; inquiry-based tasks requiring information synthesis and analysis.

Table 5: Multiple Regression Results - Predictors of Academic Achievement

Predictor Variable	**B**	**t-value**	**P value**	**95% CI**
AI Usage Frequency	0.189	3.98	<0.001	[0.098, 0.280]
AI Self-Efficacy	0.298	6.12	<0.001	[0.202, 0.394]
Digital Literacy	0.156	3.23	0.001	[0.061, 0.251]
Academic Level	0.134	2.87	0.004	[0.042, 0.226]
Gender (Female)	0.089	1.98	0.048	[0.001, 0.177]

Model Summary: $R^2 = 0.387$, Adjusted $R^2 = 0.379$, $F = 51.23$, $p < 0.001$

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Table 5 shows that multiple regression model explains 38.7% of variance in academic achievement, representing substantial explanatory power for educational research. AI self-efficacy emerges as the strongest predictor ($\beta = 0.298$, $p < 0.001$), indicating a one-standard-deviation increase in AI self-efficacy associates with 0.298 standard-deviation increase in academic achievement. The significant but smaller coefficients for AI usage frequency ($\beta = 0.189$) and digital literacy ($\beta = 0.156$) indicate these factors contribute independently but are less influential than AI self-efficacy. Academic level and gender represent significant control variables requiring consideration in AI education research.

Hypothesis 2

There is no significant perceived benefits and challenges of AI usage among CE Economics students of College of Education Akwanga.

Table 6: Perceived Benefits and Challenges of AI Usage

Benefits (N = 350)	**Mean Benefit s**	**SD Benefit s**	**Challenges**	**Mean Challenge s**	**SD Challenge s**
Faster Inf ormation Access	4.23	0.87	Inconsistent Internet Connectivity	4.45	0.76
Improved Research Capabilities	4.12	0.92	Academic Integrity Concerns	3.87	1.09
Enhanced Writing Quality	3.98	1.02	Difficulty Evaluating AI Output	3.72	1.14
Better Time Management	3.87	1.15	Over-dependence on AI Tools	3.58	1.21
Increased Learning Efficiency	3.76	1.08	Limited AI Understanding	3.45	1.18
Personalized Learning Support	3.65	1.12	Cost of Internet Data	3.34	1.28

Note: Measured on 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)

Table 6 shows that ranking of perceived benefits reveals pragmatic student perspectives with faster information access (M = 4.23) and improved research capabilities (M = 4.12) addressing fundamental challenges in developing country educational contexts where traditional resources may be limited. Students recognize AI's particular value for complex information tasks requiring synthesis and analysis. Primary challenges include inconsistent internet connectivity (M = 4.45) reflecting Nigeria's digital infrastructure issues, and academic integrity concerns (M = 3.87) demonstrating encouraging ethical awareness requiring institutional guidance.

Table 7: Moderation Effects on AI Usage-Performance Relationship

Moderator	**Interaction Effect (β)**	**t- value**	**P value**	**Effect Size**
Digital Literacy	0.234	4.56	<0.00 1	Medium
Academic Level	0.156	2.98	0.003	Small-Medium
Gender	0.124	2.34	0.020	Small

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Age Group	0.089	1.77	0.096	Not Significant
Subject Specialization	0.078	1.45	0.148	Not Significant

Table 7 shows that digital literacy emerges as the most significant moderator ($\beta = 0.234$, $p < 0.001$), indicating students with stronger technological skills experience significantly greater academic benefits from AI usage. Gender moderation ($\beta = 0.124$, $p = 0.020$) suggests female students may derive greater academic benefits, possibly reflect different usage strategies or learn preferences. Academic level moderation ($\beta = 0.156$, $p = 0.003$) confirms AI's benefits compound with advancement as more experienced students leverage tools more effectively through developed critical thinking skills and deeper subject knowledge.

DISCUSSION OF FINDINGS

The finding that 82.75% of NCE Economics students have used AI tools for academic purposes represents remarkably high adoption rates exceeding many international benchmarks and challenges assumptions about technology adoption in developing country educational contexts. This aligns with recent global trends showing rapid AI adoption among university students, where studies report usage rates ranging from 70% to 89% across different educational contexts (HEPI, 2025; Sun & Zhou, 2024). The dominance of ChatGPT as the preferred AI tool reflects global patterns where conversational AI tools have achieved mainstream adoption.

The study provides empirical evidence that AI usage positively associated with academic achievement. The moderate to strong positive correlations ($r = 0.284$ to 0.467) demonstrate AI serves as valuable educational resource rather than detrimental dependency, aligning with meta-analytic findings showing consistent positive effects across diverse educational contexts (Kim & Lee, 2025). The strongest correlation between AI self-efficacy and academic performance ($r = 0.467$) aligns with Technology Acceptance Model predictions and recent empirical findings showing confident and skilled AI usage leads to better outcomes (Chen et al., 2025).

The particularly strong correlation between AI usage and research project scores ($r = 0.378$) is noteworthy for teacher education contexts, as research skills are crucial for evidence-based teaching practices. This finding suggests AI tools may be particularly valuable for developing analytical and inquiry skills needed for effective teaching. The multiple regression model explaining 38.7% of variance represents substantial explanatory power, with AI self-efficacy as strongest predictor ($\beta = 0.298$) reinforcing that quality of AI interaction matters more than mere usage frequency.

The emphasis on practical benefits such as faster information access and improved research capabilities addresses fundamental challenges in Nigerian educational contexts where library resources and internet connectivity may be limited. However, the moderate rating for enhanced creativity ($M = 3.23$) suggests students may not yet fully recognize or utilize AI's potential for creative academic work, providing opportunities for educational interventions exploring AI's creative applications while maintaining academic integrity.

Infrastructure and ethical challenges reveal continued digital divide affecting Nigerian educational institutions, with inconsistent internet connectivity as primary barrier ($M = 4.45$) emphasizing need for infrastructure development. Academic integrity concerns ranking second ($M = 3.87$) demonstrate encouraging ethical awareness creating opportunities for developing responsible usage practices. The relatively low concern about privacy and data security ($M = 2.98$) may indicate limited awareness requiring enhanced digital citizenship education.

The significant moderation effects for digital literacy, academic level, and gender indicate differential impacts across student groups requiring inclusive AI education strategies addressing varying levels of technological access. Female students experiencing greater benefits challenges assumptions about gender and technology, suggesting AI tools may be particularly well-suited to collaborative and research-oriented learning approaches. The universality of benefits across age and subject specialization supports broad-based AI integration initiatives in teacher education programs.

CONCLUSION

The study concludes that AI tools represent valuable educational resources that can enhance academic achievement in teacher education contexts when supported by appropriate infrastructure, institutional policies, and skills development programs. The positive relationship between AI usage and academic achievement, particularly for research-related activities, suggests that strategic AI integration can support development of critical competencies needed for effective teaching in the 21st century. However, realizing AI's full educational potential requires addressing infrastructure limitations, developing digital literacy skills, and establishing clear ethical guidelines for responsible usage

RECOMMENDATIONS

Based on these findings, the following recommendations were made.

College of Education Akwanga should establish comprehensive AI literacy programs integrated into existing NCE Economics curriculum structure, focusing on building AI self-efficacy which emerged as the strongest performance predictor.

Institutional policies governing AI usage must balance innovation with academic integrity, following recent guidance emphasizing responsible AI integration while prioritizing student safety, data privacy, and educational effectiveness Collaboration with telecommunications providers and government agencies to improve internet connectivity is critical, as infrastructure limitations represent the primary barrier to effective AI usage.

College development programs training educators on AI technologies, educational applications, and assessment strategies for AI-enhanced student work are essential, as college AI competency is necessary for guiding student usage and maintaining academic standards.

Systematic incorporation of AI tools into specific courses, particularly those focusing on research methods, educational technology, and pedagogical planning, should be guided by findings showing research applications demonstrate strongest performance correlations.

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