

ARTIFICIAL INTELLIGENCE ADOPTION AND ACADEMIC PERFORMANCE OF STUDENTS IN FEDERAL COLLEGE OF EDUCATION (TECHNICAL), UMUNZE, ANAMBRA STATE

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Abstract

This study examined the effect of artificial intelligence adoption on academic performance of students in Federal College of Education (Technical) Umunze, Anambra State. The study specifically examined the effect of awareness and knowledge, access and availability, and perceived usefulness of AI tools on academic performance of students in Federal College of Education (Technical) Umunze, Anambra State. The work adopted a survey approach. A total of six hundred and sixty six (666) questionnaires containing seven (7) questions were distributed to selected respondents who are students in Federal College of Education (Technical) Umunze, Anambra State. Six hundred and fifty (650) questionnaires were completed and returned. Data collected were analyzed using percentages and Likert scale. The responses were further analyzed using Structural Equation Modeling (SEM) technique. The results of the analyses revealed that there is a positive and significant relationship between academic performance of students and perceived usefulness of AI tools in academic; a positive insignificant relationship between academic performance and access and availability of AI Tools, while a negative insignificant relationship between academic performance and awareness and knowledge of AI tools. This study concluded that artificial intelligence adoption has positive effect on academic performance of students in Federal College of Education (Technical) Umunze, Anambra State. Higher education institutions ought to formally include AI technology into their teaching and learning procedures, as there is a shown correlation between their adoption and students' academic performance. In order to improve individualized learning and ongoing evaluation, this entails integrating AI-driven platforms into the curriculum, such as intelligent feedback systems, adaptive learning systems, virtual tutors, and plagiarism detection tools. Regular training workshops, seminars, and certification programs should be held by higher education institutions to give instructors the pedagogical techniques and technical know-how they need to incorporate AI into their lessons.

Keywords: Artificial intelligence adoption, academic performance

Introduction

The swift development of digital technology in the twenty-first century has changed almost every aspect of human endeavour, with education being one of the areas most affected. Artificial intelligence (AI) is one of the most innovative technologies that is changing educational institutions around the world. Higher

education institutions are rapidly using artificial intelligence which is usually described as robots simulating human intelligence processes in their teaching, learning, research, and administrative operations. Its expanding importance raises significant concerns about how technology affects students' academic performance, especially in higher education institutions where advanced learning and innovation are crucial. For many years, the conventional educational approach has depended on face-to-face communication between teachers and students, supplemented by lecture notes, textbooks, and tangible tests. But the demands of the digital world have made new methods of instruction and learning necessary. The integration of intelligent systems into education is a result of the explosion of information and the demand for individualized, effective, and flexible learning environments. Artificial intelligence technologies are now essential for improving student engagement, optimizing learning outcomes, and bolstering institutional effectiveness. These technologies range from chatbots, predictive analytics, and automated grading to intelligent tutoring and learning management systems (Luckin, Holmes, Griffiths, & Forcier, 2016; Mahmood, Sarwat, & Gordon, 2022).

Artificial intelligence-based applications have been adopted by universities and other tertiary institutions worldwide for a variety of uses. Smart tutoring programs can adjust to each student's unique strengths and shortcomings, offering tailored feedback to enhance in-class training (Mahmood, Sarwat, & Gordon, 2022). While providing students with instant feedback on their papers, automated grading systems also save teachers time. Predictive analytics pinpoints students at risk of academic failure and permits prompt interventions, while recommendation systems driven by artificial intelligence assist students in accessing learning materials catered to their individual needs (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019; Mahmood, Sarwat, & Gordon, 2022). The Sustainable Development Goal number four (SDG 4), which prioritises inclusive and high-quality education for all, and other more general global education objectives are in line with these developments. The use of artificial intelligence in higher education has already shown great potential in industrialized nations. For example, educational institutions in the US, UK, and certain Asian countries have used AI-powered platforms that offer individualized and flexible learning experiences (Luckin, Holmes, Griffiths, & Forcier, 2016). Similarly, by encouraging innovation and ethical scholarship, artificial intelligence-supported plagiarism detection systems improve academic integrity and, in turn, indirectly impact academic achievement (Mahmood, Sarwat, & Gordon, 2022). Self-directed learning has also been promoted by the use of artificial intelligence into academic procedures, empowering students to take charge of their own learning paths (Williamson & Eynon, 2020). The scenario in poor nations, such as Nigeria and other African countries, shows that tertiary institutions are adopting artificial intelligence more cautiously but steadily. Integration is slowed down by issues like poor infrastructure, low funding, low digital literacy, and opposition to change (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019; Adiguzel, Kaya, & Cansu, 2023). However, because many universities were forced to rely on e-learning platforms, virtual classrooms, and educational technologies driven by artificial intelligence, the COVID-19 pandemic brought attention to the urgent need for digital transformation in education. This abrupt change revealed artificial intelligence's potential and difficulties in improving academic achievement in settings with limited resources.

In higher education, academic performance is still one of the most important measures of both student achievement and institutional efficacy. Examinations, assignments, projects, and total grade point averages are commonly used to gauge it. Performance is a reflection of students' intellectual aptitude as well as the caliber of instruction, the resources available, and the institution's flexibility in responding to changes in the global educational landscape. In this sense, new dynamics have been brought about by the advent of artificial intelligence instruments. Students may now complete academic assignments more efficiently because to quick information, virtual libraries, and collaboration platforms. There are still concerns, though, regarding whether artificial intelligence actually improves learning outcomes or if it increases inequality among students with unequal access to digital resources, fosters dependency, and diminishes critical thinking (Williamson & Eynon, 2020; Luckin, Holmes, Griffiths, & Forcier, 2016). The research of AI and academic performance is supported by a number of theoretical stances. The active role that students play in creating knowledge is emphasized by constructivist learning theory. This viewpoint is supported by artificial intelligence-based technologies like interactive simulations and adaptive learning systems, which provide settings for experimentation, exploration, and real-time feedback to students (Luckin, Holmes, Griffiths, & Forcier, 2016). Likewise, self-determination theory emphasizes the significance of relatedness, competence, and autonomy in inspiring students to perform better. By allowing students to choose their own learning style and material, artificial intelligence systems for personalized learning meet these demands and promote intrinsic motivation (Adiguzel, Kaya, & Cansu, 2023).

Statement of the Problem

Artificial intelligence in education has both beneficial and bad effects, according to empirical research. Positively, studies have demonstrated that platforms driven by artificial intelligence increase retention rates, encourage participation, and strengthen problem-solving abilities (Chen, Chen, & Lin, 2020; Mahmood, Sarwat, & Gordon, 2022). When learning resources are adapted to students' cognitive abilities and they receive prompt feedback, they frequently do better (Luckin, Holmes, Griffiths, & Forcier, 2016; Mahmood, Sarwat, & Gordon, 2022). By automating repetitive duties, artificial intelligence also assists lecturers in efficiently managing large classrooms, freeing up more time for interactive learning and mentoring (Mahmood, Sarwat, & Gordon, 2022; Adiguzel, Kaya, & Cansu, 2023). On the down side, some academics warn that an excessive dependence on AI could hinder human connection, diminish students' inventiveness, and raise ethical questions about data privacy, monitoring, and grading equity (Williamson & Eynon, 2020; Mahmood, Sarwat, & Gordon, 2022). The use of artificial intelligence in Nigerian higher education institutions is still in its infancy. Digital resources like virtual libraries, e-learning, and online tests are being introduced gradually by universities. In keeping with worldwide trends, the National Universities Commission (NUC) has also urged academic institutions to adopt digital learning. However, widespread adoption is hampered by infrastructure constraints like inadequate finance, inadequate internet access, and a lack of ICT facilities. Additionally, whether AI technologies improve or hinder students' academic performance depends heavily on their views towards technology and their level of digital literacy (Adiguzel, Kaya, & Cansu, 2023; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). As a result, there is still

disagreement over artificial intelligence and academic achievement. Artificial intelligence, according to some, is a game-changer that may improve efficiency, encourage innovation, and democratize education in postsecondary institutions. Others contend that artificial intelligence could exacerbate already-existing disparities and have a detrimental impact on educational quality in the absence of appropriate regulation, funding, and training (Williamson & Eynon, 2020; Mahmood, Sarwat, & Gordon, 2022). Against this backdrop, this study seeks to examine the effect of artificial intelligence adoption on academic performance of students in Federal College of Education (Technical), Umunze, Anambra State.

LITERATURE REVIEW

Artificial Intelligence Adoption in Education

Adoption of artificial intelligence (AI) in education refers to the methodical incorporation of AI-powered tools, systems, and technologies into administrative, instructional, and learning procedures in order to improve student results. The idea encompasses the adoption, use, and institutionalization of AI advancements in educational settings in addition to the use of AI apps. The increasing digital revolution of education has made artificial intelligence (AI) a vital force behind data-driven decision-making, adaptive instruction, and personalized learning, claim Chen, Chen, and Lin (2020). In order to enhance learning experiences and administrative effectiveness, AI adoption thus refers to the degree to which institutions, educators, and students use AI technology like chatbots, intelligent tutoring systems, predictive analytics, and automated grading systems. Adoption of AI is seen practically in a variety of educational applications. For example, intelligent tutoring systems analyze students' progress and modify content to meet their needs, resulting in personalised learning experiences. Early interventions are made possible by AI-powered analytics that can identify at-risk students and forecast their performance. Additionally, apps that use Natural Language Processing (NLP), such AI chatbots and virtual teaching assistants, improve communication between educational institutions and students. By automating tedious processes and providing learning opportunities outside of traditional classrooms, these applications jointly support efficiency, diversity, and accessibility in education, as highlighted by Zawacki-Richter, Marin, Bond, and Gouverneur (2019).

Academic Performance

Academic performance is the degree to which students meet learning objectives and exhibit their command of academic material, competencies, and abilities as defined by an educational establishment. It reflects how well students perform on tests, assignments, projects, and other evaluation criteria, making it a key measure of educational success and efficacy. According to York, Gibson, and Rankin (2015), academic performance includes students' engagement, cognitive growth, and attainment of learning objectives in addition to their grades. As a result, it is a multifaceted concept that encompasses both qualitative and quantitative elements of learning. Grades, test scores, Cumulative Grade Point Average (CGPA), and completion rates have historically been used to gauge academic performance. These metrics offer quantifiable proof of students' growth and intellectual proficiency within a particular learning environment. However, according to recent educational research, academic achievement encompasses the development of critical thinking, creativity, problem-solving, and social skills in addition to test scores (Richardson, Abraham, &

Bond, 2012). The constructivist approach to education, which emphasizes learning as an active, student-centered process rather than a passive intake of knowledge, is consistent with this broader worldview.

Theoretical Framework

This study is anchored on **Technology Acceptance Model (TAM)**. One of the most important theoretical frameworks for comprehending how people accept and use technology is the technology acceptance model, which was postulated by Davis in 1989. Perceived utility and perceived ease of use are two important aspects that define users' attitudes towards technology, which in turn affect their behavioural intention and actual use, according to the model. The TAM has become a crucial tool in the field of education for elucidating how instructors and students embrace new technology, such as artificial intelligence (AI) systems, and how this adoption affects academic achievement. Understanding TAM offers a framework through which to evaluate students' acceptance, utilization, and learning results in digitally mediated contexts, especially as AI-driven educational technologies proliferate. Academic achievement and AI adoption (as impacted by TAM) are related to how technology use results in cognitive and behavioural engagement. Students are more likely to successfully incorporate AI technologies into their learning routines when they are seen as practical and user-friendly. This results in enhanced motivation, problem-solving skills, and comprehension, all of which boost academic achievement. Because perceived utility motivates students to devote more time and energy to technology-mediated learning, it has a direct impact on learning outcomes. AI-powered personalized learning platforms, like the adaptive suggestions in Coursera or the AI-based feedback loops in Duolingo, for instance, offer instant insights that let students learn at their own speed, enhancing retention and proficiency. Students who use AI-assisted learning technologies frequently outperform their colleagues who only use traditional approaches in terms of academic performance, time management, and problem-solving abilities (Holmes, Bialik, & Fadel, 2021). Because perceived ease of use lessens cognitive load, it has an indirect effect on performance. Students can concentrate on learning material rather than technological challenges if AI systems are easy to use. Access to AI-driven assistance, such AI tutors or automated grading systems, is simple, enabling prompt feedback and effective learning. For example, AI chatbots that answer students' questions round the clock can assist lower academic anxiety and encourage self-directed learning, which is a crucial factor in determining academic performance (Huang & Hew, 2018). Additionally, the relationship between academic success and technology acceptability is mediated by the behavioural desire to utilize AI. Higher usage frequency, which improves digital literacy and learning efficiency, is the outcome of positive intentions. Thus, by influencing how students engage with AI learning environments, the incorporation of TAM factors indirectly improves academic success.

Empirical Studies

Olopade and Okeke (2025) examined the effect of AI tools on students' academic performance at Federal Polytechnic, Ilaro, Ogun State. A survey research design was employed, utilizing a structured questionnaire as the primary data collection instrument. The study targeted HND final-year students, with a total population of 2,639 as of December 2024. Using the Taro Yamane sample size formula, a sample of 347 respondents was selected. Regression and correlation

statistical models were applied to analyze the relationship between AI tool usage and students' academic performance. The findings revealed no significant relationship between the use of AI tools and students' academic performance. Specifically, ChatGPT exhibited a weak negative correlation with academic performance; however, the result was not statistically significant. Likewise, Turnitin and Quillbot showed correlations close to zero, indicating no meaningful relationship with students' academic outcomes. The high p-values for all three AI tools 0.064 for ChatGPT, 0.979 for Turnitin, and 0.881 for Quillbot further confirmed that their impact on academic performance was not statistically significant at the institution. Therefore, it can be concluded that while AI tools such as ChatGPT, Turnitin, and Quillbot are widely utilized in academic settings, their direct influence on students' academic performance at Federal Polytechnic, Ilaro, remains minimal.

Fan, Deng, and Liu (2025) investigated how 148 students from diverse engineering disciplines and regions across China used generative AI, focusing on its impact on their learning experience and the opportunities and challenges it poses in engineering education. Based on the surveyed data, we explored four key areas: the frequency and application scenarios of AI use among engineering students, its impact on students' learning and performance, commonly encountered challenges in using generative AI, and future prospects for its adoption in engineering education. The results showed that more than half of the participants reported a positive impact of generative AI on their learning efficiency, initiative, and creativity, with nearly half believing it also enhanced their independent thinking. However, despite acknowledging improved study efficiency, many felt their actual academic performance remained largely unchanged and expressed concerns about the accuracy and domain-specific reliability of generative AI.

Phua, Neo, and Teo (2025) investigated the perceptions and attitudes of students towards the use of AI tools in their academic activities, focusing on constructs such as perceived usefulness, the perceived ease of use, security and privacy concerns, and both positive and negative attitudes towards AI. On the basis of Technology Acceptance Model (TAM) and the General Attitudes towards Artificial Intelligence Scale (GAAIS), this research seeks to identify the factors influencing students' behavioral intentions and actual adoption of AI tools in educational settings. A structured survey was administered to students at Multimedia University, Malaysia, capturing their experiences and opinions on widely used AI tools such as ChatGPT, Quillbot, Grammarly, and Perplexity. Hypothesis testing was used to evaluate the statistical significance of relationships between the constructs and behavioral intention and actual use of the AI tools. The findings reveal a high level of engagement with AI tools among University students, primarily driven by their perceived benefits in enhancing academic performance, improving efficiency, and facilitating personalized learning experiences.

Salleh, Shamsuddin, Ibrahim, Hamid, Mat Zin, Abidin, and Tanjung (2025) explored whether opportunities to use AI, perceived importance of AI, and attitudes towards AI are critical variables in motivating students to learn. A quantitative survey approach was used, using a questionnaire with a sample of 331 UiTM Kelantan Branch students. Of these, 208 students participated in the online survey. The results show that the opportunity to use AI and its perceived importance are relevant to students' motivation to study at the higher education level. In addition, the findings

reveal a significant and strong relationship between students' attitudes and motivation to incorporate AI into their learning process.

Vieriu and Petrea (2025) investigated the impact of AI technologies on students' learning processes and academic performance, with a focus on their perceptions and the challenges associated with AI adoption. Conducted at the National University of Science and Technology Politehnica Bucharest, this research involved second-year students who had direct experience with AI enhanced learning environments. Using purposive sampling, 85 participants were selected to ensure relevance. Data were collected through a structured questionnaire comprising 11 items as follows: seven closed-ended questions assessing perceptions, usage, and the effectiveness of AI tools; and four open-ended questions exploring experiences, expectations, and concerns. Quantitative data were analyzed using frequency and percentage calculations, while qualitative responses were subjected to thematic analysis, incorporating both vertical (individual responses) and horizontal (cross-dataset) approaches to ensure comprehensive theme identification. The findings reveal that AI offers significant benefits, including personalized learning, improved academic outcomes, and enhanced student engagement.

Cubillas, Lusica, Sabanal, and Yula (2025) examined the influence of AI adoption on the academic performance of pre-service teachers, focusing on factors like perspective on using AI, self-confidence, user-friendliness, apprehension, and purposeful behavior. A descriptive-correlational research design was used to explore these connections. Findings show that while pre-service teachers adopt AI at a high level, their AI-related competencies and attitudes do not significantly affect their academic performance. This suggests that factors beyond AI adoption, such as study habits, learning strategies, and curriculum design, influence academic success.

Dogaru, Pisica, Popa, Ragman, and Tololoi (2025) explored how technical university students perceive and leverage ChatGPT in academic tasks, focusing on motivation, learning outcomes, and ethical awareness. Using the Technology Acceptance Model and Self-Determination Theory, the research surveyed 84 students from a technical university via a 5-point Likert-scale questionnaire. Six salient dimensions of student engagement with ChatGPT emerged: perceived usefulness for problem solving, learning retention and skill acquisition, structured interaction with familiar content, consultation on unfamiliar topics, preference for conciseness, and confidence in the accuracy of AI responses. Students who perceived ChatGPT as a valuable resource for addressing academic problems reported enhanced motivation and competence, and frequent structured interaction was linked to the practice of verifying uncertain information, indicating the emergence of AI literacy. However, extensive reliance was correlated with dependence and limited citation practices, revealing risks to academic integrity.

Shahzad, Xu, Lim, Yang, and Khan (2024) focused on the nexus between AI and social media usage in relation to academic performance and mental well-being, and the role of smart learning in facilitating these relationships. Using partial least squares–structural equation modeling (PLS-SEM) on a sample of 401 Chinese university students. The study results reveal that both AI and social media have a positive impact on academic performance and mental well-being among university students. Furthermore, smart learning serves as a positive mediating variable, amplifying the beneficial effects of AI and social media on both academic performance and mental well-being.

Yusuf (2024) investigated the role of AI in improving the quality of the student learning process, focusing on personalization of learning, adaptive evaluation, and learning data analysis. This research uses a qualitative research approach. The research design adopted is a case study, which allows us to understand the implementation of artificial intelligence in student learning deeply. The research population and sample were 100 students at the Indonesian Technocrat University in Lampung province, Indonesia. The research results show that implementing AI in education has great potential to increase learning effectiveness, inclusiveness and efficiency.

Hu, Xiao, Zhu, Zhu, and Hu (2024) examined the direct impact of smart learning, artificial intelligence, and beliefs about the future on academic performance. It further investigates whether the desire for knowledge mediates the relationships between these variables. A structural questionnaire was designed using the existing literature, and data was collected through face-to-face distribution. The respondents have diversified demographic dimensions for which a sample of 317 was empirically tested with the help of MS-Excel and Smart PLS version 4. The results signify the following output: artificial intelligence, desire for knowledge, and smart learning promote the academic performance of the study. Desire for knowledge fully mediates the relationship between smart learning and academic performance and between beliefs about the future and academic performance.

Abbas, Ali, Manzoor, Hussain, and Hussaini (2023) investigated various AI applications such as personalized learning systems, intelligent tutoring systems, and automated assessment tools, and their potential to enhance learning outcomes, engagement, and overall academic achievement. Through a comprehensive review of existing literature and empirical research, the abstract highlights the benefits and challenges associated with AI adoption in education. It also underscores the need for effective implementation strategies, teacher training, and ethical considerations to ensure the responsible and effective use of AI technologies in higher education.

Methodology

The study applied a survey research design using the population of students in Federal College of Education (technical), Umuze, Anambra State. The study was conducted at Federal College of Education (technical), Umuze, Anambra State based on the fact that the locations was proximate to the researcher, so it was easy for data collection. The study employed the Structural Equation Modeling (SEM) technique to analyze the data from the respondents.

Sample Size and Sampling Technique

For the purpose of this study, the sample size was selected using sampling procedure. The formula used is the Yaro-Yamani sampling procedure which yielded at total of 666 respondents. To select 666 respondents the researcher adopted a simple random sampling method

Design, Validity and Reliability of the questionnaire

The main research instrument used was the questionnaire, and questionnaire items were formed to address the objective of the study. The questionnaire was divided into two: the first part was for demographic data of the respondent visa viz: sex, age, and religious affiliation. The second part was structured to capture artificial

intelligence adoption and academic performance. The Alpha Cronbach's reliability test was employed to ensure reliability of the research instruments.

4. ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Presentation of Data

A total of six hundred and sixty six (666) questionnaires containing seven (7) questions were distributed respondents. Six hundred and fifty (650) questionnaires were completed and returned thus, showing a responses rate of 97.60%. From the questions asked in the questionnaire, four (4) questions were of direct relevance to the objective of the study, while some of the questions served as a check on the answer provided by the respondent. Table 4.1 shows the number of questionnaire distributed and returned, which (650) and 97.60% were returned while (16) 2.40% were not returned.

Table 4.1: Distribution of Respondents

No of Sent Questionnaire	Number Returned	Number Not Returned	Percentage Returned	Percentage Not Returned
666	650	16	97.60	2.40

Source: Researcher's Field Survey September, 2025

Gender Distribution of Respondents

Table 4.2 reflects the gender pattern of the respondents. However, from Table 4.2, it is crystal clear that 56% of the respondents are male while, 44% are female. This shows a clear indication that both male and female are utilizing AI in their studies.

Table 4.2: Gender Distribution of Respondents

Gender	Respondents	Percentage of Respondents
Male	364	56
Female	286	44
Total	650	100

Source: Researcher's Field Survey September, 2025

Age Distribution of Respondents

As shown in Table 4.3, 1.85% of the respondents are less than 18 years, 9.54% are between 19 – 20 years, 44.92% are between 21 – 25 years, while 43.69% are above 25 years.

Table 4.3: Age Distribution of Respondents

Age	Respondents	Percentage of Respondents
Less than 18 years	12	1.85
19-20 years	62	9.54
21-25 years	292	44.92
25 years and Above	284	43.69
Total	650	100

Source: Researcher's Field Survey September, 2025

Distribution of Respondents on Religion Affiliation

Table 4.4 shows that 2.00% of the respondents are Islam, 95.08% are Christians, 2.92 are traditionalist, while no Atheist and other religious affiliation were reported.

Table 4.4: Distribution of Respondents on Religion Affiliation

Religion Affiliation	Respondents	Percentage of Respondents
Islam	13	2.00
Christianity	618	95.08
Traditionalist	19	2.92
Atheist	0	0
Others	0	0
Total	650	100

Source: Researcher's Field Survey September, 2025

4.2 Alpha Cronbach's Reliability Test

The responses of the respondents were checked for internal reliability through the alpha Cronbach's reliability test. The test result yielded over 0.90, suggesting that all the questionnaire items were valid and reliable. The alpha Cronbach for all the constructs and codes are presented in Table 4.5.

Table 4.5: Alpha Cronbach Reliability Test

Construct	Code	Items	Alpha Cronbach
Academic Performance	[AP1]	AI tools have helped me understand difficult topics better before tests and exams	0.997
	[AP 2]	My test and examination scores have improved since I started using AI tools for learning	
	[AP 3]	Using AI tools reduces my anxiety during tests and examination because I feel more prepared	
	[AP 4]	AI tools help me prepare for exams more effectively than traditional study methods	
	[AP 5]	I rely on AI-based practice questions or simulations to test my knowledge before assessments	
Awareness and Knowledge	[AK1]	I am aware that artificial intelligence (AI) tools are being used in higher education	0.991
	[AK2]	I know of specific AI tools (e.g., ChatGPT, Turnitin, Coursera AI tutors, Grammarly) that support learning in tertiary institutions	
	[AK3]	I frequently hear about AI applications in teaching, learning, or research within my institution	
	[AK4]	I understand how AI tools can be used to improve students' academic performance	
	[AK5]	I know how to use at least one AI-powered academic tool effectively.	
	[AA1]	I can easily access AI tools (e.g., chatbots, virtual tutors, digital assistants) for academic purposes	

Access and Availability of AI Tools	[AA2]	The cost of accessing AI-powered applications (e.g., subscriptions, data bundles) enhances my usage in academics	0.970
	[AA3]	I am satisfied with the level of access and availability of AI tools in the internet	
	[AA4]	There are sufficient internet facilities to support AI usage in my academic activities	
	[AA5]	I can conveniently access AI-based resources (e.g., e-libraries, research databases with AI features) both on and off campus	
Perceived Usefulness (PU) of AI Tools in Academic	[PU1]	AI tools help me complete my assignments and projects more efficiently	0.999
	[PU2]	I find that AI enhances the quality of my learning compared to traditional methods	
	[PU3]	AI tools provide feedback that helps me understand course material better	
	[PU4]	Using AI applications saves me time in studying and researching	
	[PU5]	Learning how to use AI tools for academic purposes is easy for me	

Source: SPSS 31.0 Data Output

4.3 Principal Component Analysis Result

In an attempt to ensure that items in each of constructs are reduced to fewer variables which would fully capture the intent of objective or most of the variance in the study's objective, the principal component analysis was performed and the result presented in Table 4.6. The result reveals that the number of items selected to reflect the variables if the objectives was adequate and inferences made is reliable and statistically robust. The varimax option of the principal component analysis rotation was utilized to ascertain the underlying dimensions of artificial intelligence adoption and academic performance in order to extract the dimensions of each construct.

Table 4.6: Principal Component Analysis Result

Constructs and Code	Factor Load	Eigen value	Cumulative % of Variance
Academic Performance		4.945	98.900
[AP1]	0.997		
[AP 2]	0.984		
[AP 3]	1.000		
[AP 4]	0.992		
[AP 5]	1.000		
Awareness and Knowledge		4.843	96.854
[AK1]	0.983		
[AK2]	0.994		
[AK3]	1.000		
[AK4]	1.000		
[AK5]	0.943		

Access and Availability of AI Tools		4.497	89.948
[AA1]	0.936		
[AA2]	0.907		
[AA3]	0.979		
[AA4]	0.984		
[AA5]	0.933		
Perceived Usefulness (PU) of AI Tools in Academic		4.981	99.612
[PU1]	1.000		
[PU2]	0.996		
[PU3]	0.997		
[PU4]	0.999		
[PU5]	0.997		

Source: SPSS 31.0 Data Output

4.4 Respondents Distribution on AI Adoption and Academic Performance Distribution of Respondents on Academic Performance

With respect to academic performance in Table 4.7, this study showed that respondents believed that AI tools help students prepare for exams more effectively than traditional study methods with a mean score of 4.55. In the second place is respondents' believe that AI tools have helped them to understand difficult topics better before tests and exams (mean score of 4.53). Using AI tools reduces students' anxiety during tests and examination because they feel more prepared was in third place with (4.49) as mean score. Respondents reliance on AI-based practice questions or simulations to test their knowledge before assessments was ranked fourth with a mean score (4.47). Test and examination scores have improved since they started using AI tools for learning has the lowest mean score (4.40).

Table 4.7: Responses on Academic Performance

Academic Performance Items	SA	A	N	DA	SD	TS	STD	M	R
AI tools have helped me understand difficult topics better before tests and exams	350	295	5	0	0	2945	176.81	4.53	2 nd
My test and examination scores have improved since I started using AI tools for learning	280	355	10	2	3	2857	173.23	4.40	5 th
Using AI tools reduces my anxiety during tests and examination because I feel more prepared	325	317	8	0	0	2917	174.41	4.49	3 rd
AI tools help me prepare for exams more effectively than traditional study methods	360	285	5	0	0	2955	177.72	4.55	1 st
I rely on AI-based practice questions or simulations to test my knowledge before assessments	320	315	15	0	0	2905	171.28	4.47	4 th

Source: Researcher's Field Survey September, 2025

Note: SA = Strongly Agreed; A=Agreed; SD=Strongly Disagreed; DA=Disagreed; N=Neutral; TS=Total Score; STD-Standard Deviation; M=Mean and R=Rank

Distribution of Respondents on Awareness and Knowledge

With regard to awareness and knowledge in Table 4.8, this study revealed that respondents are aware that artificial intelligence (AI) tools are being used in higher education with a mean score of 4.68. In the second place is respondents' knowledge of specific AI tools (e.g., ChatGPT, Turnitin, Coursera AI tutors, Grammarly) that support learning in tertiary institutions (mean score of 4.66). Respondents frequently hear about AI applications in teaching, learning, or research within tertiary institution was in third place with (4.61) as mean score. Respondents understanding of how AI tools can be used to improve students' academic performance was ranked fourth with a mean score (4.54), while respondents knowledge of how to use at least one AI-powered academic tool effectively has the lowest mean score (4.38).

Table 4.8: Responses on Awareness and Knowledge

Awareness and Knowledge Items	SA	A	N	DA	SD	TS	STD	M	R
I am aware that artificial intelligence (AI) tools are being used in higher education	450	192	8	0	0	3042	196.80	4.68	1 st
I know of specific AI tools (e.g., ChatGPT, Turnitin, Coursera AI tutors, Grammarly) that support learning in tertiary institutions	430	216	4	0	0	3026	191.75	4.66	2 nd
I frequently hear about AI applications in teaching, learning, or research within my institution	400	245	5	0	0	2995	184.09	4.61	3 rd
I understand how AI tools can be used to improve students' academic performance.	390	236	12	9	3	2949	175.73	4.54	4 th
I know how to use at least one AI-powered academic tool effectively	300	320	15	7	8	2847	164.50	4.38	5 th

Source: Researcher's Field Survey September, 2025

Note: SA = Strongly Agreed; A=Agreed; SD=Strongly Disagreed; DA=Disagreed; N=Neutral; TS=Total Score; STD-Standard Deviation; M=Mean and R=Rank

Distribution of Respondents on Access and Availability of AI Tools

In terms of access and availability of AI tools, respondents can conveniently access AI-based resources (e.g., e-libraries, research databases with AI features) both on and off campus. Secondly, respondents are satisfied with the level of access and availability of AI tools in the internet, as shown by a mean score of 4.63. Respondents opined that there are sufficient internet facilities to support AI usage in their academic activities is ranked third with a mean score (4.59). Jointly in the fourth place are respondents can easily access AI tools (e.g., chatbots, virtual tutors, digital assistants)

for academic purposes as well as the cost of accessing AI-powered applications (e.g., subscriptions, data bundles) enhances their usage in academics with mean score (4.20).

Table 4.9: Responses on Access and Availability of AI Tools

Access and Availability of AI Tools Items	SA	A	N	DA	SD	TS	STD	M	R
I can easily access AI tools (e.g., chatbots, virtual tutors, digital assistants) for academic purposes	250	340	23	17	20	2733	153.96	4.20	4 th
The cost of accessing AI-powered applications (e.g., subscriptions, data bundles) enhances my usage in academics	235	361	19	20	15	2731	159.71	4.20	4 th
I am satisfied with the level of access and availability of AI tools in the internet	415	230	5	0	0	3010	187.52	4.63	2 nd
There are sufficient internet facilities to support AI usage in my academic activities	400	235	15	0	0	2985	180.94	4.59	3 rd
I can conveniently access AI-based resources (e.g., e-libraries, research databases with AI features) both on and off campus	460	180	10	0	0	3050	199.75	4.69	1 st

Source: Researcher's Field Survey September, 2025

Note: SA = Strongly Agreed; A=Agreed; SD=Strongly Disagreed; DA=Disagreed; N=Neutral; TS=Total Score; STD-Standard Deviation; M=Mean and R=Rank

Distribution of Respondents on Perceived Usefulness (PU) of AI Tools in Academic

As it can be seen in Table 4.10, respondents believe that using AI applications saves time in studying and researching and AI enhances the quality of learning compared to traditional methods as illustrated by the joint highest mean of 4.51. Respondents are of the view that AI tools help in completing assignments and projects more efficiently was ranked second with a mean score (4.50). In the third place is the fact that respondents believe that learning how to use AI tools for academic purposes is easy for students. Respondents are confident that AI tools provide feedbacks that help them understand course material better was in the fourth place as unveiled by 3.74 as mean score.

Table 4.10: Responses on Perceived Usefulness (PU) of AI Tools in Academic

Perceived Usefulness (PU) of AI Tools in Academic Items	SA	A	N	DA	SD	TS	STD	M	R
AI tools help me complete my assignments and projects more efficiently	350	286	7	6	1	2928	173.12	4.50	2 nd
I find that AI enhances the quality of my learning compared to traditional methods	363	270	8	4	5	2932	173.40	4.51	1 st
AI tools provide feedback that helps me understand course material better	323	307	9	6	5	2432	168.98	3.74	4 th
Using AI applications saves me time in studying and researching	352	284	11	1	2	2933	173.34	4.51	1 st
Learning how to use AI tools for academic purposes is easy for me	320	302	19	6	3	2880	165.46	4.43	3 rd

Source: Researcher's Field Survey September, 2025

Note: SA = Strongly Agreed; A=Agreed; SD=Strongly Disagreed; DA=Disagreed; N=Neutral; TS=Total Score; STD-Standard Deviation; M=Mean and R=Rank

4.5 SEM Regression Result

The responses from the respondents were further analyzed via regression analysis estimated using the Structural Equation Modeling (SEM) technique. The adjusted R-square, R-square and the beta coefficient of the academic performance and artificial intelligence adoption surrogates formed the bases of the interpretation of the Structural Equation Modeling (SEM) regression results.

Academic Performance and Artificial Intelligence Adoption

Adjusted R squared is the coefficient which tells us the variation in the dependent variable due to changes in the independent variable. As shown in Table 4.11, the value of adjusted R squared was 1.000, so that there was variation of 100.0% in academic performance. This divulges that 100.0% changes in academic performance of students in Federal College of Education (Technical) Umunze, Anambra State was accounted for by artificial intelligence adoption. From the R-square, the correlation coefficient shows that there is a strong positive relationship between academic performance of students in Federal College of Education (Technical) Umunze, Anambra State and artificial intelligence adoption (1.000).

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000 ^a	1.000	1.000	1.07660

Source: SPSS 31.0 Data Output

A look at the ANOVA statics in Table 4.12, the value of significance (p-value) is less than 5%. This implies that the data are suitable to draw a conclusion on the parameters of this study.

Table 4.12: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	120877.449	3	40292.483	34762.731	.004 ^b
Residual	1.1590000	1	1.1590000		
Total	120878.608	4			

Source: SPSS 31.0 Data Output

Table 4.13 shows that if artificial intelligence adoption (awareness and knowledge, access and availability, and perceived usefulness) is held constant, academic performance of students in Federal College of Education (Technical) Umunze, Anambra State would be down by a factor of 4.36. There is a positive and significant relationship between academic performance of students and perceived usefulness of AI tools in academic; a positive insignificant relationship between academic performance and access and availability of AI Tools, while a negative insignificant relationship between academic performance and awareness and knowledge of AI tools. Access and availability, and perceived usefulness coefficient of 0.049 and 1.367 suggest that a unit increase in access and availability of AI Tools and perceived usefulness of AI tools in academic would increase academic performance of students in Federal College of Education (Technical) Umunze, Anambra State by 4.9% and 136.7% respectively, whereas a percentage increase in awareness and knowledge of AI tools results in 42.7% depreciation in academic performance students in Federal College of Education (Technical) Umunze, Anambra State.

Table 4.13: Coefficients of Artificial Intelligence Adoption

Dependent Variable: Academic Performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Beta	Beta		
(Constant)	-4.360	1.139		-3.829	0.163
Awareness and Knowledge	-0.413	0.044	-0.427	-9.472	0.067
Access and Availability	0.051	0.123	0.049	0.415	0.749
Perceived Usefulness	1.394	0.078	1.367	17.753	0.036

Source: SPSS 31.0 Data Output

Discussion of Findings

This study found that artificial intelligence adoption has positive influence on academic performance of students in Federal College of Education (Technical) Umunze, Anambra State. This suggests encouraging individualised educational experiences. Conventional classroom settings frequently find it difficult to accommodate students' varied learning styles and speeds. Predictive analytics, adaptive learning platforms, and intelligent tutoring systems are examples of AI technologies that can customise training according to each learner's preferences, abilities, and shortcomings. This is consistent with previous studies of Olopade and

Okeke (2025), Fan, Deng, and Liu (2025), Phua, Neo, and Teo (2025), Salleh, Shamsuddin, Ibrahim, Hamid, Mat Zin, Abidin, and Tanjung (2025), and Vieriu and Petrea (2025). Students' performance, retention, and comprehension all greatly improve when they are given content that is appropriate for their learning style and rate of advancement. AI-based platforms, such as Pearson's AI tutoring systems or Coursera's adaptive recommendation engine, can close learning gaps by analysing students' past performance and suggesting relevant content (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). Two important factors that influence academic achievement are motivation and autonomy, which are fostered by this personalisation. In tertiary institutions, where students come from various academic and socio-economic backgrounds, AI's adaptive flexibility assures inclusion, helping weaker students catch up while allowing stronger ones to go quicker. Therefore, a more effective and equitable learning ecology is implied by the positive effect of AI adoption. By automating repetitive academic work and giving instant feedback, AI integration increases students' productivity and efficiency. Students can receive fast feedback on their work using tools like learning analytics dashboards, automated essay scoring, and AI-powered grading systems, which facilitate ongoing improvement. By reducing the delays brought on by conventional evaluation techniques, this real-time feedback loop encourages self-regulated learning and academic discipline. Additionally, Learning Management Systems (LMS) with AI support assist students in planning their assignments, establishing study objectives, and monitoring their academic progress. By handling the administrative parts of learning, AI-based support systems, as argued by Huang and Hew (2018), lessen cognitive overload and free up students to concentrate on comprehending and using concepts. Therefore, increased productivity results in better academic performance and greater pleasure.

5. CONCLUSION AND POLICY IMPLICATIONS

This study examined the effect of artificial intelligence adoption on academic performance of students in Federal College of Education (Technical) Umuze, Anambra State. This result revealed that there is a positive and significant relationship between academic performance of students and perceived usefulness of AI tools in academic; a positive insignificant relationship between academic performance and access and availability of AI Tools, while a negative insignificant relationship between academic performance and awareness and knowledge of AI tools. To this end, this study concludes that artificial intelligence adoption has positive effect on academic performance of students in Federal College of Education (Technical) Umuze, Anambra State.

Higher education institutions ought to formally include AI technology into their teaching and learning procedures, as there is a shown correlation between their adoption and students' academic achievement. In order to improve individualized learning and ongoing evaluation, this entails integrating AI-driven platforms into the curriculum, such as intelligent feedback systems, adaptive learning systems, virtual tutors, and plagiarism detection tools. Regular training workshops, seminars, and certification programs should be held by higher education institutions to give instructors the pedagogical techniques and technical know-how they need to incorporate AI into their lessons. Higher education institutions should create precise

guidelines and moral standards governing the application of AI in classrooms in order to maintain the benefits. These regulations ought to cover topics like data security, intellectual property protection, appropriate AI use, and plagiarism detection. A clear institutional strategy guarantees the ethical and transparent use of AI tools without sacrificing students' independence or inventiveness.

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