PROCEEDINGS OF THE INTERNATIONAL CONFERENCE FOR INSTITUTE OF ADMINISTRATION (ICIA 2025)

AHMADU BELLO UNIVERSITY ZARIA - NIGERIA

Website: *https://icia.org.ng* **ISBN:** *978-978-695-265-9* ***Volume I, 2025***

EFFECT OF ARTIFICIAL INTELLIGENCE ON STUDENT ACADEMIC PERFORMANCE IN AHMADU BELLO UNIVERSITY, ZARIA

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Abstract

This study evaluates the impact of Artificial Intelligence (AI) on students' academic performance at Ahmadu Bello University, Zaria, from 2020 to 2024. Using both primary (questionnaires and interviews) and secondary data, the researchers analyzed responses from 364 participants through various sampling techniques and statistical tools, including Structural Equation Modeling (SMART PLS4) and thematic analysis. The findings revealed a largely negative perception of AI's influence on academic performance. Questionnaire data showed a strong negative relationship between AI use and academic performance, while interview responses highlighted concerns about over-reliance on technology, reduced critical thinking, limited human interaction, and unequal access. Ethical and privacy concerns were also mentioned. A minority of respondents saw AI positively, noting benefits like personalized learning, improved efficiency, and support for independent learning and students with disabilities. This study recommends a strategic and blended integration of AI in education, emphasizing its role in complementing, not replacing, traditional teaching methods. This approach aims to preserve essential elements of learning, such as critical thinking and human interaction, while leveraging AI to improve overall educational effectiveness.

Keywords: Artificial Intelligence & Student Academic Performance

1.1 Introduction

Globally, artificial intelligence (AI) has emerged as a transformative force in the education sector. With the ability to process vast amounts of data and provide personalized learning experiences, AI is reshaping traditional educational practices (Rehan, 2023). Tools such as intelligent tutoring systems, automated assessment, adaptive learning platforms, and AI-powered chatbots are increasingly being used to enhance student learning, engagement, and academic outcomes. Institutions in technologically advanced countries are integrating AI into classrooms to facilitate real-time feedback, individualized instruction, and data-driven decision-making aimed at improving student performance (Alsbou & Alsaraireh, 2024). In Africa, the adoption of AI in education is growing, albeit at a slower pace due to infrastructural, financial, and policy-related challenges (Butcher, Wilson-Strydom, & Baijnath, 2021). However, governments and educational stakeholders are beginning to recognize the potential of AI in bridging educational gaps, particularly in regions with limited access to quality teaching resources. AI-based solutions have been introduced to support digital literacy, improve student tracking systems, and create alternative learning methods in under-resourced environments. Countries such as South Africa, Kenya, and Rwanda are taking early steps toward implementing AI policies and piloting educational technologies to support learning (Ntakirutimana, 2022).

In Nigeria, the education system faces several challenges, including large class sizes, teacher shortages, inconsistent curriculum delivery, and limited access to quality educational materials. These challenges have spurred interest in adopting digital and AI-driven solutions to improve learning outcomes. While AI implementation remains in its nascent stages in most Nigerian schools and universities, some institutions have begun integrating AI-powered tools such as plagiarism detection software, online learning platforms, and virtual learning environments to complement traditional teaching methods (Alotaibi, 2024). The Federal Ministry of Education has also shown increasing interest in digital transformation and the role of emerging technologies in education. Kaduna State has demonstrated a growing commitment to educational innovation and technology adoption (Mohamed Hashim, Tlemsani, & Matthews, 2022). With a relatively high concentration of tertiary institutions and a rapidly growing youth population, the state has become a focal point for educational development initiatives. Efforts have been made to introduce e-learning programs and enhance ICT infrastructure in public institutions. However, disparities in access to technology and digital skills continue to limit the effective implementation of AI across many academic settings within the state.

At Ahmadu Bello University (ABU), Zaria, one of the oldest and most prestigious universities in Nigeria, the ongoing digital transformation in academia presents both opportunities and challenges (Adamu, 2019). As a leading institution with a large student population and diverse academic programs, ABU has significant potential to benefit from the integration of AI into its academic processes. AI applications such as computer-aided instruction, learning management systems, digital libraries, and academic support chatbots are beginning to emerge within the university environment (Rega, Fuccio, & Inderst, 2024). However, there remains a gap in understanding how these tools directly influence students' academic performance. Factors such as student awareness, accessibility, usage patterns, and faculty integration strategies play a critical role in determining the effectiveness of AI in improving academic outcomes (Alotaibi, 2024).

Despite the growing global adoption of AI in the education sector, its implementation and impact within Nigerian higher education institutions remain insufficiently understood, particularly at Ahmadu Bello University, Zaria (Zakariya, 2025). Although AI holds significant potential to enhance teaching and learning through tools such as virtual tutors, automated assessments, and personalized learning platforms, the extent of its usage and effectiveness in improving student academic performance at ABU is still unclear (Alrakhawi, Jamiat, & Abu-Naser, 2023). Key challenges including limited infrastructure, low digital literacy among students and staff, and inadequate institutional support continue to hinder the successful integration of AI technologies. Moreover, there is a notable lack of empirical evidence on whether AI applications contribute positively or negatively to academic outcomes. This gap in knowledge underscores the urgent need to investigate the influence of AI on student academic performance at ABU in order to inform effective educational strategies and guide responsible technology adoption within the university's academic system. Against this background, this study examines the effect of artificial intelligence on student academic performance at Ahmadu Bello University, Zaria.

1.2 Research question

To what extent has artificial intelligence affected students' academic performance in Ahmadu Bello University, Zaria?

1.3 Objective of the Study

To examine the effect of artificial intelligence on students' academic performance in Ahmadu Bello University, Zaria.

1.4 Hypothesis of the Study

The study hypothesizes that there is no significant relationship between artificial intelligence and students' academic performance in Ahmadu Bello University, Zaria.

2.1 Literature Review and Theoretical Framework

2.1.1 Concept of Artificial Intelligence

Artificial Intelligence refers to the branch of computer science focused on creating machines and software that can perform tasks typically requiring human intelligence, such as decision-making, problem-solving, language processing, and learning from experience (Chatterjee, 2020). AI is the simulation of human cognitive functions such as reasoning, learning, perception, and problem-solving by machines, allowing them to "think" and adapt to new situations without direct human intervention (Korteling, Visschedijk, Blankendaal, Boonekamp, & Eikelboom, 2021). Artificial Intelligence involves the development of systems that can analyze data, recognize patterns, and make autonomous decisions to improve efficiency or effectiveness in various applications, ranging from healthcare to transportation (Olugbade, Ojo, Imoize, Isabona, & Alaba, 2022). AI can be defined as the creation of intelligent agents capable of performing tasks that require reasoning, understanding, and, in some cases, self-awareness prompting questions about the nature of consciousness and the relationship between humans and machines (Okoli & Nnajiofor, 2024).

2.1.2 Concept of Student Academic Performance

Academic performance refers to how well a student is accomplishing their educational goals, typically measured through grades, test scores, and overall classroom achievement (Kumar, Agarwal, & Agarwal, 2021). Academic performance is the level of success a student attains in school, determined by grades and test scores. They noted that academic performance is closely tied to students' psychological well-being, teaching methods, and access to learning resources (York, Gibson, & Rankin, 2019). Academic performance is the demonstration of knowledge, skills, and competencies by students, as evaluated through grades, project work, and examinations (Rahman, Watanobe, Kiran, Thang, & Paik, 2021). academic performance as the measure of how well students can meet the academic standards set by their educational institutions. He examined how elements like school infrastructure, teacher-student interaction, and student motivation contribute to performance outcomes in Nigerian secondary schools (Opana, & Guantai, 2025).

2.3 Theoretical Framework of the Study

The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), propounded by Fred Davis in 1989, is a widely recognized theory that explains user acceptance of technology.

2.3.1 Assumptions Of The Theory

The model is grounded in four key assumptions. First, Perceived Usefulness (PU) suggests that users will adopt a technology if they believe it enhances their performance. In the context of this study, students are more likely to use AI tools if they perceive them as beneficial to their academic success. Second, Perceived Ease of Use (PEOU) implies that the easier a technology is to use, the more likely it is to be accepted. If AI applications are user-friendly, students are more inclined to integrate them into their academic routines. Third, Behavioral Intention to Use (BI) indicates that the intention to use technology is shaped by perceptions of usefulness and ease of use, which in turn predicts actual usage behavior. Lastly, Actual System Use refers to the real-world application of the technology, which results from the user's behavioral intention.

2.3.2 Relevance of the Theory

The relevance of TAM to this study, which investigates the effect of Artificial Intelligence on student academic performance at Ahmadu Bello University, Zaria, is substantial. TAM offers a theoretical framework for understanding how students perceive and adopt AI technologies in academic settings. It helps explain why certain students benefit from AI tools, while others may experience drawbacks such as over-reliance or misuse. The model supports the examination of students' attitudes toward AI, specifically their perceptions of its usefulness and ease of use, and how these factors impact their academic outcomes. TAM aligns well with the mixed-methods approach employed in this study, facilitating both quantitative assessment through surveys and qualitative insights through interviews. Furthermore, TAM can inform practical and policy recommendations by emphasizing the importance of proper AI integration, user training, and intuitive interface design in educational environments.

The study finds a strong and significant negative relationship between AI use and student academic performance, a result that appears counter-intuitive but becomes clearer when interpreted through the Technology Acceptance Model (TAM). While students perceive AI as useful and easy to usedriving high adoption TAM does not guarantee effective or appropriate usage. High perceived ease of use may

encourage over-reliance, misuse, and surface-level learning, thereby reducing critical thinking and independent study. Qualitative evidence highlights additional contextual issues, including reduced human interaction, unequal access, ethical concerns, and weak institutional guidance, which further weaken the link between AI acceptance and positive academic outcomes.

3.1 Methodology

This study employed a mixed-methods approach using a concurrent embedded research design, which enabled the simultaneous collection and analysis of both quantitative and qualitative data. Primary data were obtained through questionnaires and interviews, while secondary data were sourced from relevant published literature. The research focused on departments within Ahmadu Bello University, Zaria, including Public Administration, Local Government and Development Studies, Business Administration, Accounting, Computer Science, Law, Geography, Mass Communication, and Economics.

From a total population of 2,318, a sample size of 331 was determined using Krejcie and Morgan's (1970) sample size table. To account for potential non-responses and errors, an additional 10% was added, following Israel's (2013) recommendation, resulting in a final sample size of 364. Stratified, simple random, and purposive sampling techniques were employed to select respondents. Additionally, interviews were conducted with seven (7) management staff and stakeholders, along with one (1) student union representative, totaling eight (8) participants, to enrich the qualitative data. Data analysis was conducted using thematic analysis for qualitative data and Structural Equation Model (SEM) via SMART PLS 4 for hypothesis testing.

4.1 Measurement of Variables

The Artificial intelligence is assessed using five items from the measurement scale adopted from Rai et al. (2019); Mikalef et al. (2021), with each item rated on a five-point Likert scale. Similarly, student academic performance is evaluated using five items, adopted from York et al. (2015); Credé & Kuncel (2008) also rated on a five-point Likert scale.

The structural model assessed individual item reliability, internal consistency reliability, and discriminant validity. Firstly, the individual item reliability was assessed by examining the outer loadings of each construct's measure (Hair et al., 2017). This is depicted in Figure 1 below:

4.1.2 Figure 1: Measurement Model

Figure 1 presents the measurement model used in this study, illustrating the relationships between the latent constructs and their observed indicators.

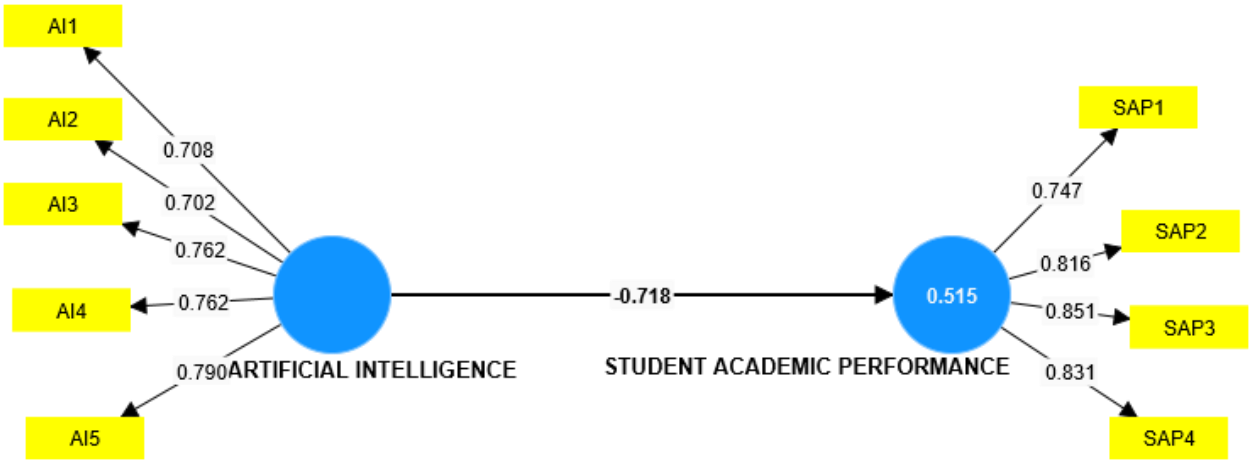


Figure 1: Measurement Model. As shown in Figure 1 above, the loadings of the respective constructs meet the threshold of individual item reliability. Secondly, this study employs composite reliability to assess the internal consistency of the constructs. Hair et al. (2019) recommended that an internal consistency reliability of 0.60 and above is significant. As can be seen in Table 1, the internal consistency reliability is adequate because the CR ranges from 0.862-0.886, which is beyond the threshold. Thirdly, this study employed AVE to measure the convergent validity of the constructs. The recommended value of the AVE should be 0.50 or higher (Hair et al., 2017). As can be seen from Table 1 below, the constructs achieved both convergent validity because the values are above the threshold.

Table 1 Construct reliability and validity.

Construct	Composite reliability	Average variance extracted
AI	0.803	0.556
SAP	0.830	0.660

Table 1 shows that both Artificial Intelligence (AI) and Student Academic Performance (SAP) exhibit strong measurement properties. The composite reliability (CR) values for AI (0.862) and SAP (0.886) exceed the recommended threshold of 0.70, indicating high internal consistency. Similarly, the average variance extracted (AVE) values for AI (0.556) and SAP (0.660) are above the 0.50 threshold, confirming satisfactory convergent validity. Overall, the results indicate that the constructs are both reliable and valid, making them suitable for further structural analysis.

Table 2: Measurement Model: Discriminant Validity (Fornell and Larcker)

Construct	Artificial intelligence	Student Academic performance
Artificial intelligence	0.746	
student academic performance	-0.718	0.812

Table 2: The Fornell–Larcker results confirm adequate discriminant validity between Artificial Intelligence and Student Academic Performance, as the square roots of AVE (0.746 and 0.812) exceed their correlation (–0.718). While the constructs are empirically distinct, the strong negative correlation indicates an inverse relationship, suggesting that increased AI use is associated with lower student academic performance in this study.

Table 3 Heterotrait-Monotrait Ratio (HTMT)

Discriminant Validity (HTMT)

Construct	Artificial intelligence	Student Academic performance
Artificial intelligence		
student academic performance	0.875	

Table 3: The HTMT value of 0.875 between Artificial Intelligence and Student Academic Performance is below the recommended 0.90 threshold, indicating acceptable discriminant validity, though close to the cutoff. This suggests that the constructs are empirically distinct but strongly related, supporting the adequacy of discriminant validity in the measurement model.

R-Squared The coefficient of determination (R2) illustrates the amount of variance in the endogenous constructs. It indicates that the threshold value of 0.25 (as weak), 0.5 (as moderate) and 0.7 (as substantial respectively) (Chin 1998). Thus, below is the R square value for the study.

Table 4: Coefficient of Determination

R Square	R -Square	R-Square Adjusted
Student academic performance	0.515	0.514

Table 4 indicates that the model explains 51.5% of the variance in student academic performance (R^2 = 0.515), demonstrating moderate to substantial explanatory power. The close alignment between R^2 and adjusted R^2 (0.514) suggests model stability, with the remaining variance attributable to other factors not included in the model.

4.1.3 Structural Model

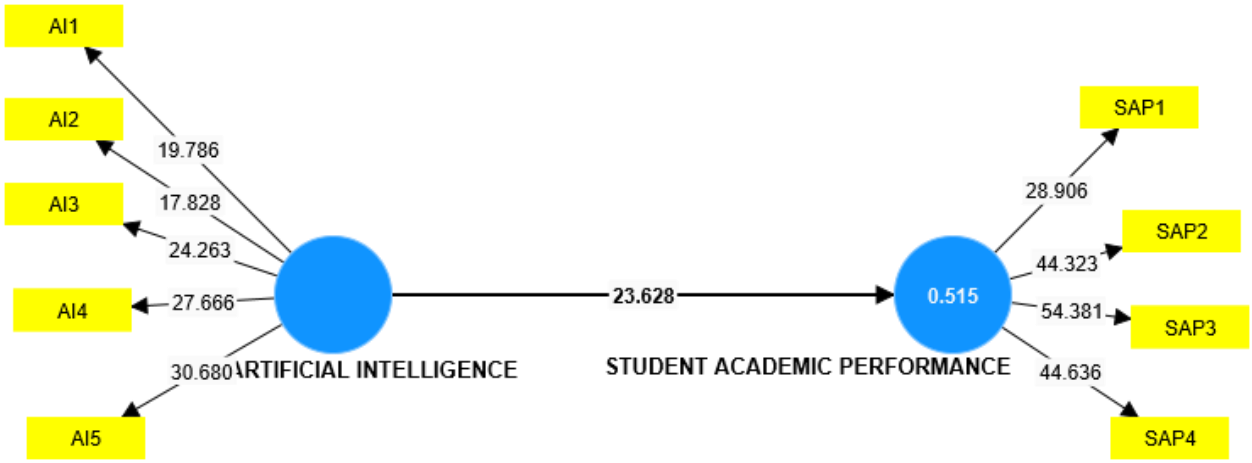


Table 5 **Hypotheses test**

Hyp	Construct	Beta	Standard deviation	T statistics	P values	Decision
HO	AI-> SAP	-0.718	0.030	23.628	0.000	Rejected

The table 5: results show a strong and statistically significant negative effect of Artificial Intelligence on student academic performance ($\beta = -0.718$, $p < 0.001$). The high T-statistic (23.628) leads to rejection of the null hypothesis, indicating that increased AI use is associated with lower academic performance, possibly due to misuse or over-reliance on AI tools.

4.2. Qualitative data analysis

In order to complement the data obtained from the questionnaire, interviews were conducted with eight members of the university management staff. The responses from these interviews were analyzed using a thematic analysis approach, a widely accepted method in qualitative research. This process involved several key steps: familiarizing oneself with the data, systematically coding the responses, identifying initial themes, reviewing and refining these themes, clearly defining and naming them, and finally, compiling the findings into a coherent report. This method provided deeper insights into the perspectives of university management regarding the effect of Artificial Intelligence on student academic performance.

Table 5.6 Analysis of Interview Responses Using Thematic Analysis

Respondents	**Position**	**Code**	**Date**
$Respondent_1$	Registrar Office	(R_1)	
$Respondent_2$	Librarians	(R_2)	
$Respondent_3$	Academic staff	(R_3)	
$Respondent_4$	Union of Student	(R_4)	
$Respondent_5$	Deans	(R_5)	
$Respondent_6$	Member of a civil society	(R_6)	
$Respondent_7$	H.O. Ds	(R_7)	
$Respondent_8$	IT Staff	(R_8)	

***Source*: Researcher's survey 2025.**

Theme I: Artificial Intelligence and Student Academic Performance in ABU Zaria.

Sub-theme 1a: artificial intelligence and student academic performance in Ahmadu Bello University, Zaria

There is unanimous agreement among the respondents by stating that:

AI positively impacts student academic performance by offering personalized learning, improving efficiency and time management, and providing access to diverse educational resources. It helps students identify and address their academic weaknesses, supports independent learning through tools like virtual assistants and online tutorials, enhances research capabilities, and assists students with disabilities through technologies like speech-to-text and language translation. (R_4, R_6, and R_8)

On the contrary, some respondents are concerned about the negative effects of AI on academic performance. Key issues include over-reliance on technology, which may hinder critical thinking and traditional learning, and the lack of human interaction, which is vital for academic and social development. Misuse of AI tools can lead to superficial learning focused only on passing exams. Additionally, unequal access to AI due to financial or technological barriers may widen performance gaps among students. Ethical and privacy concerns also arise, especially regarding the use and security of students' personal data (R_1, R_2, R3, R_5, and R_7).

4.3 Discussion of Major Findings

The questionnaire analysis on assessing the relationship between Artificial Intelligence (AI) and student academic performance. The results indicate a strong negative relationship, leading to the rejection of the initial assumption that there is no significant connection. This suggests that increased use of AI is associated with a decline in academic performance. The finding is unexpected, as AI is generally thought to improve learning. It highlights the need to consider how AI is integrated into education, as it may be displacing effective traditional methods, causing distractions, or fostering dependency rather than promoting critical thinking and independent learning.

Interview analysis reveals that the majority of respondents view AI as having a negative impact on academic performance. Key concerns include over-reliance on technology, which may limit critical thinking and traditional learning methods, and reduced human interaction, essential for academic and social growth. Misuse of AI tools may result in surface-level learning aimed solely at passing exams.

Furthermore, unequal access due to financial or technological limitations could deepen academic disparities, alongside rising ethical and privacy concerns over the handling of student data.

In contrast, only a few respondents believe AI positively influences academic performance. They highlight benefits such as personalized learning, improved efficiency, better time management, access to a wide range of resources, support for independent study, enhanced research capabilities, and assistance for students with disabilities through tools like speech-to-text and translation technologies.

4.4 Summary of Major Findings

Analysis of both questionnaire and interview data reveals a predominantly negative perception of AI's impact on student academic performance. The questionnaire results show a strong negative relationship, suggesting that increased AI use may lead to academic decline contrary to common expectations. Interviews support this, with most respondents expressing concerns about over-reliance on technology, reduced critical thinking, limited human interaction, and unequal access. Ethical and privacy issues were also noted. Only a small number of participants viewed AI positively, citing benefits like personalized learning, efficiency, and support for independent study and students with disabilities. The findings emphasize the need for careful integration of AI into education.

5.1 Conclusion

The overall findings indicate that while AI has potential benefits in education, its current use is more often associated with negative impacts on student academic performance. Both quantitative and qualitative data point to concerns such as over-reliance on technology, diminished critical thinking, reduced interpersonal interaction, and unequal access, which may outweigh the perceived advantages. This suggests that simply introducing AI into learning environments is not inherently beneficial. To harness its potential effectively, AI must be thoughtfully and strategically integrated into educational systems in a way that supports—not replaces—traditional teaching methods and promotes meaningful, equitable learning experiences.

5.2 Recommendation

The study recommended that educational institutions should adopt a strategic, blended approach to AI integration. This involves using AI tools to support and enhance traditional teaching methods, rather than replace them. By thoughtfully incorporating AI into lesson plans, educators can maintain critical

elements of learning such as human interaction, critical thinking, and personalized mentorship while leveraging AI to improve efficiency, provide tailored resources, and support diverse learning needs.

Reference

Alotaibi, N. S. (2024). The impact of AI and LMS integration on the future of higher education: Opportunities, challenges, and strategies for transformation. *Sustainability, 16*(23), 10357. https://doi.org/10.3390/su162310357

Alrakhawi, H. A., Jamiat, N., & Abu-Naser, S. S. (2023). Intelligent tutoring systems in education: A systematic review of usage, tools, effects, and evaluation. *Journal of Theoretical and Applied Information Technology, 101*(4), 1205–1226.

Alsbou, M. K. K., & Alsaraireh, R. E. A. I. (2024). Data-driven decision-making in education: Leveraging AI for school improvement. In *Proceedings of the 2024 International Conference on Knowledge Engineering and Communication Systems (ICKECS)* (Vol. 1, pp. 1–6). IEEE. https://doi.org/10.1109/ICKECS58772.2024.1234567

Butcher, N., Wilson-Strydom, M., & Baijnath, M. (2021). *Artificial intelligence capacity in sub-Saharan Africa: Compendium report*. Zenodo. https://doi.org/10.5281/zenodo.5091802

Chatterjee, R. (2020). Fundamental concepts of artificial intelligence and its applications. *Journal of Mathematical Problems, Equations and Statistics, 1*(2), 13–24.

Credé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science, 3*(6), 425–453. https://doi.org/10.1111/j.1745-6924.2008.00089.x

Korteling, J. H., van de Boer-Visschedijk, G. C., Blankendaal, R. A., Boonekamp, R. C., & Eikelboom, A. R. (2021). Human-versus artificial intelligence. *Frontiers in Artificial Intelligence, 4*, Article 622364. https://doi.org/10.3389/frai.2021.622364

Kumar, S., Agarwal, M., & Agarwal, N. (2021). Defining and measuring academic performance of HEI students: A critical review. *Turkish Journal of Computer and Mathematics Education, 12*(6), 3091–3105.

Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. (2021). Investigating the effects of big data analytics capabilities on firm performance: The mediating role of dynamic capabilities. *Information & Management, 58*(2), 103346. https://doi.org/10.1016/j.im.2020.103346

Mohamed Hashim, M. A., Tlemsani, I., & Matthews, R. (2022). Higher education strategy in digital transformation. *Education and Information Technologies, 27*(3), 3171–3195. https://doi.org/10.1007/s10639-021-10625-5

Ntakirutimana, E. (2022). Challenges and ethical aspects of technological use in Rwanda basic education. *Journal of Education, 5*(5), 93–102.

Okoli, I. K., & Nnajiofor, O. G. (2024). The nature of consciousness in the context of artificial intelligence: Redefining human–technology relationships. *UJAH: Unizik Journal of Arts and Humanities, 25*(1), 1–30.

Olugbade, S., Ojo, S., Imoize, A. L., Isabona, J., & Alaba, M. O. (2022). A review of artificial intelligence and machine learning for incident detectors in road transport systems. *Mathematical and Computational Applications, 27*(5), 77. https://doi.org/10.3390/mca27050077

Opana, O. J., & Guantai, K. H. (2025). Relationship between clear performance standards and students' academic performance in Homa Bay County. *Journal of Education, 5*(2), 15–26.

Rai, A., Constantinides, P., Sarker, S., & Sarker, S. (2019). How does artificial intelligence influence firm performance? A research agenda. *Journal of the Association for Information Systems, 20*(1), 1–25.

Rega, A., Di Fuccio, R., & Inderst, E. (2024). Learning enhancer tools: A theoretical framework to use AI chatbots in education and learning applications. In *Proceedings of the International Conference on Human–Computer Interaction* (pp. 409–419). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-42367-6_30

Rehan, H. (2023). Shaping the future of education with cloud and AI technologies: Enhancing personalized learning and securing data integrity in the evolving EdTech landscape. *Australian Journal of Machine Learning Research & Applications, 3*(1), 359–395.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success. *Practical Assessment, Research & Evaluation, 20*(5), 1–20.

Zakariya, Y. F. (2025). Artificial intelligence in education: A phenomenological approach to exploring pre-service teachers' experience. In *Proceedings of the 9th International Conference on Global Practice of Multidisciplinary Scientific Studies* (p. 944). Havana, Cuba.