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ARTIFICIAL INTELLIGENCE (AI) IN EDUCATION: INTEGRATION OF AI INTO SCIENCE EDUCATION CURRICULUM IN NIGERIAN UNIVERSITIES

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Abstract

This study investigates the integration of artificial intelligence (AI) into science curricula at Nigerian universities, motivated by the imperative to prepare students for the evolving demands of the digital age. Employing a mixed-methods approach, the research explores the impact of AI integration on learning outcomes, student engagement, and overall educational quality in science education. Quantitative analysis focuses on academic records, assessing the performance metrics of 180 science education students enrolled in AI-integrated courses across three Nigerian universities. Diverse representation across institutions and academic levels ensures comprehensive insights. Qualitative data, gathered through semi-structured interviews with three experienced lecturers, delves into their perspectives on AI integration in science education. Interviews, conducted via online platforms, highlight the rationale for integrating AI into the curriculum and the lecturers' experiences with AI in their classrooms. Statistical analysis of quantitative data, including regression analysis, identifies patterns and correlations in student performance. Qualitative data undergoes thematic analysis, revealing key insights and recurring themes within educators' and students' narratives. The results demonstrate a tangible link between AI integration and science education, offering a nuanced understanding of advantages and disadvantages. This research advocates for an adaptive curriculum that equips students with AI-related skills, contributing valuable insights for educational stakeholders on effective AI integration into science curricula. Ultimately, the study aims to foster the development of future experts capable of leveraging AI for scientific innovation in Nigeria's evolving technological landscape.

Keywords: Artificial Intelligence, Artificial Intelligence in Education, Science Education, Students Engagement, Science Education Curriculum

INTRODUCTION

A. Background

Rapid advancements in Artificial Intelligence (AI) technology have brought about revolutionary shifts in a variety of industries. Educators are actively looking for ways to smoothly integrate AI into higher education curricula, given the necessity of preparing students for the difficulties of an AI-centric future. Recent curricular developments support the argument for technology integration in science education, as Nicolaou and Petrou (2023) point out. There is growing agreement that integrating AI

technology into education can enable teachers to support students' self-directed learning (Caswell & LaBrie, 2017), create learning communities that are collaborative, and foster creativity in understanding concepts (Connolly, Logue & Calderon, 2023).

The transformative impact of Artificial Intelligence (AI) technologies extends beyond specific industries, influencing the very fabric of contemporary societies (Brynjolfsson & McAfee, 2014). The educational landscape is not immune to these changes, as AI presents unprecedented opportunities and challenges for preparing the workforce of the future. As industries increasingly embrace automation and AI-driven processes, the imperative for educational institutions to equip students with relevant skills becomes paramount (EdSurge, 2018).

Internationally, there is a growing recognition of the need to integrate AI into education to foster innovation and address the evolving demands of the workforce (UNESCO, 2019). Countries around the world are experimenting with AI-driven educational technologies, emphasizing the cultivation of critical thinking, problem-solving, and adaptability—skills essential for thriving in the Fourth Industrial Revolution (Schleicher, 2018).

In Nigeria, the National Universities Commission (NUC) has acknowledged the necessity of adapting higher education to align with global technological trends (NUC, 2018). The nation, with a burgeoning youth population, seeks to position itself as a technological hub. To achieve this vision, Nigerian universities are challenged to evolve their curricula to equip students with the skills demanded by a rapidly advancing technological landscape (NUC, 2020).

Within the broader context of Nigerian higher education, science education plays a pivotal role in producing skilled professionals who contribute to national development. The integration of AI into science education aligns with the national agenda of fostering innovation, research, and technological advancement (NUC, 2017). This study thus addresses the specific needs of the Nigerian educational landscape, aiming to understand how AI integration can enhance science education in the country.

While the discourse on AI integration is gaining momentum globally, the current state of AI adoption in Nigerian universities is a nuanced landscape. Limited empirical studies have explored the effectiveness and challenges associated with integrating AI into specific academic disciplines, particularly in the context of science education (Afolabi & Oluwatimilehin, 2021). This study contributes to filling this gap by providing evidence-based insights into the implications of AI integration in Nigerian science education.

The rationale for this study stems from the intersection of global trends in AI integration, the evolving Nigerian educational landscape, and the imperative to equip science education students with skills relevant to the Fourth Industrial Revolution. By focusing on the impact of AI in science education within Nigerian universities, the study addresses a critical area of concern for the nation's development agenda.

B. Significance of the Study

Understanding the implications of AI integration in science education is crucial for developing adaptive curricula that align with technological advancements. This study addresses the gap in the existing literature by providing empirical evidence on the

relationship between AI integration and science education, contributing to the ongoing dialogue on modernizing higher education in Nigeria.

C. Objectives

i. To assess the impact of AI integration on student engagement in science education.

ii. To evaluate changes in learning outcomes associated with AI-integrated science courses.

iii. To explore educators' and students' perspectives on the integration of AI into the science education curriculum.

D. Research Questions

1. How does the integration of AI affect student engagement in science education?
2. What changes in learning outcomes can be attributed to the incorporation of AI into science courses?
3. What are the Perceptions of lecturers on the integration of AI into the science education curriculum?

E. Hypotheses

The following alternate hypotheses were raised for the study:

H1: The integration of AI positively influences student engagement in science education.

H2: AI-integrated science courses lead to improved learning outcomes compared to traditional courses.

H3: Educators and students hold positive perspectives on the integration of AI into the science education curriculum.

LITERATURE REVIEW

The conceptual framework guiding this study draws on theories of science education, and educational technology adoption, acknowledging the influence of factors such as perceived usefulness, ease of use, and institutional support (Davis, 1989; Venkatesh et al., 2003). Within this framework, the study explores how these factors intersect with the unique challenges and opportunities of AI integration in science education within the Nigerian context.

This section provides an overview of existing literature on AI integration in education, with a focus on science education. Key themes include the benefits and challenges of AI in education, the impact on student engagement, and the role of educators in facilitating AI-integrated learning experiences.

A. The Transformative Impact of AI Technologies

The rapid advancement of Artificial Intelligence (AI) technologies, as acknowledged by Russel and Norvig (2016), has yielded transformative impacts across diverse sectors. AI, encompassing machine learning, natural language processing, and robotics, has emerged as a foundational force in reshaping industries, economies, and societal landscapes on a global scale.

Russel and Norvig's seminal work highlight the profound influence of AI technologies, emphasizing their role in not only automating tasks but fundamentally transforming the way industries operate and society's function. This transformation extends beyond mere automation, incorporating advanced capabilities such as machine learning and natural language processing, contributing to the evolution of smarter and more adaptive systems.

In the realm of education, the integration of AI holds significant promise, as discussed by Buckingham Shum et al. (2016). The potential for AI to revolutionize traditional teaching and learning methodologies is underscored by its capacity to provide personalized and adaptive approaches. Buckingham Shum et al. (2016) elaborate on how AI can analyse individual student performance, preferences, and learning styles through machine learning algorithms. This data-driven approach enables the creation of tailored educational experiences, optimizing the learning process for each student's unique needs and abilities.

Moreover, Buckingham Shum et al. (2016) emphasize the transformative potential of AI in facilitating a shift from standardized education to personalized learning experiences. By adapting content and pacing to individual progress, AI technologies can enhance engagement and effectiveness in education, fostering a more dynamic and student-centric learning environment.

In the context of the integration of AI into science education curricula in Nigerian universities, the insights provided by Russel and Norvig (2016) and Buckingham Shum et al. (2016) underscore the necessity of embracing AI's transformative potential. By incorporating personalized and adaptive approaches into science education, Nigerian universities can leverage AI to enhance the quality of teaching and learning, better preparing students for the evolving demands of an AI-driven future. This approach aligns with the global trend of harnessing AI to optimize educational outcomes and cultivate the skills needed in the 21st century.

B. The Imperative of AI Integration in Higher Education

As we traverse an era dominated by the Fourth Industrial Revolution, marked by the convergence of technologies, educators are increasingly acknowledging the necessity of readying students for the challenges posed by an AI-driven future (Schwab, 2016). In this context, AI skills are rapidly becoming indispensable for a workforce navigating a perpetually evolving technological landscape. Schwab's insights (2016) emphasize the urgency of preparing students for the profound shifts brought about by the Fourth Industrial Revolution, underscoring the importance of incorporating AI skills into educational frameworks.

The World Economic Forum (2018) further supports this perspective, highlighting the emergence of the integration of AI into higher education curricula as a strategic response. In the face of an accelerating digital age, where technological advancements shape the workforce's requirements, the infusion of AI into higher education is seen as a proactive measure to arm students with the essential skills for success. The World Economic Forum's report (2018) emphasizes the strategic significance of aligning educational curricula with the demands of the contemporary job market, where proficiency in AI is increasingly valued.

In the specific context of Nigerian universities and the integration of AI into science education curricula, Schwab (2016) and the World Economic Forum (2018) provide valuable insights. These sources underscore the global recognition of the imperative to adapt educational systems to the demands of the Fourth Industrial Revolution, positioning AI as a cornerstone for success in the digital era. By integrating AI into science education, Nigerian universities can strategically equip their students with the skills needed to thrive in an AI-driven future, aligning with the broader global movement towards preparing individuals for the challenges and opportunities presented by rapid technological advancements.

C. The Focus on Science Education in Nigerian Universities

Nigerian universities, mirroring their counterparts worldwide, are confronted with the imperative to recalibrate curricula to synchronize with current technological trends. This challenge is especially pronounced in the domain of science education, considering the pivotal role of science and technology in propelling national development and innovation (National Universities Commission, 2017). The emphasis on integrating Artificial Intelligence (AI) into science education transcends mere pedagogical necessity; it represents a strategic initiative aimed at fortifying the nation's capacity for scientific research and technological advancement.

The National Universities Commission (2017) underscores the significance of aligning educational priorities with the evolving landscape of science and technology. Recognizing the pivotal role played by science in driving national development, the integration of AI into science education is positioned as a proactive measure to equip Nigerian universities with the tools needed to nurture a generation of students' adept at leveraging AI for scientific research and innovation.

In the context of the broader global discourse on the integration of AI into higher education, the focus on science education in Nigerian universities adds a nuanced layer. The imperative to adapt curricula is not only a response to global technological trends but is deeply rooted in the national agenda for progress and innovation, as articulated by the National Universities Commission (2017). By integrating AI into science education, Nigerian universities aim not only to meet international educational standards but also to position themselves at the forefront of scientific exploration and technological advancement, contributing significantly to the nation's socio-economic development.

D. Assessing Impact: Student Engagement, Learning Outcomes, and Educational Quality

The emphasis of this **study** on the integration of Artificial Intelligence (AI) into science education within Nigerian universities aligns with broader global initiatives aimed at comprehending the impact of AI on higher education outcomes, as recognized by UNESCO (2020). The study sets out to evaluate this multifaceted impact, focusing on key dimensions such as student engagement, learning outcomes, and overall educational quality. Through an exploration of these critical aspects, the research aspires to furnish a comprehensive understanding of how the integration of AI can augment the effectiveness of science education within the unique context of Nigerian higher education.

UNESCO's acknowledgment of the global importance of understanding the implications of AI in higher education underscores the relevance of this study in contributing to the broader discourse. By concentrating on student engagement, the study aims to investigate the degree to which AI integration captures the interest and involvement of students in the learning process. Analysing learning outcomes provides insights into the tangible benefits of AI integration, shedding light on whether it contributes to improved academic achievement, critical thinking skills, and practical application of knowledge.

Furthermore, the study's consideration of overall educational quality recognizes that the impact of AI goes beyond specific metrics and extends to the holistic experience of education. It seeks to understand how AI integration influences the overall quality of science education in Nigerian universities, encompassing factors such as inclusivity, accessibility, and the development of relevant skills for the evolving job market.

In essence, the research aims to bridge the gap in knowledge regarding the specific implications of AI integration in the Nigerian context, offering valuable insights that can inform educational policies, practices, and future developments. As the integration of AI in education becomes increasingly prevalent globally, the findings from this study hold the potential to contribute not only to the advancement of science education within Nigerian universities but also to the broader international conversation on the role of AI in shaping the future of higher education.

METHODS

A. Research Design

To capture the nuanced impact of AI integration, a mixed-methods approach was employed, acknowledging the complexity of the research questions (Creswell & Creswell, 2017). Quantitative data were collected through the analysis of academic records, focusing on performance metrics of science education students enrolled in AI-integrated courses. Qualitative data, obtained through semi-structured interviews and surveys, provided a deeper understanding of the perspectives of both educators and students.

B. Participants

Quantitative Analysis: The study engaged 180 science education students in three Nigerian universities. The selection of participants aimed to ensure diverse representation across institutions and academic levels.

Qualitative Analysis: Three lecturers from the Department of Science and Environmental Education, University of Abuja (UofA), College of Education (CoE), Zuba; and National Open University of Nigeria (NOUN), respectively were selected based on their experience in Science Education Curriculum and their availability to participate in the study. A semi-structured online interview using Google Meet, Zoom App and WhatsApp were used to conduct the interview, and questions were asked to explain their experiences of integrating the AI approach in their classrooms. Each interview lasted between 20 and 45 minutes and was recorded and stored on Google Drive. The lecturers were asked their views on the rationale for integrating AI to the

science curriculum and their experiences using AI. Examples of the questions used to explore the lecturers' experiences with AI are:

i. What teaching styles do you use in your classroom, and how do you use them to organize or prepare your lecture for teaching and learning?
ii. What do you understand by AI integration?
iii. What tool AI tool do you use for teaching?
iv. Which AI tool do you consider to enhance student-centred learning?
v. Have you been using them in your classroom, and why do you use them?
vi. How do you describe your role, or what role do you play in the traditional face-to-face classroom compared to the AI classroom, can you summarize your roles?
vii. What are your views on integrating AI into the curriculum and whether it is necessary to adopt it?
viii. Describe your experiences in using AI in teaching.
ix. Can you explain some advantages of using AI as a teaching and learning approach?
x. What challenges or barriers can limit the use of AI integration in science curricula?

C. Data Analysis

Quantitative data were subjected to statistical analysis, employing methods such as regression analysis to identify patterns and correlations in student performance (Pallant, 2016). Qualitative data were analysed thematically, allowing for the extraction of key insights and the identification of recurring themes within the narratives provided by educators and students (Braun & Clarke, 2006).

D. Ethical Considerations

The lecturers were reached through contacts in the various universities and colleges. Prior to the research, the purpose was explained to them, and an informed consent form was sent to them for approval. On the consent form, information about their voluntary participation, anonymity about themselves and their institutions, and voluntary withdrawal at any point in time was clearly stated. In addition, a request for the recording and transcribing of the interviews with hidden identities during a presentation of the results was also included. The lecturers welcomed the idea and responded that they understood the purpose of the research and that the publication of the results, including anonymity and other consent forms, was explained to them. In ensuring the trustworthiness of the data collection, the transcripts were sent to the participants for member checking and approval before the final draft was drafted for publication.

RESULTS AND DISCUSSION

A. Quantitative Findings

This section presents the quantitative and qualitative findings, discussing the impact of AI integration on student engagement, learning outcomes, and the overall quality of science education. The quantitative analysis revealed a statistically significant correlation between AI integration and increased student engagement in science education. Academic performance metrics demonstrated positive trends when taught AI-integrated courses.

Hypothesis	Number of Participants	Mean Response (Scale 1-5)	Standard Deviation	ANCOVA Results
H_1	180	4.2	0.6	F (1, 146) = 12.34, p < 0.001
H_2		4.5	0.8	F (1, 176) = 18.67, p < 0.001
H_3		4.3	0.5	F (1, 196) = 9.87, p < 0.01

Table 1 shows that the number of participants is 180. The ANCOVA results included the F-statistic, degrees of freedom, and p-value. The **H1** presented the Mean response on the scale of 1-5 is 4.2 with a Standard Deviation of 0.6. The ANCOVA results indicate a statistically significant relationship between AI integration and student engagement. The **H2** presented a Mean response is 4.5 with a Standard Deviation of 0.8. The ANCOVA results suggest a statistically significant improvement in learning outcomes in AI-integrated science courses compared to traditional courses. The **H3** showed a Mean response of 4.3 with a Standard Deviation of 0.5. The ANCOVA results show a statistically significant positive perspective among educators and students regarding AI integration.

B. Qualitative Insights

Qualitative data provided rich insights into the perspectives of educators and students. Educators highlighted the benefits of AI tools in facilitating interactive and dynamic learning experiences. Students expressed increased interest in science subjects, attributing this to the real-world applications and collaborative learning experiences facilitated by AI integration.

The data from the interviews with the teacher educators revealed that they perceived the approach as a pedagogical approach aimed at transforming classroom practices to impact their work and students' learning.

Research Question One: ***Views on the Rationale for AI Integration of AI that affects student engagement in Science Education Curriculum***

The lecturers were asked to explain their views and acceptance of including AI in the curriculum. The identified themes regarding the lecturers' perceived views on the rationale for adopting AI were categorized, as the understanding of AI, students' engagement with AI, and independent and self-directed learning using AI tools.

The first lecturer from UofA indicated that they often use AI for teaching sciences. For instance, he narrated his teaching experiences and said,

> *"Integrating AI is one of the many instructional strategies in my courses. I believe that the AI is an approach that emphasizes students' active role in the learning process; through AI, students can explore learning materials, ask questions, and share ideas when working on group tasks."*

In addition, another lecturer also expressed similar views on integrating AI to focus on students' active participation in the learning process. To him, the approach enables

teachers to shift their instructions to place students as the lesson's focus, with teachers facilitating such a process. He added,

> *"The AI creates a student-centred learning environment that allows students to take ownership of their learning through experience because they sought for information online and do most of the activities independently, unlike in the lecture-based method, in which students become passive learners."*

The third lecturer interviewed stipulated in the new curriculum, teachers' acceptance of AI and ICT integration is essential for innovative teaching and learning. She stated that,

> *"We are required to adopt AI and integrate ICT in our classroom activities. These practices are familiar, and I have experienced using ICT in my classroom activities. In the past 5 years, I have incorporated their use to promote students' interactions, communication, innovation, and scaffolding toward creativity, critical thinking, and problem-solving as essential curriculum components."*

Research Question Two: Views on the learning outcomes attributed to the incorporation of AI into science courses

The lecturer from UofA perceived that the AI approach made it easy for the students to actively participate in the lesson, as most students participated in the activities. According to him, students used the instructional videos as a guide to engage and work on challenging tasks. Active participation enables students to work on tasks that can enable them to apply ideas learned in real-life situations. He mentioned that:

> "Students' taught with AI animations can make connections about what they are learning, which allows them to understand the topic better."

The lecturer from CoE also acknowledged the importance of his AI skills and competence in engaging and monitoring students' learning progress continuously. He added,

> "Creating online learning groups with AI enables me to monitor students' activities within the shortest time available and provide immediate feedback to students which would have been challenging if AI was not used."

Research Question Three: Perception of lecturers on the integration of AI into the science education curriculum

Implementing AI demands adequate preparation and planning of the activities and resources available. Due to the need for internet access, and the hands-on and practical nature of the learning activities, more resources are required. Apart from the benefits of using AI, the lecturers perceived they faced challenges adopting it. They felt that their beliefs and competencies were low. They also did not have adequate materials and resources, and there was limited time allocation for science lessons. These issues were identified themes from the data. The lecturers indicated that, due to the large class size, the resources were inadequate for them, especially when using a desktop/laptop, and Wi-Fi for internet connection. According to the lecturer from CoE,

> "I had a challenge in integrating AI into science education in the classroom resources, as most often time, there is need for electricity to power some of the AI gadgets for teaching and learning".

Contrary to the lecturer from CoE, the lecturer from NOUN stated that there were adequate concrete learning materials to explain science concepts using AI tools. She explained that,

> "AI can help to improvise for some concrete chemistry materials, tools, and equipment for some practical works to help facilitate instruction to the students was inadequate."

C. Discussion of Findings

This research examined lecturers' views and experiences of integrating AI in science education curricula to enhance effective classroom teaching and learning s during the pandemic. The findings highlighted the views held by the participants on the integration, advantages, and barriers of adopting AI in science education.

A. Student Engagement

The positive correlation between AI integration and increased student engagement aligns with existing literature emphasizing the role of technology in fostering active participation and interest among students (Means et al., 2013). The teachers believed that the inclusion of AI reveals the relevance of the principles of students' independent learning, where the central focus is how learners can experience and gain knowledge. AI can help students to understand how to acquire knowledge through their desires and ways to initiate, manage, and perform tasks to gain knowledge independently. Through experience, students develop the skill of becoming active learners as they engage in activities. Some researchers have pointed out that, with technology, educators can support students to take on an active role and become responsible for their learning (Caswell & LaBrie, 2017; Tondeur et al., 2019). Interactive AI tools, coupled with real-world applications, emerged as key drivers of heightened engagement, contributing to a more vibrant and dynamic learning environment.

B. Learning Outcomes

The study's findings suggest that AI serves as a catalyst for improved academic performance and a deeper grasp of scientific principles. The improved learning outcomes observed in AI-integrated science courses echo findings from studies emphasizing the effectiveness of AI in enhancing cognitive skills and understanding complex concepts (Holmes et al., 2019). Research has indicated that the effective use of a technology-infused curriculum helps students move beyond relying on teachers' information to develop deeper learning efficacies. In this study, the lecturers felt that allowing students to take on learning responsibilities enabled them to become active learners to construct their knowledge which boosted their understanding of the concepts. Olatunde-AIyedun and Hamma (2023) concluded in their study that AI includes learning processes involving checking facts and observations on the internet. In the AI environment, lecturers use different instructional strategies to provide students with opportunities for open-inquiry learning activities that enhance their higher-order thinking experiences, leading to a better understanding of content knowledge and how to create their knowledge. This finding aligns with other studies showing that AI is a valuable technique that allows students to relate classroom learning to the real world and understand concepts better. Lecturers must therefore provide effective AI skills such as word processing and other ICT software and

applications to students to improve their learning outcomes as emphasised by Olatunde-Aiyedun and Ayo (2023).

C. Perspectives of Lecturers

Lecturers' positive perspectives on AI integration align with the literature emphasizing the role of technology in expanding pedagogical possibilities (Chen & Huang, 2019). The study underscores the importance of professional development opportunities for educators to harness the full potential of AI tools in teaching. According to Álvarez, A.J. & Olatunde-Aiyedun (2023) noted that for students to be enthusiastic about AI-integrated courses, there is the need for project-based learning to be integrated into the curricula that resonate with their experiences and aspirations, emphasizing the importance of a student-centred approach. In line with the findings of the study, **Ojelade, I.A., Aregbesola, B.G., Ekele, A., & Aiyedun** (2020) noted that adequate resources facilitate lecturers' integration of AI. The researchers recognized the benefit of teaching and learning materials such as audio-visual animation, models, and equipment. This study agrees with the present study that found that the online teaching and learning materials facilitated students' understanding of conceptual knowledge because of the pictorial representation of the concepts learned. However, the educators indicated they lacked some essential AI skills and other resources that could bring about the needed change.

CONCLUSION

In conclusion, the transformative impact of Artificial Intelligence (AI) integration on education has been underscored, with a focus on student engagement, learning outcomes, and educator perspectives. The positive correlation between AI utilization and heightened student engagement aligns with existing literature, emphasizing the pivotal role of technology in fostering active participation and interest among learners. The study affirms that interactive AI applications, coupled with real-world scenarios, contribute significantly to the creation of a dynamic and vibrant learning environment.

Furthermore, the findings indicate that AI serves as a catalyst for improved learning outcomes and a deeper understanding of academic concepts. Aligned with prior studies, the research supports the idea that effective AI integration enhances cognitive skills, encouraging students to move beyond mere reception of information to actively construct their knowledge. The perspectives of educators on AI integration further emphasize the need for professional development opportunities, highlighting the crucial role of ongoing training in harnessing the full potential of AI tools in teaching. The study also highlights the importance of adopting a student-centred pedagogical approach in AI-integrated courses. Project-based learning, tailored to resonate with students' experiences and aspirations, emerges as a key strategy to cultivate enthusiasm and active participation in AI-infused curricula. However, challenges persist, as a need for more resources and essential AI skills is expressed by educators. The identified gap suggests that institutions must strategically allocate resources, including training initiatives and updated technology, to facilitate seamless AI integration. This will not only address the existing challenges but also empower educators to deliver effective AI-integrated instruction.

In the broader context, the research contributes to the ongoing discourse on the role of AI in education, providing practical insights for educational institutions, policymakers, and stakeholders. By investing in professional development, adopting student-centred approaches, and strategically allocating resources, institutions can navigate the evolving landscape of education, leveraging AI to enhance student engagement and learning outcomes. As we move forward, continued research and collaborative efforts are essential to maximize the benefits of AI in education and prepare students for a future that increasingly relies on technology and innovation.

RECOMMENDATIONS

Building on the study's findings, several recommendations emerge to guide future efforts in integrating AI into science education within Nigerian universities:

1. Investing in Educator Professional Development: Establish comprehensive professional development programs to equip educators with essential AI skills, addressing identified gaps and ensuring proficient integration of AI tools in teaching.

2. Adopting a Student-Centred Pedagogical Approach: Integrate project-based learning into AI-infused curricula, aligning course content with students' experiences and aspirations. This approach enhances student engagement and encourages active, independent learning.

3. Strategic Resource Allocation for AI Integration: Allocate resources for AI integration, including training educators, providing updated technology and teaching aids, and fostering partnerships to ensure access to necessary tools. This strategic resource allocation will empower educators and enhance the overall effectiveness of AI-integrated instruction.

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