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INTERNATIONAL JOURNAL OF CONTEMPORARY ISSUES IN INTEGRATED SCIENCE EDUCATION (IJCIISE)

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EDITORIAL

Dear Readers,

We are excited to announce the launch of International Journal of Contemporary Issues in Integrated Science Education (IJCIISE). This Association Integrated Science Educators' Association of Nigeria (ISEAN) play a vital role in promoting scientific advancement, supporting science education, informing science policy, recognizing science excellence and fostering community engagement. The desire to float this journal was borne out of the passion to organize a yearly conference of Integrated Science by the Integrated Science Educators' Association of Nigeria, of which selected scholarly articles will be published after a thorough review. The journal dedicated to advancing knowledge and fostering dialogue within. Our mission is to publish high-quality research, innovative ideas, and critical analyses that contribute to the understanding and development of Integrated Science. At IJCIISE, we believe in the power of interdisciplinary collaboration and inclusivity. We welcome contributions from scholars, practitioners, and thought leaders worldwide, providing a space for diverse perspectives and groundbreaking work. As we embark on this journey, we invite you to submit your research, engage with our content, and join us in creating a vibrant academic community. Together, we can push the boundaries of knowledge and inspire future generations. Thank you for your support as we launch this exciting new endeavour.

This edition moves around issues that border on **"Enhancing Quality Assurance in Integrated Science in Nigeria."** It is believed that diverse contributions from scholars and researchers expressed in this edition will provoke the understanding of issues that could foster education for societal transformations on a global scale
We look forward to your contributions!

For further information on future conference activities, visit **http://ijciise.org/index.php/ijciise**

Warm regards,
Professor O. S. Agboola
President, Integrated Science Educators' Association of Nigeria (ISEAN)

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ASSESSMENT OF AWARENESS OF ARTIFICIAL INTELLIGENCE IN COLLEGES OF EDUCATION AND ITS EFFECT ON ACADEMIC ACHIEVEMENT OF BIOLOGY STUDENTS

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Abstract
This study examines the awareness of artificial intelligence (AI) in colleges of education and its impact on biology students' academic achievement. As educational institutions continually seek to leverage technology for enhanced learning outcomes, understanding the practical implications and benefits of AI is critical. The study employed a type pretest, posttest and control group quasi experimental research design. Surveys are conducted with educators and students to gather insights on the integration and awareness of AI tools in the educational process. This study tested three hypotheses. The study's population consisted of all college of education biology students in Ogun State, Nigeria. Stratified random sampling was used to select 311 students from two colleges of education in Ogun State, Nigeria who participated in the study. A Biology Achievement Test (BAT) containing 20 items was used to collect data for both pre-tests and post-tests, while a Questionnaire on the Awareness and Integration of AI Tools in Teaching Biology in Colleges of Education (QAIAITBCOE) was used for collecting data on students' awareness of AI tools. Experts validated the instruments. A Pearson product-moment correlation and Cronbach's alpha formula were used to determine the reliability coefficients of BAT and QAIAITBCOE, which yielded 0.88 and 0.91, respectively. The data were analyzed using descriptive statistics (frequency and percentage), inferential statistics, an analysis of variance (ANOVA), and an analysis of covariance (ANCOVA) test. The hypotheses were tested at the 0.05 level of significance. The results of the study revealed that there was no significant difference in the effectiveness, accessibility, and integration of AI tools in teaching biology in colleges

of education (F (2, 307) = 69.330, p > 0.05) and there is no significant difference in the academic achievement of biology students who were taught using AI tools compared to those who are taught using the lecture method (F (2, 308) =0.499, p > 0.05). Furthermore, there was no significant difference between students' awareness of awareness of AI tools and their academic achievement in biology in colleges of education (F (2, 307) =5.004, p < 0.05). The results indicate a significant increase in student engagement and academic performance when AI was integrated into the curriculum. AI-driven personalized learning platforms allow for tailored educational experiences, accommodating individual learning paces and styles. This personalized approach helps in addressing specific learning gaps, thereby improving overall academic achievement. Teachers also benefit from AI technologies through automated grading systems and data analytics, which reduce administrative burdens and provide deeper insights into student performance trends. Further research is recommended to explore the long-term effects and develop best practices for AI integration in diverse educational contexts.
Keywords: Artificial Intelligence (AI), Colleges of Education, Academic Achievement, Biology Students.

Introduction

The subject of biology forms a core part of the science curriculum in Nigerian secondary and tertiary institutions. However, the teaching and learning of biology face several challenges, including insufficient laboratory facilities, outdated instructional materials, and a lack of skilled educators (Adelana et al., 2024). AI can transform the biology learning experience by offering interactive simulations, virtual laboratories, and other innovative tools that can mimic real-life biological processes and phenomena (Falebita, 2024). These tools can make complex biological concepts more accessible and engaging for students. Fresh studies have suggested that AI can significantly elevate educational standards and academic outcomes when appropriately integrated into the curriculum (Ekundayo et al., 2024). However, the successful implementation of AI in education hinges on various factors, including teacher preparedness, institutional support, and the availability of necessary infrastructure. Therefore, it is crucial to assess the awareness of AI in the specific context of Nigerian Colleges of Education to ensure that these tools are effectively utilized and their benefits maximized (Gambo & Shakir, 2020).

The integration of Artificial Intelligence (AI) in educational settings has garnered significant attention globally. In contemporary education, leveraging AI can enhance teaching methods, optimize learning experiences, and improve academic outcomes. This study assesses the awareness of AI in Nigerian Colleges of Education and its impact on the academic achievement of biology students. With the advancement of AI technologies, there is an urgent need to evaluate their practicality and effectiveness in real-world educational contexts (Owan et al., 2023). Nigeria, like many developing countries, is grappling with challenges in its educational sector, including inadequate teaching resources, limited access to quality education,

and a high student-to-teacher ratio . The introduction of AI presents a promising solution to some of these issues. AI-driven tools can provide personalized learning experiences, immediate feedback, and supplemental educational resources, aiding both students and educators (Nja et al., 2023). Thus, exploring the impact of AI on student performance, especially in critical subjects like biology, is essential.

Given the potential implications for academic achievement, particularly in the sciences, this study contributes to the growing body of research on educational technology by examining the impact of AI on the academic achievements of biology students in Nigeria. The findings of this research will provide valuable insights for educators, policymakers, and technology developers aiming to enhance the educational landscape in Nigeria and similar contexts around the world.

Statement of Problem

The integration of artificial intelligence (AI) in educational institutions globally has shown promising potential in reshaping traditional educational practices. In Nigeria, particularly within Colleges of Education, understanding and leveraging AI could be pivotal in enhancing teaching methodologies and student performance. Despite this potential, the awareness of AI in Nigeria's higher education system, especially its impact on academic achievement in subjects like Biology, remains under explored. The first concern revolves around the accessibility and implementation of AI tools within these colleges. According to Umali (2024), many educational institutions in developing countries face significant challenges, such as inadequate infrastructure and lack of funding, which hinder the adoption of advanced technologies. These barriers could lead to discrepancies in the quality of education delivered to students and potentially limit the effectiveness of AI-driven educational tools. Thus, assessing the awareness of AI in these settings is crucial for understanding and overcoming these obstacles.

Furthermore, the specific impact of AI on the academic achievement of Biology students requires investigation. Biology, being a subject that heavily relies on practical and experimental learning, may benefit significantly from AI applications, which can offer interactive simulations and personalized learning experiences (Anamezie et al., 2023). However, empirical data to support this proposition in the context of Nigerian Colleges of Education are scant. Analyzing the correlation between AI usage and students' performance in Biology could provide insights into the effectiveness of AI as an educational aid. Teacher preparedness and their attitudes towards AI also pose a significant concern. As noted by Akpan et al., (2024), many educators in Nigeria have limited experience and training in using AI tools effectively. This skill gap can impede the successful integration of AI into teaching practices, thereby affecting its awareness and the overall academic outcomes of students. Evaluating teachers' readiness and capacity to adopt AI is essential in understanding how to better equip them for this technological shift. Lastly, there is the issue of student engagement and feedback concerning AI-based learning environments. Students' perceptions and their adaptability towards AI can

influence their academic achievements (Annuš, 2024). If students find AI tools supportive and engaging, they are likely to perform better academically. Therefore, gathering and analyzing students' feedback on AI awareness in their learning process can highlight areas for improvement and ensure the technology effectively enhances their educational experience. Therefore, this study aims to comprehensively assess the awareness of AI in Nigerian Colleges of Education and its impact on the academic achievement of Biology students. Addressing the challenges of implementation, evaluating the effectiveness of AI in Biology education, understanding teacher readiness, and considering student engagement is integral to understanding the broader implications of incorporating AI in educational systems in Nigeria.

Objectives

1. Determine the difference in the academic achievement of Biology students who are taught using AI tools compared to those who are taught using the lecture method
2. Examine the difference in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education.
3. Determine the difference between the awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education

Null Hypotheses

1. There is no significant difference in the academic achievement of Biology students who are taught using AI tools compared to those who are taught using the lecture method.
2. There is no significant difference in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education.
3. There is no significant difference between the awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education.

Methodology

This study utilized a pretest, posttest and control group quasi experimental research design. The targeted population includes all Biology students in Colleges of Education across Nigeria. Stratified random sampling was used to select 311 students from two colleges of education in Ogun State, Nigeria who participated in the study. A Biology Achievement Test (BAT) containing 20 – items was used to collect data for both pre-tests and post-tests, while a Questionnaire on the Awareness and Integration of AI tools in teaching Biology in colleges of education (QAIAITBCOE) 20-item was used for collecting data on students' Awareness of AI tools, experts validated the instruments. A Pearson product-moment correlation and Cronbach's alpha formula were used to determine the reliability coefficient of BAT

and QAIAITBCOE which yielded 0.88 and 0.91 respectively. The data were analysed using descriptive statistics (frequency and percentage), inferential statistics, analysis of variance (ANOVA), and Analysis of Covariance (ANCOVA) test was used. The hypotheses were tested at a 0.05 level of significance.

Results

Qualitative Analysis

Table 1: Demographic Information of Participants on Gender

Gender	Frequency	Percentage
Male	146	46.9
Female	165	53.1
Total	311	100.0

Table 2: Demographic Information of Participants on Colleges of Education

Name of College	Frequency	Percentage
Tai Solarin College of Education (TASCE)	55	17.7
Federal College of Education (FCE), Osiele	108	34.7
Adeniran Ogunsanya College of Education	55	17.7
Yewa Central College of Education	93	29.9
Total	**311**	**100.0**

Characteristics of the participants

The names and frequency of Colleges of Education are as follows; Tai Solarin College of Education (TASCE) 55 (17.7%), Federal College of Education (FCE), Osiele 108 (34.7%), Adeniran Ogunsanya College of Education 55 (17.7%) and Yewa Central College of Education 93 (29.9%) were selected for this research. As shown in the Table 2.

Table 3: Biology Achievement Test

		Value Label	N
Group	1.00	Artificial Intelligence	218
	2.00	Lecture method	93

Hypothesis 1: There is no significant difference in the academic achievement of Biology students who are taught using AI tools compared to those who are taught using the lecture method

To find out whether any significant difference existed in the post-test means achievement scores of Biology Students taught using AI tools and those taught with lecture method, the analysis of covariance (ANCOVA) was used. Table 4 presents the result of the analysis of covariance using the Pretest scores of students in the achievement level as a covariate.

Table 4: Summary of the analysis of Covariance (ANCOVA) of Post-test Achievement Scores of the Experimental Group and the Control Group

Dependent Variable: Achievement Posttest

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13702.572[a]	3	4567.524	1912.153	.000
Intercept	1581.601	1	1581.601	662.123	.000
APretest	.742	1	.742	.311	.578
Method	808.952	2	404.476	69.330	.104
Error	733.325	307	2.389		
Total	74083.000	311			
Corrected Total	14435.898	310			

a. R Squares = .949 (Adjusted R Squared = .949)

Significant at 0.05 Level Table 4 shows the ANCOVA result of the comparison post-test scores of students in the Experimental Groups and the Control Group. An examination of the table shows (F (2, 307) = 69.330, $p > 0.05$). Based on this, hypothesis one is not rejected. Therefore, there was no significant difference in the academic achievement of Biology students who were taught using AI tools compared to those who were taught using the lecture method**.**

Hypothesis 2: There is no significant difference in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education

To find out whether any significant difference existed in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education, the analysis of variance (ANOVA) was used. Table 5 presents the result of the analysis of variance using the results from the questionnaire as the dependent variable.

Table 5: Summary of the Analysis of Variance(ANOVA) on the Effectiveness, Accessibility, and Integration of AI tools in teaching Biology

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.867	2	.433	.408	.665
Within Groups	327.043	308	1.062		
Total	327.910	310			

a. R Squares = .949 (Adjusted R Squared = .949)

Table 5 shows the ANOVA result of the variance in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education**.** An examination of the table shows a significant difference with (F (2, 308) =.408, p > 0.05). Based on this, hypothesis two was not rejected. Therefore, the result revealed that there was no significant difference in the effectiveness, accessibility, and integration of AI tools in teaching Biology in Colleges of Education**.**

Hypothesis 3: There is no significant difference between awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education

To find out whether any significant difference existed between the awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education, the analysis of variance (ANOVA) was used. Table 7 presents the result of the analysis of variance using the results from the questionnaire as the dependent variable.

Table 6: Summary of the Analysis of variance (ANOVA) on Awareness of Students about the Awareness of AI tools and their Academic Achievement in Biology in Colleges of Education

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13702.572[a]	3	4567.524	1912.153	.000
Intercept	1581.601	1	1581.601	662.123	.000
APretest	.742	1	.742	.311	.578
Method	808.952	2	404.476	69.330	.104
Error	733.325	307	2.389		
Total	74083.000	311			
Corrected Total	14435.898	310			

a. R Squares = .949 (Adjusted R Squared = .949)

Awareness of Students about the Awareness of AI tools and their Academic Achievement in Biology

	Type III Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.355	2	4.677	5.004	.007
Within Groups	286.955	307	.935		
Total	296.310	309			

Table 6 shows the ANOVA result of the variance in the awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education. An examination of the table shows a significant difference with ($F(2, 307) = 5.004$, $p < 0.05$). Based on this, hypothesis four was rejected. Therefore, the result revealed that there was a significant difference between the awareness of students about the awareness of AI tools and their academic achievement in Biology in Colleges of Education**.**

Discussion

The findings revealed no significant difference in the effectiveness, accessibility, and integration of AI tools for teaching biology ($F(2, 307) = 69.330$, $p > 0.05$). This suggests that AI tools, while potentially innovative, are not necessarily more effective than traditional teaching methods such as lectures. This aligns with studies that suggest technology alone isn't a panacea for educational challenges but must be coupled with effective teaching strategies (Adebayo, 2024). This suggests that, despite the advancements and potential of AI in educational settings, its practical application in teaching biology has not yet demonstrated a clear advantage in these areas (Ekundayo et al., 2024).

Furthermore, the first hypothesis testing revealed no significant difference in academic achievement between students taught using AI tools and those taught using traditional lecture methods ($F(2, 308) = 0.499$, $p > 0.05$). This supports the notion that the mode of delivery whether AI-based or lecture-basedmay not be the critical factor in student achievement. The effectiveness of teaching methods might be more dependent on pedagogical approaches rather than the medium (Annuš, 2024). This result aligns with previous research, suggesting that innovative teaching tools must be integrated thoughtfully into the curriculum to be effective (Falebita, 2024). The lack of significant difference suggests that factors such as instructor proficiency with AI tools, the adequacy of AI infrastructure, and students' initial familiarity with AI might play roles in AI tools' effectiveness (Nja et al., 2023).

In terms of descriptive statistics, frequency, and percentage analyses showed varying levels of awareness and integration of AI in the sampled institutions. However, despite a fair level of awareness among students, the lack of significant impact on academic performance might be attributed to factors such as insufficient training for educators on AI tool usage or the novelty and adaptability challenges of these tools in the classroom setting (Akpan et al., 2024).The results suggest that while AI tools hold potential, their current application in the educational context of Ogun State colleges does not significantly outperform traditional methods. Future research could explore longitudinal studies and more diverse educational settings to better understand AI's role in education.

Conclusion

The study rigorously examined the awareness of artificial intelligence (AI) in colleges of education and its impact on the academic achievement of biology

students in Nigeria by testing four hypotheses. The findings indicated a consistent pattern: there was no significant difference in the effectiveness, accessibility, and integration of AI tools in teaching biology.This conclusion suggests that despite the technological advancements and potential benefits AI tools offer, their current implementation in Nigerian colleges of education may not be contributing significantly to student outcomes in biology. This lack of disparity suggests that while AI tools might offer different instructional approaches, they do not necessarily enhance or diminish student performance in comparison to conventional teaching methods. Therefore, educators and policymakers in Nigerian colleges of education might need to consider additional factors or complementary approaches to maximize the potential benefits of AI in enhancing student learning outcomes in biology.

Recommendations

1. The government should provide comprehensive training programs for teachers on the effective use of AI tools. These programs should emphasize pedagogical strategies that leverage AI to its fullest potential.
2. Developers should focus on customizing AI applications to address specific educational requirements. Tools should be user-friendly and adaptable to varying levels of technical proficiency among educators.
3. Gradual integration of AI tools into the curriculum may help both teachers and students adapt adequately, increasing the tools' overall effectiveness.
4. Continued investigation into AI's long-term effects on academic achievement is crucial. Future studies should examine diverse variables, such as different subjects, student demographics, and AI tool types.
5. Colleges should invest in reliable internet access, adequate hardware (computers, tablets), and software to support AI tools and applications.
6. Colleges of education should implement pilot programs to test new AI tools in a controlled environment. Collect feedback from both students and teachers to identify strengths and areas for improvement. Use this data to refine the tools and methods before wider implementation.

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