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ARTIFICIAL INTELLIGENCE IN EDUCATIONAL RESEARCH AND PRACTICE IN FEDERAL UNIVERSITIES IN SOUTH-EAST NIGERIA: OPPORTUNITIES AND CHALLENGES

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Abstract - This study investigated Artificial Intelligence in educational research and practice, focusing on its opportunities, and challenges in Federal Universities in South East Nigeria. The study adopted a descriptive survey research design. The population of the study was 1192 comprising 522 lecturers (312 from UNN and 210 from AEFUNAI) and 670 students (350 from UNN and 320 from AEFUNAI). Multistage sampling procedure was adopted for the study. In the first place, simple random sampling technique was used to sample only two federal universities and one faculty each (Faculty of Education) from the two federal universities from South-East, Nigeria, precisely, University of Nigeria, Nsukka and Alex Ekwueme Federal University of Ndufu-Aliko (AEFUNAI). The sample size of the study was 300 respondents determined through Taro Yamane formula consisting of 131 lecturers(78 from UNN and 53 from AEFUNAI) and 169 students (88 from UNN and 81 from AEFUNAI) totaling 300 respondents who are educational researchers drawn through proportionate stratified random sampling technique. Data were collected using a structured questionnaire titled "Artificial Intelligence in Educational Research and Practice Questionnaire (AIERPQ)" and analyzed using mean and standard deviation. Findings revealed that Artificial Intelligence offers significant opportunities in educational research and practice, including improved data analysis, automated literature review, personalized learning, predictive academic analytics, automated assessment, and enhanced research productivity. However, the study also found that the integration of Artificial Intelligence is constrained by challenges such as inadequate ICT infrastructure, lack of technical skills, ethical concerns, data privacy issues, high cost of implementation, resistance to change, and academic dishonesty. The study concluded that Artificial Intelligence has transformative potential in education but its effectiveness depends on adequate infrastructure, human capacity development, and ethical regulation. It recommended that governments and educational institutions should invest in ICT infrastructure, provide continuous training for educators, establish ethical guidelines for AI use, and develop clear policies for sustainable integration of Artificial Intelligence in education among others.

Keywords: Artificial Intelligence, educational research, educational practice, opportunities

Introduction

Education in the twenty-first century is undergoing one of the most profound transformations in its history, driven largely by rapid technological advancement and the emergence of Artificial Intelligence (AI). Russel and Norving (2021) explained that the traditional boundaries of teaching, learning, assessment, and educational research are being reshaped by intelligent systems that can analyze data, generate content, predict outcomes, and support decision-making processes in ways that were previously unimaginable. In this new educational digital era, Artificial Intelligence has become not

just a technological innovation but a powerful educational force redefining how knowledge is created, transmitted, and evaluated.

Artificial Intelligence (AI), as a concept, has been defined from different scholarly perspectives. According to John McCarthy (2007), AI is "the science and engineering of making intelligent machines, especially intelligent computer programs," emphasizing its capacity to simulate human intelligence in problem-solving and reasoning. In a more contemporary view, Russell and Norvig (2021) defined Artificial Intelligence as the study of agents that perceive their environment and take actions that maximize their chances of achieving defined goals, highlighting AI as goal-driven and adaptive systems. Similarly, Andrew Ng (2020) described AI as the capability of machines to perform cognitive tasks such as learning from data, recognizing patterns, understanding language, and making intelligent decisions with minimal human intervention. In the educational context, AI refers to the integration of these intelligent systems into teaching, learning, assessment, and research processes to improve efficiency, personalization, and academic productivity.

In educational research, Artificial Intelligence is revolutionizing the way knowledge is generated, analyzed, and applied. Educational research refers to systematic inquiry aimed at solving educational problems, improving instructional practices, and expanding knowledge in the field of education. According to Sambo and Magaji (2025), educational research is a systematic process of collecting, analyzing, and interpreting data to understand educational issues and improve practice. Similarly, Benjamin (2020) defined educational research as a disciplined investigation that seeks to generate knowledge for solving educational problems and enhancing teaching and learning effectiveness. In another perspective, Best and Kahn (2019) described educational research as a scientific inquiry that uses systematic methods to discover principles, facts, and relationships that improve educational practice. Recently, it is discovered that artificial intelligence can enhance in educational research.

Artificial Intelligence enhances educational research by automating literature reviews, improving data analysis, detecting patterns in large datasets, supporting hypothesis generation, and enhancing academic writing through intelligent tools. For instance, AI-powered systems can analyze thousands of academic articles within seconds, identify trends in educational performance, and predict future learning outcomes. According to Ocean (2021), tools such as machine learning algorithms and natural language processing systems are increasingly used by researchers to improve the speed, accuracy, and depth of educational investigations. This makes educational research more efficient, evidence-based, and data-driven in contemporary academic environments.

In contemporary education, Artificial Intelligence has significantly transformed educational practices by enabling personalized learning, adaptive instruction, intelligent tutoring systems, automated grading, virtual classrooms, and learning analytics. Ugwu (2020) equally found that Artificial Intelligence significantly reduces the burden of manual academic tasks, enhances accuracy in educational research, and creates individualized learning pathways that improve students' engagement and performance. It also supports teachers and researchers in making evidence-based decisions through predictive analytics and intelligent systems (Russel and Norvig 2025). Arriazu (2025) observed that, AI-powered educational tools can adjust learning materials to suit individual student needs, provide real-time feedback, and track student progress more accurately than traditional methods. For example, intelligent tutoring systems can identify students' learning

difficulties and provide targeted instructional support, thereby improving learning outcomes and student engagement.

The opportunities presented by Artificial Intelligence in education are vast and transformative. AI enhances efficiency in educational research, reduces workload for educators, improves decision-making, supports personalized learning, and promotes inclusive education. It also enables predictive analytics that help institutions identify at-risk students and improve academic performance. Best and Kahn (2019) asserted that Artificial Intelligence presents vast opportunities in educational research and practice. One of the most significant opportunities is the enhancement of research efficiency through automated data analysis, literature review support, and predictive modeling. Also, Magnus (2024) stated that, AI tools can process large datasets within seconds, allowing researchers to identify trends and patterns that would take humans much longer to detect. In educational practice, AI enables personalized learning, where instructional content is tailored to individual learner needs, pace, and ability. Intelligent tutoring systems and adaptive learning platforms adjust learning materials in real time, improving student engagement and academic performance. Studies show that AI systems significantly improve learning outcomes by providing real-time feedback and individualized support. Ibitoye (2025) opined that, AI also enhances assessment and evaluation through automated grading systems, reducing teachers' workload and increasing efficiency. Furthermore, AI supports inclusive education by assisting learners with disabilities through speech recognition, text-to-speech systems, and adaptive interfaces. Systematic reviews confirm that AI contributes to learning, teaching, assessment, and administrative efficiency, identifying multiple roles of AI across educational domains including personalization, automation, and prediction (Arriazu, 2025).

However, alongside these opportunities are significant challenges, including ethical concerns, data privacy issues, lack of technical skills among educators, digital inequality, overdependence on technology, and potential job displacement. Russell and Norvig (2021) articulated that despite its benefits, Artificial Intelligence in education is associated with several challenges that hinder its effective integration. The scholars further stated that, one major challenge is lack of adequate infrastructure, including poor internet access, limited technological tools, and unstable electricity supply in many developing countries. Also, Arriazu (2025) and Sambo-Magaji (2025) in their study found that the adoption of Artificial Intelligence in education is hindered by infrastructural barriers, digital literacy gaps, ethical concerns, and unequal access to technology. Their study emphasized that many educational institutions, especially in developing contexts, are not fully prepared for effective AI integration due to lack of policy frameworks and technical capacity. The scholars further noted that pedagogical adaptation, ethical concerns, and overdependence on AI systems pose serious risks to effective teaching and learning processes. Ocean (2025) opined that from the findings, it is evident that while Artificial Intelligence is highly beneficial, its effectiveness is limited by human, institutional, and technological barriers. Many educators are not adequately trained to use AI tools, infrastructure is insufficient in many institutions, and ethical concerns such as plagiarism and data misuse are increasing.

Another major challenge is insufficient digital literacy and technical skills among educators and researchers, which limits their ability to effectively use AI tools in teaching and research. Many educators still rely on traditional methods due to lack of training and exposure to AI technologies. According to Ibitoye (2025), ethical concerns also pose

significant challenges, including data privacy issues, academic dishonesty, plagiarism, and misuse of AI-generated content. Studies have shown that overdependence on AI can lead to reduced critical thinking skills among students and increased academic misconduct. Additionally, concerns about job displacement, cost of implementation, and resistance to technological change among educators further limit the adoption of AI in education. Research also highlighted that AI systems may lack transparency, raising concerns about fairness and accountability in educational decision-making. These challenges raise critical questions about the responsible and sustainable integration of AI in education.

Looking into the future, Artificial Intelligence is expected to play an even more dominant role in shaping educational systems. Future directions include the development of fully adaptive learning environments, AI-driven curriculum design, intelligent educational governance systems, and enhanced human–machine collaboration in teaching and research. However, achieving these advancements requires careful planning, ethical regulation, investment in digital infrastructure, and continuous professional development for educators (Russel 2025).Thus, as technology continues to evolve, education must evolve with it. However, the challenge remains not only how to adopt Artificial Intelligence, but how to use it meaningfully, ethically, and effectively to enhance human learning rather than replace human intelligence. Education must therefore strike a balance between technological innovation and human-centered learning.

Statement of the Problem

Despite the rapid global advancement and increasing integration of Artificial Intelligence in education, many educational institutions, particularly in developing countries such as Nigeria, are still at the early stages of effective adoption and utilization of AI technologies in educational research and classroom practices. While Artificial Intelligence tools have demonstrated significant potential in enhancing teaching effectiveness, improving research productivity, supporting personalized learning, and strengthening educational administration, their application in many institutions remains limited, uneven, and poorly regulated. A major challenge is the inadequate digital literacy and technological competence among many educators and researchers, which limits their ability to effectively utilize AI tools in teaching, learning, and research processes. Many educators still rely heavily on traditional pedagogical and research methods, thereby failing to maximize the benefits of AI-driven educational innovations. Furthermore, issues such as lack of adequate infrastructure, high cost of technological tools, ethical concerns surrounding data privacy, academic integrity issues, fear of job displacement, and overdependence on AI systems continue to hinder effective integration of Artificial Intelligence in education. There is also growing concern about the misuse of AI tools by students for academic assignments, raising questions about originality, creativity, and intellectual development.

Although several studies have been conducted on Artificial Intelligence in education, most of them are concentrated in developed countries, leaving a contextual gap in understanding how AI is being utilized in educational research and practices within Nigerian educational institutions. Existing studies have largely focused on general applications of AI in education, with less emphasis on a balanced examination of its opportunities, challenges, and future directions within specific institutional contexts. More importantly, there is limited empirical evidence that simultaneously explores how AI is currently being used in both educational research processes and classroom practices,

especially in public tertiary institutions in Nigeria. This creates a gap in knowledge regarding the practical realities, readiness level, and contextual constraints affecting AI integration in the Nigerian educational system. This study therefore investigates Artificial Intelligence in educational research and practice, focusing on its opportunities, and challenges, in order to provide empirical evidence that will guide effective policy formulation, educational planning, and sustainable integration of AI in education.

Research Questions

The following research questions guided the study;

1. What are the opportunities of Artificial Intelligence in educational research and practice in educational institutions?
2. What are the challenges affecting the effective integration of Artificial Intelligence in educational research and practice?

Methods

The research adopted descriptive survey design as it involves obtaining available information from respondents as at the point of study which represent the entire population used for the study. According to Asika (2020) explained that descriptive survey design focuses on collecting data from a representative sample to describe and interpret existing conditions and phenomena. The design was considered appropriate for this study because the study seeks to obtain factual information on Artificial Intelligence in educational research and practice. The design enabled the researcher to collect firsthand information from lecturers and students on the use of AI in research and practice in schools. The area of the study was federal universities in South East Nigeria. The population of the study was 1192 comprising 522 lecturers (312 from UNN and 210 from AEFUNAI) and 670 students (350 from UNN and 320 from AEFUNAI). Multistage sampling procedure was adopted for the study. In the first place, simple random sampling technique was used to sample only two federal universities and one faculty each (Faculty of Education) from the two federal universities from South-East, Nigeria, precisely, University of Nigeria, Nsukka and Alex Ekwueme Federal University of Ndufu-Aliko (AEFUNAI). These categories of respondents were chosen because they are directly involved in teaching, learning, and educational research activities where Artificial Intelligence is applied. Purposive sampling technique was used to sample only final year students who were already writing their projects. The sample size of the study was 300 respondents determined through Taro Yamane formula consisting of 131 lecturers(78 from UNN and 53 from AEFUNAI) and 169 students (88 from UNN and 81 from AEFUNAI) totaling 300 respondents who are educational researchers drawn through proportionate stratified random sampling technique. A 19- item questionnaire was used to collect data from the respondents. The instrument was structured on a 4-points likert type scale on which the respondents reacted to. The items in the questionnaire were weighted as a follow: Strongly Agree (SA)-4 points, agree (A)- 3 points, disagree (D) -2 points and Strongly Disagree (SD) -1point.

The criterion mean of acceptance is 2.50. The instrument was face validated by two senior lecturers in Educational Administration and planning and one in measurement and evaluation, all from the University of Nigeria, Nsukka. Cronbach Alpha Co-efficient method was used to determine the reliability of the instrument. It yielded an overall co-efficient of 0.93. A total of 150 copies of the instrument were administered and retrieved. The data was analyzed using mean and standard deviation scores. Any item statement with

mean rating of 2.50 and above was accepted value while item statement with a mean rating less than 2.50 was rejected.

RESULTS

Research Question 1: What are the opportunities of Artificial Intelligence in educational research and practice in educational institutions?

Table 1: Mean response of lecturers and students on the opportunities of Artificial Intelligence in educational research and practice in educational institutions.

S/N	Item	$\bar{X}$i	SD2	$\bar{X}$2	SD2	$\bar{X}$2	Dec.
1	Artificial Intelligence enhances the speed and efficiency of data analysis in educational research.	3.18	.60	2.95	.62	3.03	.61 A
2	AI tools support researchers in conducting literature reviews within a short period of time.	2.82	.60	3.05	.71	2.97	.67A
3	Artificial Intelligence improves accuracy in data interpretation and research findings.	3.36	.67	2.84	.76	3.03	.76A
4	AI enables personalized learning experiences for students in educational institutions.	3.18	.75	3.32	.95	3.27	.87A
5	Artificial Intelligence supports teachers in preparing instructional materials more effectively.	3.09	.83	2.68	1.00	2.83	.95A
6	AI-based tools assist in predicting students' academic performance and learning outcomes.	3.73	.47	3.47	.70	3.57	.63SA
7	Artificial Intelligence enhances students' engagement and participation in learning activities.	3.00	.63	3.11	.74	3.07	.69A
8	AI facilitates automated grading and assessment of students' academic work.	3.27	.79	2.79	.79	2.97	.81A
9	Artificial Intelligence improves access to educational resources and learning materials.	2.36	.67	2.89	.74	2.70	.75A
10	AI promotes innovative teaching and research practices in educational institutions.	2.73	.65	3.32	.82	3.10	.80A
	Cluster Mean	**3.03**	**.05.**	**3.01**	**.06**	**3.02**	**.06 A**

KEY: $\bar{X}$1 = Mean for lecturers SD1 = Standard deviation for lecturers
$\bar{X}$2 = Mean for students SD2 = Standard deviation for students
$\bar{X}$3 = Total mean SD2 = Standard deviation

The result presented in table 1 shows the mean scores and standard deviations on the opportunities of Artificial Intelligence in educational research and practice in educational institutions. Table 1 indicates that items 1, 2, 3, 5, 7, 8, 9, and 10, had overall

mean scores of 3.03, 2.97, 3.03, 3.27, 2.83, 3.00, 3.07, and 2.97, with standard deviations of .61, .67, .76, .87, .95, .79, .69, and 68 for male and female teachers. The mean scores fall under the decision of agree based on the real limit of numbers. On the other hand, item 6 has means score of 3.57 with standard deviation of .63 which fall under the decision of Strongly Agree based on the real limit of numbers. The cluster mean is 3.02 with the standard deviation of .06 which fall under the decision of agree using the real limit of numbers. This indicates that Artificial Intelligence significantly enhances educational research and practice by improving efficiency, personalization, academic productivity, and data-driven decision-making in educational institutions.

Research Question 2: What are the challenges affecting the effective integration of Artificial Intelligence in educational research and practice**?**

Table 2: Mean response of lecturers and students on the challenges affecting the effective integration of Artificial Intelligence in educational research and practice.

S/N	Item	$\bar{X}1$	SD2	$\bar{X}2$	SD2	$\bar{X}2$	Dec.
11	Many educators lack sufficient training and skills in the use of AI tools for teaching and research.	3.09	.30	2.94	.23	3.00	.26A
12	High cost of acquiring and maintaining AI technologies affects their adoption in schools.	3.27	.65	3.42	.61	3.37	.61SA
13	Concerns about data privacy and security hinder the use of Artificial Intelligence in education.	3.00	.00	2.95	.23	2.97	.18A
14	Overdependence on AI tools may reduce students' critical thinking and creativity.	3.09	.30	2.94	.23	3.00	.26A
15	Unstable electricity supply affects the effective use of AI technologies in educational institutions.	3.91	.30	3.79	.42	3.83	.38SA
16	Resistance to change among some educators slows down AI integration in education.	3.09	.30	3.11	.46	3.10	.40A
17	Ethical issues such as plagiarism and academic dishonesty are associated with AI use.	3.91	.30	3.79	.42	3.83	.38A
18	Lack of government policy and regulation on AI in education creates implementation gaps.	3.09	.54	3.05	.40	3.07	.45A
19	Fear of job displacement among educators reduces acceptance of Artificial Intelligence in education.	3.09	.70	3.47	.51	3.33	.61A
	Cluster Mean	**3.44**	**.00**	**3.37**	**.23**	**3.40**	**.81A**

The result presented in table 2 shows the mean response of lecturers and students on the challenges affecting the effective integration of Artificial Intelligence in educational research and practice in federal universities in South East. Items 11, 13, 14, 17, 18 and 19had overall mean scores of 3.00, 2.97, 3.00, 3.10, 3.07 and 3.33 with standard deviation

of .26, .18, .26, .40, .45 and .61 which fall under the decision of agree based on the real limit of numbers. On the other hand, item 12, 15 and 16 had mean of 3.37, 3.83 and 3.83 with standard deviation of .61, .38 and .38 which fall under the decision of strongly agree based on the real limit of numbers. The cluster mean is 3.40 with standard deviation of .18. This means that despite its benefits, Artificial Intelligence integration in education is significantly constrained by infrastructural, ethical, financial, institutional, and human capacity challenges in Federal Universities in South-East Nigeria.

Discussion

The findings of this study revealed that Artificial Intelligence provides wide-ranging opportunities in educational research and practice, including improved research efficiency, personalized learning, automated assessment, enhanced academic productivity, predictive analytics, and improved access to learning resources. These findings suggest that AI is not only a supportive tool but a transformational force in modern education systems.

This finding aligns with the studies of Ivan (2022) and Ocean (2021), who stated that Artificial Intelligence enhances teaching and learning processes by improving efficiency, supporting innovation, and streamlining administrative tasks in higher education institutions. Their work emphasized that AI systems improve both instructional delivery and institutional decision-making processes, making education more adaptive and responsive to learners' needs. They further explained that AI tools enable faster data processing, better academic writing support, and more accurate interpretation of research findings. Ugwu (2020) equally found that Artificial Intelligence significantly reduces the burden of manual academic tasks, enhances accuracy in educational research, and creates individualized learning pathways that improve students' engagement and performance. It also supports teachers and researchers in making evidence-based decisions through predictive analytics and intelligent systems (Russel and Norvig 2025).Therefore, it can be concluded that Artificial Intelligence presents powerful opportunities that enhance efficiency, personalization, and productivity in educational research and practice, thereby transforming traditional educational systems into data-driven and technology-enhanced environments

The other findings revealed that despite the numerous opportunities offered by Artificial Intelligence, its integration into educational research and practice is constrained by several challenges, including inadequate ICT infrastructure, lack of technical skills among educators, ethical concerns, data privacy issues, high cost of implementation, resistance to change, and risk of academic dishonesty. This finding is consistent with the study of Arriazu (2025) and Sambo-Magaji. (2025), who asserts that the adoption of Artificial Intelligence in education is hindered by infrastructural barriers, digital literacy gaps, ethical concerns, and unequal access to technology. Their study emphasized that many educational institutions, especially in developing contexts, are not fully prepared for effective AI integration due to lack of policy frameworks and technical capacity. They further noted that pedagogical adaptation, ethical concerns, and overdependence on AI systems pose serious risks to effective teaching and learning processes. Ocean (2025) opined that from the findings, it is evident that while Artificial Intelligence is highly beneficial, its effectiveness is limited by human, institutional, and technological barriers. Many educators are not adequately trained to use AI tools, infrastructure is insufficient in many institutions, and ethical concerns such as plagiarism and data misuse are increasing. These challenges reduce the full realization of AI's potential in education. Therefore, it can

be concluded that although Artificial Intelligence has transformative potential in education, its successful integration is significantly constrained by infrastructural deficiencies, ethical concerns, inadequate training, and institutional resistance, especially in developing educational systems.

Conclusion

Artificial Intelligence has emerged as one of the most transformative forces reshaping the landscape of educational research and practice in the twenty-first century. This study has demonstrated that AI is no longer a futuristic concept but a present reality that is steadily redefining how knowledge is generated, disseminated, and applied in educational systems. Through intelligent systems, machine learning tools, automated assessment platforms, adaptive learning environments, and data-driven research models, Artificial Intelligence has significantly enhanced efficiency, accuracy, personalization, and productivity in education. So, the successful integration of AI in education requires strategic planning, ethical regulation, infrastructural development, and continuous professional training of educators. Ultimately, Artificial Intelligence represents a powerful educational revolution that, if properly harnessed, will redefine educational research and practice, improve learning outcomes, and promote sustainable educational development.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Government and educational authorities should invest in strong ICT infrastructure to support effective integration of Artificial Intelligence in educational institutions.
2. Regular training and capacity-building programmes should be organized for lecturers, and researchers to enhance their digital literacy and AI competencies.
3. Artificial Intelligence should be integrated into teacher education curricula to prepare future educators for technology-driven classrooms.
4. Educational institutions should develop clear ethical guidelines and policies regulating the use of AI to prevent misuse, plagiarism, and academic dishonesty.
5. Stable electricity supply and reliable internet connectivity should be prioritized to ensure effective use of AI technologies in schools and universities.

REFERENCES

Arriazu, R. (2025). Artificial intelligence in education: Pedagogical adaptation and ethical implications. *Journal of e-Learning and Knowledge Society*, *21*(1), 45–60.

Best, J. W., & Kahn, J. V. (2019). *Research in education* (10th ed.). Pearson.

Creswell, J. W. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Ibitoye, D. (2025). Artificial intelligence in education: Opportunities for teaching, learning, and research enhancement. *Journal of Technology and Science Research, 12*(2), 88–101.

Ivan, L. N. (2022). *The development of higher psychological potentials.* Rano Press.

Magnus, C. (2025). *Education and leadership.* Marx's Publication.

McCarthy, J. (2007). *What is artificial intelligence?* Stanford University.

Ng, A. (2020). *AI transformation in education and industry.* DeepLearning.AI.

Nworgu, B. G. (2016). *Educational research: Basic issues and methodology.* University Trust Publishers.

Ocean, S. M. (2021). Artificial intelligence and higher education transformation: A systematic review. *Frontiers in Education.* https://doi.org/10.3389/feduc.2025.1530247

Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.

Sambo-Magaji, A. (2025). Challenges of artificial intelligence adoption in developing educational systems. *Journal of Science, Technology and Research, 9*(1), 112–128.

Ugwu, C. N. (2020). *Leadership and educational development.* Emma Press.