



STRATEGIES FOR ADDRESSING THE CHALLENGES OF ARTIFICIAL INTELLIGENCE INTEGRATION IN EDUCATIONAL ASSESSMENT

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Abstract

This study examined strategies for addressing the challenges of integrating Artificial Intelligence (AI) in educational assessment in Imo State, Nigeria. The study adopted a descriptive survey design, targeting 1,200 lecturers, ICT coordinators, examination officers, and selected secondary school administrators in Imo State. A sample of 240 respondents was selected through purposive and stratified random sampling. Data were collected via a structured questionnaire administered electronically using Google Forms, and reliability was established with a Cronbach's alpha of 0.84. Data analysis employed mean and standard deviation to determine the extent of challenges and the effectiveness of proposed strategies. Findings revealed that respondents agreed technical, ethical, and pedagogical challenges significantly hinder AI integration, with major issues including infrastructure deficiencies, limited training, and ethical concerns. They also agreed that strategic measures; such as stable infrastructure, teacher training, national AI policy development, data protection frameworks, human moderation, continuous monitoring, stakeholder sensitization, and expert collaboration, can effectively address these challenges. The study concluded that deliberate implementation of these strategies is essential to maximize AI's potential in educational assessment.

Keywords: Artificial Intelligence, Assessment, Educational Technology, Strategies

Introduction

Globally, Nations are presently witnessing rapid advances in technology that have transformed almost every aspect of human life. One of the most significant developments is the rise of Artificial Intelligence (AI), which refers to computer systems capable of performing tasks that usually require human intelligence, such as problem-solving, decision-making, language understanding, and learning (Holmes, Bialik, & Fadel, 2019). AI technologies are no longer limited to industrial or scientific applications; they have increasingly found their way into education, offering new opportunities for teaching, learning, and assessment. From virtual tutors to intelligent learning platforms, AI provides tools that can support students' understanding, track performance, and provide personalized feedback (Adiguzel, Kaya, & Cansu, 2023). These applications have the potential to revolutionize traditional classrooms by allowing students to learn at their own pace, engaging with content in ways that were previously impossible, and giving teachers insights into learners' strengths and weaknesses (Hennekeuser, Vaziri, Golchinfar, Schreiber, & Stevens, 2024).

Educational assessment, which involves measuring what students know and can do, is an essential part of learning. It informs teachers about students' progress, guides curriculum development, and ensures accountability in education systems (Owan, Abang, Idika, Etta, & Bassey, 2023). Traditionally, assessment has relied heavily on paper-and-pencil tests, essays, and examinations, which are often time-consuming and prone to human errors in scoring. AI has introduced the possibility of automating parts of the assessment process, improving efficiency, and potentially increasing the accuracy and fairness of scoring (Kakungulu, 2024). Intelligent systems can analyze large amounts of student data, adapt test difficulty based on individual performance, and even detect patterns that may indicate learning gaps (Delgado, de Azevedo Fay, Sebastiany, & Silva, 2020). Through AI-driven assessment, educators can move beyond one-size-fits-all evaluation methods to more personalized and adaptive measures, helping students learn better and teachers make more informed instructional decisions (Huang, Zou, Cheng, Chen, & Xie, 2023).

Despite these promising developments, integrating AI into educational assessment comes with a range of challenges that must be addressed to realize its full potential. One of the major challenges is technical in nature. AI-based systems require stable digital infrastructure, reliable internet connectivity, and electricity to function effectively. In many regions of Nigeria, these resources are often inconsistent or unavailable, making it difficult to implement AI-powered assessments at scale (Wu, 2023). Technical challenges also include the need for advanced software, compatible devices, and proper system maintenance. Without these supports, AI systems can fail to deliver accurate results, undermining their reliability and reducing educators' confidence in these tools (Hawes & Arya, 2023). Similarly, a lack of technical expertise among teachers and assessment officers can limit the effective use of AI, as individuals may struggle to operate, interpret, and maintain AI-driven assessment platforms (Nazaretsky, Ariely, Cukurova, & Alexandron, 2022).

Ethical challenges are another significant factor. AI systems often collect and process large amounts of sensitive student data, raising concerns about privacy and security. Students' personal information must be protected to prevent misuse or unauthorized access, and policies must be in place to guide responsible use (Elliott & Soifer, 2022). Furthermore, algorithmic bias in AI can threaten fairness in assessment. If AI systems are trained on biased data or designed without consideration for diversity, they may produce results that favor certain groups of students over others (Dergaa, Chamari, Zmijewski, & Saad, 2023). Ethical considerations also extend to the transparency of AI systems; students and educators must understand how decisions are made and have confidence that outcomes are not arbitrary or discriminatory (Săseanu, Gogonea, & Ghiță, 2024).

Pedagogical challenges further complicate the integration of AI into assessment. Teachers and students may resist using AI systems due to unfamiliarity, fear of job replacement, or distrust of machine-generated scores (Wardat, Tashtoush, AlAli, & Jarrah, 2023). Aligning AI tools with curriculum standards is another difficulty, as educational content must be accurately represented within the AI system for assessments to be meaningful (Huang, 2018). In addition, insufficient training for educators can limit their ability to design, interpret, and use AI-driven assessments effectively, which may lead to

underutilization of these tools or misinterpretation of results (Karsenti, 2019). Cost is also a concern, as procuring AI systems, maintaining infrastructure, and training staff require significant financial resources that some schools may not be able to provide (Halaweh, 2023).

Given these challenges, it is clear that strategies are needed to address the technical, ethical, and pedagogical barriers to AI integration in educational assessment. Technical strategies may include improving digital infrastructure, ensuring stable internet and power supply, and providing compatible devices and software for AI applications (Wu, 2023). Building the technical capacity of educators through training and professional development programs is essential for effective implementation (Johnson & Smith, 2019). Institutions can also foster collaboration between teachers, ICT experts, and psychometricians to design AI systems that are both technically sound and pedagogically relevant (Khan, Ahmad, Jabeur, & Mahdi, 2021). Such collaborations can ensure that AI assessments are accurately aligned with learning objectives and curriculum standards. Ethical strategies are equally important. Schools and education authorities must establish policies and frameworks to protect student data, ensure fairness in AI-generated scores, and promote transparency in decision-making (Elliott & Soifer, 2022). Students, teachers, and parents should be educated about how AI works in assessment and how their data is used, building trust and acceptance of these systems (Nazaretsky et al., 2022). Periodic auditing of AI algorithms can help detect and correct biases, ensuring that assessments remain equitable and reliable (Delgado et al., 2020). Pedagogical strategies include designing AI assessments that complement teacher instruction, providing training for teachers to interpret AI results, and fostering a culture of acceptance and collaboration in using technology in education (Hennekeuser et al., 2024). Encouraging students to engage with AI systems responsibly and providing ongoing support can also enhance the effectiveness of these assessments (Hawes & Arya, 2023).

Several studies have highlighted the transformative potential of AI in education while also emphasizing the need to address the associated challenges. Adiguzel et al. (2023) noted that AI tools such as ChatGPT can revolutionize learning and assessment by providing personalized support, yet they require careful management to avoid ethical and technical pitfalls. Hennekeuser et al. (2024) observed that AI could support lecturers in higher education by offering insights into student performance and reducing workload, but success depends on adequate infrastructure and training. Similarly, Owan et al. (2023) emphasized that AI can enhance educational measurement and assessment, provided strategies are implemented to overcome barriers related to technology, ethics, and pedagogy. These findings suggest that while AI has enormous potential, proactive measures must be taken to address challenges to ensure its benefits are fully realized. In the context of secondary education in Nigeria, integrating AI into assessment systems can improve the quality, reliability, and fairness of evaluations. However, without deliberate strategies, students may not benefit from these innovations, and existing disparities in educational resources can be exacerbated (Vieriu & Petrea, 2025). Challenges such as inadequate infrastructure, lack of trained personnel, ethical concerns, and resistance from teachers and students must be addressed systematically. Strategic approaches, including infrastructure enhancement, policy formulation, professional development, ethical safeguards, and collaboration between stakeholders, are necessary to create an environment where AI-driven assessments can function effectively and equitably (Kakungulu, 2024; Wu, 2023). Addressing these challenges is critical for ensuring that AI contributes positively to students' learning outcomes and assessment experiences.

Despite the growing interest in AI applications in education, there is limited research in Nigeria that focused on strategies for addressing the challenges of AI integration in educational assessment. Most studies have concentrated on the benefits of AI, its use in teaching, or ethical issues in isolation, without conducting a comprehensive examination of the technical, ethical, and pedagogical barriers and how they can be addressed systematically (Cukurova & Luckin, 2018; Halaweh, 2023). Furthermore, while AI-based assessments are being introduced in some Nigerian tertiary institutions and secondary schools, there is little empirical evidence guiding policymakers, educators, and administrators on effective strategies for implementation. This gap creates uncertainty, reduces teacher and student confidence in AI systems, and may limit the adoption of AI in assessment practices. There is therefore a pressing need for a study that investigates practical and contextually relevant strategies to address the challenges of AI integration in educational assessment in Nigeria. Such a study can provide insights for policymakers,

school administrators, and educators, helping them make informed decisions about adopting AI technologies in schools. By identifying both the challenges and the strategies to overcome them, the study can contribute to more effective, fair, and reliable assessment practices that harness the full potential of AI for student learning. The purpose of this study is to examine the major technical, ethical, and pedagogical challenges associated with AI integration in educational assessment and to identify strategic approaches that can be adopted to effectively address these challenges, thereby improving the quality and effectiveness of assessment practices in Nigerian schools.

Statement of the Problem

The integration of Artificial Intelligence (AI) in educational assessment holds great promise for improving the accuracy, efficiency, and personalization of student evaluation. However, in Nigeria, including Imo State, the adoption of AI faces significant challenges. Technical issues such as inadequate digital infrastructure, unreliable electricity, and lack of trained personnel hinder effective implementation. Ethical concerns, including data privacy, algorithmic bias, and transparency, raise doubts about the fairness and security of AI-driven assessments. Pedagogical challenges, such as resistance from teachers, difficulty aligning AI tools with curriculum standards, and insufficient professional development, further limit its effectiveness. Despite these obstacles, there is limited research on practical strategies to address these challenges, leaving educators and policymakers without clear guidance on how to implement AI assessments effectively. This gap in knowledge underscores the need for a study to identify and propose strategies that can overcome these technical, ethical, and pedagogical barriers to AI integration in educational assessment.

Research Questions

The following research questions guided the study:

1. What are the major technical, ethical, and pedagogical challenges associated with the integration of Artificial Intelligence in educational assessment?
2. What strategic approaches can be adopted to effectively address the identified challenges of integrating Artificial Intelligence into educational assessment systems?

Method

This study adopted a descriptive survey research design. The population of the study comprised lecturers in educational measurement and evaluation, ICT coordinators, examination officers, and selected secondary school administrators across tertiary institutions and public secondary schools in Imo State, estimated at approximately 1,200 personnel based on institutional staff records. Using purposive and stratified random sampling techniques, a sample size of 240 respondents, representing about 20% of the estimated population, was selected to ensure adequate representation of relevant stakeholders. Data were collected through a structured questionnaire developed by the researcher and administered electronically using Google Form to facilitate broad coverage and ease of response. The instrument consisted of items structured on a four-point scale designed to elicit information on perceived challenges and strategic interventions for AI integration in educational assessment. The questionnaire was subjected to face validation by experts in educational measurement and educational technology, while reliability was established through a pilot study involving 30 respondents outside the main sample, yielding a Cronbach's alpha reliability coefficient of 0.84, which indicated high internal consistency. Data collected were analyzed using mean and standard deviation to answer the research questions, with a criterion mean of 2.50 used for decision-making.

Results

Research Question One: What are the major technical, ethical, and pedagogical challenges associated with the integration of Artificial Intelligence in educational assessment?

Table 1: Mean responses on the major technical, ethical, and pedagogical challenges associated with the integration of Artificial Intelligence in educational assessment

S/N	Items	Mean	SD	Remarks
1	Inadequate digital infrastructure affects AI integration.	3.28	0.742	Agree
2	Poor electricity supply limits AI-based assessment implementation.	3.35	0.689	Agree
3	Lack of technical expertise hinders effective AI usage.	3.12	0.801	Agree
4	Concerns about data privacy pose challenges to AI adoption.	3.30	0.655	Agree
5	Algorithmic bias threatens fairness in assessment scoring.	3.18	0.734	Agree
6	Resistance from educators limits AI implementation.	2.96	0.812	Agree
7	High cost of AI tools affects institutional adoption.	3.22	0.703	Agree
8	Limited training opportunities reduce AI effectiveness.	3.26	0.677	Agree
9	Difficulty aligning AI tools with curriculum standards.	2.89	0.845	Agree
10	Lack of clear government policy affects AI integration.	3.31	0.691	Agree
	Grand Mean	3.19	0.735	Agree

Table 1 shows that all items on technical, ethical, and pedagogical challenges recorded mean scores above 2.50, with a grand mean of 3.19, indicating that respondents agreed these factors significantly hinder AI integration in educational assessment. Major challenges include poor digital infrastructure, unreliable electricity, lack of technical expertise, data privacy concerns, algorithmic bias, resistance from educators, high costs, limited training, difficulty aligning AI with curriculum standards, and unclear government policy. Thus, AI integration faces multiple significant obstacles that need to be addressed for effective implementation.

Research Question Two: What strategic approaches can be adopted to effectively address the identified challenges of integrating Artificial Intelligence into educational assessment systems?

Table 2: Mean responses on the strategic approaches that can be adopted to effectively address the identified challenges of integrating Artificial Intelligence into educational assessment systems

S/N	Items	Mean	SD	Remarks
1	Provision of stable digital infrastructure will enhance AI adoption.	3.41	0.622	Agree
2	Regular training for educators will improve AI implementation.	3.38	0.658	Agree
3	Development of national AI assessment policy is necessary.	3.44	0.601	Agree
4	Establishing data protection frameworks will improve trust.	3.29	0.709	Agree
5	Combining AI scoring with human moderation ensures fairness.	3.33	0.683	Agree
6	Periodic validation of AI tools improves reliability.	3.36	0.647	Agree
7	Stakeholder sensitization promotes acceptance of AI systems.	3.27	0.724	Agree
8	Government funding support will enhance AI infrastructure.	3.40	0.635	Agree
9	Collaboration between ICT experts and psychometricians is vital.	3.32	0.671	Agree
10	Continuous monitoring and evaluation strengthen AI effectiveness.	3.35	0.649	Agree
	Grand Mean	3.36	0.660	Agree

Table 2 shows that all ten items on strategic approaches recorded mean scores above the criterion of 2.50, with a grand mean of 3.36, indicating that respondents agreed these strategies can effectively address the challenges of integrating AI in educational assessment. Key strategies include provision of stable digital infrastructure, regular training for educators, development of a national AI assessment policy, establishing data protection frameworks, combining AI scoring with human moderation, periodic validation of AI tools, stakeholder sensitization, government funding support, collaboration between ICT experts and psychometricians, and continuous monitoring and evaluation. Therefore, these strategies are considered effective measures for overcoming the challenges of AI integration in educational assessment systems.

Discussion

The findings of this study revealed that respondents perceived several technical, ethical, and pedagogical challenges as significant barriers to the integration of Artificial Intelligence (AI) in educational assessment. Major technical challenges identified include inadequate digital infrastructure, unreliable electricity, and lack of technical expertise. These results were expected, given that previous studies have highlighted similar obstacles in the adoption of AI in educational contexts. Adiguzel, Kaya, and Cansu (2023) emphasized that effective AI integration requires stable digital systems and access to advanced technologies, while Wu (2023) noted that infrastructure deficiencies are a primary barrier in many developing regions. Similarly, the lack of skilled personnel aligns with findings by Nazaretsky, Ariely, Cukurova, and Alexandron (2022), who reported that teachers' limited proficiency with AI tools reduces the reliability and effectiveness of AI-driven assessments. The high mean scores suggest that respondents in this study were acutely aware of these infrastructural and capacity limitations, reflecting challenges that are not unique to Nigeria but resonate with global experiences in integrating AI in education.

Ethical concerns also emerged as significant challenges. Respondents agreed that issues such as data privacy, algorithmic bias, and lack of clear government policy hinder AI adoption in assessment. These findings are consistent with Elliott and Soifer (2022), who noted that AI technologies must be governed by robust data protection frameworks to ensure trust and fairness. Dergaa, Chamari, Zmijewski, and Saad (2023) further observed that algorithmic bias can threaten the fairness of machine-generated assessment results, particularly when AI systems are trained on incomplete or biased data. The confirmation of these ethical concerns in the current study was expected, as privacy and fairness issues have consistently been highlighted in recent AI-in-education literature. The agreement on the lack of clear government policy underscores the need for regulatory and institutional support, aligning with the observations of Kakungulu (2024), who emphasized that policy frameworks are essential for guiding AI adoption in educational assessment effectively.

Pedagogical challenges were also recognized by respondents as barriers to AI integration. Resistance from educators, limited training opportunities, and difficulty aligning AI tools with curriculum standards were reported as significant issues. These results were largely anticipated, reflecting the findings of Hennekeuser, Vaziri, Golchinfar, Schreiber, and Stevens (2024), who highlighted that teacher readiness and curriculum alignment are critical factors in AI implementation. The reported resistance and limited training opportunities align with Karsenti (2019), who argued that preparing teachers for AI integration is essential to overcome reluctance and ensure effective classroom adoption. The convergence of these findings with previous studies suggests that while AI has the potential to enhance assessment quality, its effectiveness is constrained by human and organizational factors that require deliberate interventions.

The findings further revealed that respondents agreed on the strategic approaches necessary to address these challenges. Key strategies identified include provision of stable digital infrastructure, regular training for educators, development of national AI assessment policy, establishment of data protection frameworks, combining AI scoring with human moderation, periodic validation of AI tools, stakeholder sensitization, government funding support, collaboration between ICT experts and psychometricians, and continuous monitoring and evaluation. These results corroborate recent empirical studies. Halaweh (2023) emphasized the importance of professional development and ethical safeguards in responsible

AI implementation, while Adiguzel, Kaya, and Cansu (2023) highlighted infrastructure and training as critical for maximizing AI's transformative potential in education. Similarly, Owan, Abang, Idika, Etta, and Bassey (2023) reported that collaboration among technical and pedagogical experts improves the alignment of AI tools with curriculum and learning objectives. The high agreement on strategic interventions was expected, given the acknowledged challenges, and demonstrates that stakeholders are aware of practical solutions that can mitigate technical, ethical, and pedagogical barriers to AI integration.

Comparing these findings with previous studies shows both convergence and contextual specificity. While global literature consistently identifies infrastructure, teacher readiness, and ethical considerations as key barriers (Cukurova & Luckin, 2018; Dergaa et al., 2023; Elliott & Soifer, 2022), the present study highlights their manifestation within the Nigerian context, particularly in Imo State, where limited resources and policy gaps exacerbate the challenges. The emphasis on strategies such as government funding support, stakeholder sensitization, and policy development reflects local needs that may be less pronounced in more technologically advanced settings. Moreover, the respondents' agreement on integrating AI scoring with human moderation aligns with findings from Vieru and Petrea (2025) and Wardat, Tashtoush, AlAli, and Jarrah (2023), who noted that hybrid approaches enhance both fairness and reliability, suggesting that contextually adapted strategies are crucial for effective implementation. Overall, the findings indicate that while the challenges of AI integration are substantial, informed and deliberate strategies can significantly enhance the adoption and effectiveness of AI in educational assessment, consistent with current empirical evidence in the field.

Conclusion

Based on the findings, it can be concluded that the successful integration of Artificial Intelligence in educational assessment depends not only on technological availability but also on addressing ethical and pedagogical factors through deliberate strategies. Effective implementation requires coordinated efforts, including infrastructure development, teacher capacity building, policy formulation, ethical safeguards, and stakeholder collaboration. When these strategies are applied, AI can enhance the fairness, reliability, and overall quality of assessment, positioning it as a valuable tool for improving educational outcomes.

Recommendations

Based on the findings, the following recommendations are made:

Schools and education authorities should invest in stable digital infrastructure, provide regular training for educators, and develop clear policies to ensure the effective and ethical integration of AI in educational assessment.

Educators and stakeholders should implement continuous monitoring, periodic validation of AI tools, and collaboration between technical and pedagogical experts to enhance the reliability, fairness, and acceptance of AI-driven assessment systems.

Policymakers should develop clear national policies and data protection frameworks for AI-driven assessment, while ensuring that AI scoring systems are periodically validated and combined with human.

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