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Transforming Educational Assessment in Higher Institutions: The Role of Artificial Intelligence -Driven Assessment

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Abstract

The introduction of Artificial Intelligence (AI) into higher education has emerged as a agent of change, particularly in the area of assessment. Traditional assessment methods, often constrained by time, resources, and human bias, are being redefined through AI-driven tools and technologies. This paper explores the unfolding roles of AI in transforming educational assessment in higher institutions. AI-powered systems, such as adaptive testing platforms, automated grading solutions, and predictive analytics tools, offer enhanced accuracy, ease of use, and personalised modes. These systems enable real-time feedback, foster individualized learning pathways, and reduce the workload on lecturers, allowing them to focus on higher-order teaching tasks. The study reviewed the limitations of traditional assessment methods, challenges and the future of artificial intelligence driven assessment Furthermore, the ethical considerations associated with AI-driven assessment, including data privacy, algorithmic bias, and the need for transparency, are critically analyzed. By examining successful implementations and ongoing research, this study highlights the potential of AI to revolutionize assessment practices, making them more equitable, efficient, and aligned with 21st-century learning objectives. Ultimately, this paper underscores the importance of a balanced approach that integrates human oversight with AI capabilities to ensure assessments that are not only technologically advanced but also pedagogically sound.

Introduction

In this accountability age, assessment is perceived an essential component of every educational setting and has a significant and direct impact on the lives of students and teachers. Assessment involves documenting a learner's knowledge, skills, attitudes, and beliefs in measurable terms (Capraro *et al*., 2011). Assessment supports and enhances students' learning (Shams and Iqbal, 2019), ensures and sets standards (Suwandi, 2023), and benefits both teachers and learners (Yamtima &

Wongwanich, 2014). Educational assessments enable universities to gauge how well students are meeting their academic goals, ensuring the quality and effectiveness of education. This process provides valuable feedback for students, parents, and management on areas that need improvement. It affects students' perceptions about learning, instruction delivery and curriculum, improves teaching effectiveness, enhances student learning, and aids in making informed decisions at various levels of the educational system (Mbelede, *et al*. 2024).

Furthermore, assessment has an emotional component that cannot be overlooked; it has a direct impact on learners' perceptions of their cognitive process (Exemina, 2021; Nobre & Villas-Boas, 2020). Despite the importance of assessment in education, some techniques employed for assessment are very similar to those used by earlier generations, in spite of the fact that modes of instruction delivery has transformed over time. It is worthy of note that this issue has not taken its pride of place in teacher education programs or policy debate. Given this reality, one might be tempted to say that assessment evolves at a slower rate than other pedagogical advances, such as changes in methods, approaches, strategies, and resources. One of the primary causes appears to be the difficulty of shifting long-held views about assessment. Beliefs must be reconsidered for true progress experienced in the way we teach and learn. Ghaicha (2016) and O'Shaughnessy (2022) also revealed a dysfunction in these old assessment models, evident in the institutional and instructional practices. In other words, we need to adapt the assessment paradigm that can better meet the needs of the rapidly changing 21st century-teaching and learning settings and practices.

The traditional educational assessment systems, often characterized by standardized testing, quizzes and periodic exams, and use of pen and paper focuses on short-term memorisation and recall with shallow understanding. This

conventional method of assessment evaluates if the students have learned the content and the level of knowledge acquired to assign grade, rank and compare them against standards or other learners while hiding the test rather than teaching the test (Brown 2004; Coombe *et al*, 2012; Nobre, 2021). Though there are other features that made traditional assessment unique in itself, Brown (2004), has systematized traditional assessment practices. One of the qualities mentioned by Brown is the use of assessment in a summative form, that is simply check learning at the end of a term/semester. Final exams are a good illustration of this, as they address the subject covered throughout the course and assess if students are ready to advance to the next grade or level. Another quality of this form of assessment is producing reliable results since its emphasis is on learners giving a single correct answer and does not give room for doubts. The grades gotten influence the level of feedback learners receive at the end of assessment. This therefore reveals that traditional assessment is focused on the product of assessment rather than the learning process. This tends to overlook the assessment of classroom interactions, Individual core skills (listening skills and grammatical and lexical knowledge) and knowledge (Nobre, 2021) exhibited in the course of instruction delivery. This has been a major criticism of the traditional assessment method. This traditional method has also long been criticized for its limited capacity to measure higher levels of comprehension in acquired skills and competencies of students. In the 21st century, where personalized learning and authentic assessment are becoming a priority, there is an increasing need for more dynamic, flexible, and continuous assessment methods. Artificial Intelligence (AI) offers a promising avenue to transform the landscape of educational assessments. AI-driven assessments can help educators measure not just knowledge retention but also problem-solving, creativity, collaboration, and critical thinking skills. This

paper explores the roles AI-driven assessments can play in improving the quality of education, promoting equity, and personalizing learning experiences.

Limitations of Traditional Assessments

Traditional assessments with its known characteristics of measuring only students' short-term knowledge and performance poses a concern for effectiveness, mostly when we consider teaching context that relies majorly on communicative and practical approaches and requires long-term knowledge. This method focuses on memorization and recall and does not offer opportunities for deep understanding or critical thinking. This narrow focus fails to reflect the diverse set of skills that students need to thrive in this modern world. In addition, traditional exams provide only a snapshot of student performance, often ignoring the complexities of learning processes over time. The traditional paradigm may leave little leeway for measuring true output and actual communication, as this type of assessment often promotes straightforward content repetition when employed in diverse fields and frequently ignores interactive performance. For example, mathematics problems given to students to solve are targeted at rote learning and to accept only one possible answer, which differs from how mathematics are used in real life. As a result, the validity of traditional examinations in such areas claiming to assess mathematics solving competence and critical thinking skills are unlikely to be high which is expected of valid and reliable instrument

Another key limitation is the standardized nature of these assessments, which can put students from different learning backgrounds and abilities in a disadvantaged position. Standardized tests have been criticized for perpetuating inequalities, static and monolithic as they often favour students who perform well under timed conditions or those who have access to better test preparation resources (Au, 2016; Dewey, 2021). This is not only inefficient but produce results that say little or do not

reflect at all core skills such as problem-solving, critical thinking and communication abilities. The high-stake nature of these tests can induce anxiety, affecting a student's performance and not reflecting true learner capabilities or understanding. Furthermore, Amplifier (2024) outlined more touching limitations of traditional assessment.

Static and Outdated

Traditional assessments are not designed to adapt to the rapidly changing skills landscape. As a result, they can become outdated quickly, failing to keep pace with new skills and knowledge requirements.

Lack of Real-world Application

Traditional assessments frequently focus on rote memorization rather than assessing a learner's ability to apply knowledge in practical, real-world scenarios. This disconnect can result in professionals who know the theory but struggle with practical application in their fields.

Limited Feedback

Once a test is completed, learners typically receive a score or grade, with minimal feedback on their performance. This approach can hinder the learning process, as it does not provide learners with insights into their strengths and weaknesses or areas that need improvement.

Surface Level Evaluation

Traditional assessments often measure a candidate's ability to memorize and regurgitate information rather than their understanding or ability to apply knowledge. This can result in professionals who are not fully prepared to tackle real-world challenges.

AI-Driven Assessments: A New paradigm

Artificial intelligence technologies have been adopted by different sectors for decades now. However, its potential is not yet fully utilised. Statistics have shown

that only 20% of AI projects succeed (De Cremer, 2024). This highlights AI's unrealized potential in all sectors including educational assessment, as well as the necessity for a more planned approach.

AI-driven assessments are reshaping the way educators and institutions evaluate student learning. These assessments, powered by machine learning algorithms and natural language processing, have the potential to address many of the shortcomings of traditional methods. This represents a significant leap forward in educational assessment. By providing real-time feedback, personalized learning experiences, and data-driven insights, AI has the potential to make assessments a more dynamic, interactive, and student-centered process. As AI-driven assessment tools become more widespread, they offer the possibility of more inclusive, equitable, and effective education systems in diverse ways as:

Continuous and Formative Assessment.

One of the most transformative aspects of AI-driven assessments is their ability to provide continuous and formative evaluations, unlike traditional assessments that occur at fixed intervals such as midterm or final exams. AI-driven assessments can be integrated in daily learning activities. This allows for a more holistic and ongoing evaluation of a student's progress and understanding. Tools like intelligent tutoring systems and AI-powered learning platforms can track student progress in real time and offer immediate feedback. This formative assessment model allows for adjustments to be made throughout the learning process, rather than waiting until the end of a course or semester (Mbelede, *et al*, 2024; Shute & Kim, 2014). This is key to creating personalized and adaptive learning experiences that cater for individual student needs.

Monitoring and Feedback

AI-driven assessments use algorithms to continuously track student performance in real time. These systems gather data from every interaction a student

has with the learning material, from answering questions to engaging with digital lessons. By analyzing this data, AI tools can identify patterns, recognize learning gaps, and provide feedback almost instantaneously. This contrasts sharply with traditional assessments, where students often wait days or weeks for results. For example, an AI-powered learning platform can monitor how a student approaches math problems. If the student consistently struggles with a particular concept, the system can immediately flag the issue and recommend targeted practice exercises. This continuous evaluation ensures that students receive feedback at the exact moment when they need it, fostering a more responsive learning environment (Shute & Kim, 2014).

Formative Assessments for Real-Time Adjustment

The formative nature of AI-driven assessments enables educators to make adjustments during the learning process, rather than waiting until after a summative test has been administered. Formative assessments are designed to give insight into students' learning as it happens, allowing teachers to intervene before gaps in understanding become significant. AI-driven assessments take formative assessment to a new level by automating the process of identifying areas for improvement. For instance, AI can track how long students take to answer specific questions or analyze patterns in their errors. With this information, the system can suggest personalized learning pathways, such as recommending additional tutorials, altering the difficulty level of subsequent questions, or providing tailored feedback. These real-time insights help educators customize instruction based on the specific needs of each learner (Pane *et al*., 2017).

Enhancing Student Engagement and Motivation

AI-driven continuous assessment can also have a positive impact on student engagement. Traditional assessments often feel like high-stakes events, creating

pressure and anxiety among students. In contrast, the low-stakes nature of continuous AI-driven assessments can help reduce anxiety and create a more positive learning environment. Since feedback is immediate and specific, students are more likely to see learning as an ongoing process rather than a one-time evaluation. This helps to keep students motivated and engaged with the material, as they can clearly see their progress over time (Shute & Wang, 2016). Additionally, AI-driven platforms can gamify assessments, making learning more interactive and fun. For example, game-based assessments can place students in problem-solving scenarios where they are assessed on their decision-making skills rather than rote memorization. The AI tracks their progress within the game, offering feedback and adjustments without the student even realizing they are being assessed. This form of "stealth assessment" can boost engagement and deepen understanding (Shute & Kim, 2014).

Personalization and Interventions

One of the greatest advantages of AI-driven formative assessments is the ability to provide highly personalized learning experiences. By continuously tracking a student's performance, AI systems can adjust the learning content to match their needs in real time. For example, if a student demonstrates mastery of a certain topic, the AI can present more advanced material to keep them challenged. Conversely, if a student is struggling, the system can slow down, offer remedial resources, or even change the teaching approach. This personalization also extends to targeted interventions. This therefore takes care of situations where teachers are often overwhelmed with large class sizes and may not have the time or resources to give each student individualized attention. AI-driven assessments can help by identifying students who need extra support and flagging them for the teacher. This

ensures that struggling students are not left behind and that they receive the help they need before gaps in understanding widen (Baker & Smith, 2019).

Data-Driven Decision-Making

Another key benefit of AI-driven assessments is that they generate vast amounts of data that can be used to inform educational decision-making. Teachers, school administrators, and policymakers can use this data to track trends in student performance, identify areas of curriculum weakness, and evaluate the effectiveness of teaching strategies. This data-driven approach allows for more informed decisions at all levels of the education system, ultimately leading to better student outcomes (Williamson, 2017).

Adaptivity

AI-driven assessments can adapt to the learning pace and style of each student. Through adaptive learning algorithms, AI systems can identify individual strengths and weaknesses and tailor assessments accordingly. For example, if a student struggles with a particular concept, the AI system can adjust the difficulty level of subsequent questions or suggest additional resources to reinforce learning. This personalized approach fosters a more inclusive learning environment by catering to diverse student needs (Pane *et al*., 2017).

Multidimensional Skill Assessment

AI enables the assessment of higher-order thinking skills such as problem-solving, creativity, and collaboration. For instance, AI-driven simulations or game-based assessments can immerse students in complex, real-world scenarios, where their decision-making, teamwork, and innovative thinking are tested (Shute & Wang, 2016). These types of assessments offer a richer and more authentic measure of student capabilities than traditional multiple-choice tests.

Equity and Fairness

AI has the potential to reduce biases inherent in traditional assessments. Machine learning algorithms can be trained to evaluate student work impartially, focusing on objective metrics rather than subjective human judgments. Additionally, AI systems can help identify and mitigate systemic biases by analyzing patterns in student performance data, enabling educators to address disparities in a more targeted manner (Baker & Smith, 2019). However, it is crucial to ensure that AI systems themselves are designed with fairness in mind, as algorithms can inherit biases from their training data if not carefully monitored.

Challenges and Considerations

While AI-driven assessments offer significant potential, they also present certain challenges that must be addressed.

Data Privacy and Security

AI-driven systems rely on large volumes of student data, raising concerns about privacy and security (Williamson, 2017). It is essential to implement robust data protection measures to ensure that sensitive student information is not misused or exposed to breaches.

Algorithmic Transparency

The decision-making processes of AI systems can be opaque, often referred to as the "black box" problem. Educators and students may struggle to understand how certain conclusions or scores are derived (Binns, 2018). To build trust in AI-driven assessments, it is important to design algorithms that are transparent and interpretable, allowing stakeholders to understand and challenge the outcomes when necessary.

Access and Digital Divide

The effectiveness of AI-driven assessments depends on access to technology, which can exacerbate the digital divide if not managed properly. Students from under-resourced schools or communities may lack access to the necessary devices or internet connectivity to fully benefit from AI-driven tools (Kamalov, *et al* 2023). Ensuring equitable access to technology is therefore a critical consideration in implementing AI in education.

The Future of AI-Driven Assessments

AI-driven assessments represent a transformative shift in the way educational outcomes are measured. In the future, it is likely that AI will enable even more sophisticated forms of assessment, such as emotional intelligence tracking through facial recognition, or the analysis of metacognitive skills by monitoring how students approach problem-solving tasks. Moreover, as AI systems become more integrated with other educational technologies, such as virtual and augmented reality, the potential for immersive, experiential learning assessments will grow.

To fully realize the benefits of AI-driven assessments, policymakers and educators must collaborate to create frameworks that prioritize ethical considerations, such as transparency, fairness, and equity. Additionally, ongoing professional development for teachers will be necessary to help them understand and utilize AI-driven assessments effectively in the classroom.

Ethical considerations of Artificial Intelligence for Assessment

The use of Artificial Intelligence (AI) for assessment in higher education growing with an alarming speed. This raises lots of ethical considerations regarding its use, ownership, accountability, and long-term implications for educators (Capitology, 2023) that need to be addressed to ensure fairness, inclusivity, and trust in the system. Addressing these ethical concerns is crucial for building trust and

ensuring that AI-driven assessments enhance, rather than hinder, the quality and equity of education in higher institutions (Ramnani, 2024). These include:

Bias and Fairness

Algorithmic Bias. AI systems which are trained on big data may unwittingly reinforce societal biases present in the training data, leading to unfair assessments for certain groups of students based on gender, ethnicity, socioeconomic background, or disability.

Equity. Ensuring that AI-driven assessments are equitable across diverse student populations requires rigorous testing and validation of algorithms.

Transparency and Accountability

Opaque Algorithms. AI models, especially those based on machine learning, often function as "black boxes," making it difficult for educators and students to understand how decisions are made. Transparency is vital to ascertain how decisions are made and who bears responsibility for them.

Accountability. Determining who is responsible for errors in assessment, whether it is the AI system, the institution, or the developers and this is a critical ethical issue. Clarifying accountability is particularly important when AI systems make errors or cause harm, ensuring appropriate corrective actions can be taken.

Data Privacy and Security

Student Data. AI systems require large volumes of personal and academic data, raising concerns about how this data is collected, stored, and used as the usage expands

Data Misuse. Unauthorized access or misuse of sensitive student data could have severe implications for student privacy and security. In AI, preserving students' privacy and human rights becomes paramount, necessitating robust safeguards

against data breaches, unauthorized access to sensitive information, and protections from extensive surveillance.

Impact on Learning and Development

Over-Reliance on Technology. Dependence on AI tools might undermine critical human judgment in assessing complex competencies like creativity, critical thinking, and ethical reasoning.

Student Agency. Excessive automation could reduce students' sense of ownership over their learning and assessment processes.

Accessibility and Inclusivity

Digital Divide. Not all students have equal access to the technology required for AI-driven assessments, potentially widening existing inequalities.

Adaptability. AI tools must be designed to accommodate students with disabilities, ensuring assessments are accessible and inclusive.

Ethical Use of Feedback

Feedback Sensitivity. AI-generated feedback should be constructive and sensitive to avoid negative psychological impacts on students.

Misuse of Insights. Predictive analytics used to track student performance must be used ethically to support, not penalize, students.

Recommendations for Ethical Implementation

For artificial intelligence to be proficiently used for assessment, there is need to attend to the above-mentioned ethical concerns. The researcher therefore recommends as follows

Bias Auditing. There should be regularly auditing of AI systems to identify and mitigate potential biases.

Transparency Frameworks. Institutions should develop clear policies to explain how AI assessments work and involve experts/stakeholders in their development.

Data Governance. There should be implementation of robust data privacy and security measures in compliance with regulatory standards.

Human Oversight. School administrators should ensure that lecturers remain actively involved in the assessment process to complement AI capabilities with human judgment.

Inclusive Design. The school management should engage diverse stakeholders in the design and deployment of AI systems to ensure they meet the needs of all learners.

Conclusion

AI-driven assessments hold great promise for transforming educational assessment by offering continuous, personalized, and multidimensional assessment of student learning. By addressing the limitations of traditional assessments, AI can help create more equitable and effective learning environments. However, careful consideration must be given to issues of ethical considerations, data privacy, transparency, and access to ensure that these tools are implemented responsibly. With thoughtful design and policy, AI-driven assessments can be a powerful tool in advancing educational outcomes for all students in Nigerian higher institutions.

Suggestions

Based on the discussion so far on how artificial intelligence-driven assessment can transform educational evaluation and help higher education institutions move towards more efficient, fair, and personalized assessments, enhancing the overall educational experience, the following suggestions were made:

1. Teachers should apply AI to analyze students' performance data so as to provide personalized assessments tailored to their learning pace and style. More so, by adapting questions and assessments based on individual strengths and weaknesses, AI enables educators to provide more accurate and effective evaluations of each student's abilities. This can lead to a more customized learning experience and improve overall student success.

2. Institutions of higher learning should provide AI systems that enable automated grading and feedback. These systems can automate the grading process for multiple-choice, short-answer, and even some essay-based assessments. By leveraging natural language processing (NLP), AI can analyze and provide feedback on writing, grammar, and structure. This reduces the grading workload for lecturers while also offering more immediate feedback to students, allowing them to improve more quickly.
3. Lecturers should adopt AI-driven assessments, this can help reduce human biases that often arise in grading. By standardizing evaluation criteria and focusing on data-driven performance metrics, AI can offer more impartial assessments, ensuring fairer outcomes for all students. This helps mitigate unconscious biases related to gender, race, or socioeconomic background.
4. Lecturers can adjust their teaching methods or provide targeted resources to ensure students stay on track through the use of AI systems. These systems have the power to continuously track students' progress and performance, providing real-time analytics to both students and instructors. This allows for timely interventions if a student is struggling or to identify students who may need additional challenges.
5. Institutions should come up with policies, guides and in-service training to help lecturers demphasise the use of traditional assessments that focus on high-stakes exams at the end of a course and embrace the use of AIs that enable continuous and adaptive assessments, where students are evaluated on an ongoing basis through quizzes, projects, and interactive tasks. This shifts the focus from rote memorization to a more holistic understanding of the subject, assessing both knowledge retention and application skills throughout the learning process.

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