

Exploring the Role of Artificial Intelligence Tools in Conducting Educational Assessment in Tertiary Institutions

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Abstract

Artificial Intelligence (AI) is revolutionizing various aspects of education, including the critical domain of assessment. AI technology tools provide numerous benefits for educational assessment by improving accuracy and efficiency, generating immediate results for students and enabling lecturers to adapt their lecture method that meet the desire needs of students. AI has the potential to transform the teaching and learning, and assessment. AI tools are transforming traditional methods of evaluating students' knowledge and skills by providing objectivity, and personalized insights. This paper explores the role of AI tools in educational assessment, its benefits, challenges, and future implications for educators, students, policy-makers. To fill the existing gap, the paper presents strategies to address these challenges and enhance the effectiveness of AI in educational assessment.

Keywords: Artificial Intelligence, AI Technology, Educational Assessment.

Introduction

Assessment is a cornerstone of education, providing educators with information about student learning progress and areas for improvement. Integrating AI tools into educational assessment offers innovative solutions to these problems by automating processes, providing real-time feedback, and personalizing learning experiences. Artificial intelligence is the simulation of human intelligence in machines programmed to think, learn, and make decisions (Valentine, et al., 2023). Artificial intelligence (AI) is a rapidly developing the field of technology through the use of intelligent machines capable of performing tasks that typically require human intelligence, such as understanding natural language, recognizing patterns, and making decisions based on it. AI is the ability of machines to adapt to new and evolving situations, solve problems, respond to questions, create plans, and perform other intelligent functions typically associated with humans (Valentine, et al., 2023). AI refers to the field of computer science that involves the creation of computer programs capable of

imitating intelligent behavior and, ideally, augmenting human capabilities (Naqvi, 2020). AI, a rapidly expanding discipline, involves the development of intelligent robots capable of imitating human thought processes and actions, finding utility in fields as diverse as medical diagnosis, self-driving, and education (Wardat et al., 2023).

In the education sector, AI has been able to grow significantly, thanks to its algorithms to provide advice, predictions, decisions, and learning in different contexts (Chen et al., 2022).

As higher education institutions seek to stay ahead in an ever-transforming educational environment, it is critical to understand both the opportunities AIED offers and the ethical, pedagogical, and technical challenges that come with its adoption. This understanding is essential to fully embrace this new educational horizon (Grájeda et al., 2024).

The acceptance of AIED technologies is also influenced by concerns about the risks associated with Artificial Intelligence in general and specifically with AIED. A

framework of AIED risks has been outlined, prioritizing aspects such as pedagogical incompatibility of AI, misuse of AI resources, potential liability, privacy vulnerability, lack of transparency, perceived risk, bias, and misinterpretation of the human-centered AI concept. These authors argue that managing these risks should be addressed at all stages, from design and development to the acquisition and application of these technologies (Rodway & Schepman, 2023).

The purpose of technology in higher education is not limited to simply transmitting information, monitoring or evaluating. Rather, its fundamental objective is to enrich the human thinking capacity and significantly improve the educational process (Popenici & Kerr, 2017). A.I. thus becomes a powerful ally for educators and students in their search for more effective and personalized learning in higher education (Grájeda et al., 2024),

Assessment in Education

Students are assessed to make resolutions about grades, placement, advancement, instructional needs, curriculum, and, in some cases, funding (Edutopia, 2018). Assessment is commonly associated with tests, examinations, and evaluations, it is gathering and analysing data that may be used to improve student teaching (Thomas, 2019). Thomas (2019) reveals that the measurement of student learning through assessment is important because it provides useful feedback to both teachers and students about the extent to which students are successfully meeting course learning objectives.

Assessment is an important component of the teaching and learning process in higher education at both undergraduate and graduate levels (Fisher, 2020). Sithulisiwe and Cosmas (2020) state that assessment is an ongoing process aimed at understanding and improving student learning. It is also important that educators establish the purpose of assessment, the criteria being measured, and the intended outcomes before meaningful assessment methods can be achieved. Thus, through

assessment, the course instructors can evaluate their teaching by measuring the extent to which students in the classroom are learning the course material (Sithulisiwe & Cosmas, 2020). Assessment is a process that permits higher education instructors to measure the knowledge students attained by providing evidence that meaningful teaching and learning have taken place. Assessment influences the teaching and learning methods used by instructors and curriculum planners. Curriculum planners through assessment can design suitable and specific units and lessons if students have to attain the desired goals of the course (Sithulisiwe & Cosmas, 2020).

Forms of Assessment

The following are some forms of assessment practice in the educational sector

Formative assessment involves the evaluation of student learning over time to measure students' level of achievement to enhance student learning during the learning process. It may include coursework or come at the end of a unit. Formative assessment helps students identify their strengths and weaknesses and reflect on how they need to improve before they get to summative assessment (Sithulisiwe & Cosmas, 2020).

Formative assessment refers to assessment for learning, which is meant to diagnose learning problems and improve learning. Menendez, Napa and Zambrano (2019) state that formative assessment is a continuous evaluation process that occurs during learning, based on the search and interpretation of evidence about students' performance and the scope of students' different goals, projections or objectives. Formative assessment must be meant to build into the improvement of the learning process by identifying the student's weaknesses and addressing them for improved learner attainment. The students require constructive and detailed feedback to assist them to improve in learning. Sithulisiwe and Cosmas (2020) state that feedback is only deemed important if the students can complete the feedback loop by utilizing the given feedback to improve their work. Kibble (2017) in an opinion defines formative assessments as those

intended to enrich the learning process by providing nonjudgmental feedback.

A summative assessment is implemented at the end of the course of the study to measure student's learning. A summative assessment is done at the end and it completes the learning and reveals the outcomes of the learning process, for example, the end of the year or final examinations (Sithulisiwe & Cosmas, 2020). Kibble (2017) states that summative assessments are usually applied at the end of a period of instruction to measure the outcome of student learning. Kibble further states that assessment often falls somewhere between these pure summative and formative poles, for example, when grade incentives are provided for assignments or quizzes during a course. There is a continuum of summative to formative assessments depending on the primary intended purpose, although feedback to learners should be a common feature. Both summative and formative testing have important effects on student's learning, and careful attention to the selection and deployment of each is needed. It is an age-old axiom that summative assessment drives learning since most college-level students will think hard about strategies to maximize performance.

Coyte (2017) points out that there are different methods of assessment which may be summative or formative depending on how the instructor implements them. These are self-assessment and Peer Assessment. Self-assessment is meant to enable students to develop their judgment. In self-assessment students are expected to assess both practice and product of their learning. The student becomes the focal point of the learning process in self-assessment and even though, instructors want to assess student's learning, students must participate in the assessment of their learning as well (Fontanillas, Carbonell & Catasus, 2016). There is also Peer assessment where students are expected to evaluate the work of their peers and have their own evaluated by peers. Peer assessment gives students possession of the learning process as they share their learning experiences with their peers (Sithulisiwe & Cosmas, 2020).

Self-assessment is growing as a crucial learning and assessment strategy in the higher education sector that is used to improve the quality of students learning as independent learners. Hence, the involvement of students in their own assessment process can increase their success rate (Bourke, 2018).

Challenges of traditional method of conducting Assessment

Olafare, Akinoso, Omotunde and Annenne (2017) identified the paper-based assessment with some challenges such as: tedious processes as the examination are conducted at various centres simultaneously and marked manually; high risks of accidents during travels by both the staff involved and the prospective students for the paper-based examination; cost of conduct of the examination on the part of the examination bodies including honorarium for invigilators, coordinators, markers, collators and other allied staff; subjective scoring and plausible manipulation of results; late release of results and missing grades; bank draft method of payment by candidates riddled by fraud, loss of money, time stress and trauma. The challenges of paper-based tests also involved heavy resources in terms of manpower and funding. The researchers concluded that a wide variety of options are now available for conducting assessment and technology is one of the most important and convenient for the conduct of assessment especially the use of Information and Communication Technology (ICT).

The evolution of Information and Communication Technology (ICT) has clear impacts on all aspects of human lives. The utilization of ICT in the conduct of Electronic Assessment (E-Assessment) is becoming one of the assessment standards globally, which is spanning all learning activities. Tertiary institutions in Nigeria are following the same trend in adopting e-assessment. Conduct of assessments using the conventional/traditional method of paper and pencil process of preparing assessments is becoming very cumbersome and costly in terms of human resources, time, papers, photocopying and ink. This is part of the reason why the Joint

Admission and Matriculation Board (JAMB) prefers to conduct examinations using the Computer-Based Test (CBT). E-assessment represents an important qualitative shift away from traditional methods such as paper-based tests. E-assessment represents an attractive option for higher education institutions looking to address the logistical problems normally associated with the increase in students' enrolment. E-assessment is playing an increasingly important role in the transformation of higher education on issues of how to utilize the full potential of e-assessment procedures towards the transformation of student and teacher assessment processes (Whitelock, 2010). The principles of validity, reliability, flexibility and fairness under assessment are still the same in an electronic environment (Emmanuel, 2020).

With the above challenges faced in the conduct of assessment, the need for the used of AI tools as one of the electronic methods of assessment in educational sectors becomes necessary.

The integration of Artificial Intelligence in educational sector (AIEd)

Artificial Intelligence introduction in Education (AIEd) has reshaped the learning experiences in higher education by allowing individuals to meet different needs of students. The changes, highlighted by Ocaña-Fernández et al. (2019), has reduce the gap between human intelligence and information communication technology which led to the effectiveness, efficiency and enhance educational system. AIEd significantly improves the teacher-student relationship by handling routine tasks, allowing teachers to focus on deeper interactions and student engagement (Kang & Im, 2013; Seo et al., 2021). Central to AIEd is the interaction between students and content, peers, and teachers, with student- teacher interactions being especially influential in the learning process (Assaf Silva, 2020; Brown & Moore, 2012; Martin & Bolliger, 2018). Despite the high rise and improvement in the use of AI's

influence on human aspects of education, some challenges are still encounter as Seo et al. (2021) identified some challenges such as unrealistic student expectations and the necessity for improved AI literacy among educators and learners (Long et al., 2021). These has reduced the relevance of introducing AI technological in the educational journey.

The importance and use of digital skills in educational sector in non-negotiable. The advantages of digital skills is using and operating the technological tools; the attitudes and skills needed to utilize these tools productively is also very important. Educational Institution have great responsibilities to acquire the potentials of digital competencies require to train and prepare students for evaluation in the evolving technological environment. Proper handling of digital competency generation gap is necessary for educational sector to gain from technological advancements (Grájeda et al. & Cogent Education, 2024), The influence and evolution of AI's technology in various sectors has brought about the ethical and responsible approach. Understanding and addressing the challenges posed by AI's opacity is crucial for its ethical integration into education (Memarian & Doleck, 2023).

Opportunities and threats of A.I. in education

The introduction of Artificial Intelligence (AI) in educational sector has improved the system whereby student-centered approach learning method is mostly considered. By automating students' assessment, AI facilitates personalized and adaptable learning experiences, thereby changing the educator's role. Both Teachers and students can now focus on nurturing advanced skills like critical thinking and creativity and avoid high task of traditional method of conduct of assessment and administrative work. However, the integration of AI in educational institutions faces challenges, such as resource limitations

and a need for proven effectiveness (León & Viña, 2017).

The collaboration between human and AI is becoming increasingly higher in education. A better knowledge and understanding AI's ethics, skills and social implications is important for effecting proper implementation. The use of learning tools such as chatbots, particularly in flipped classrooms, is an example AI's potential in improving distance learning. Chatbots is an AI tools use for learning to simulate human conversations. over the time it has been proven to be very reliable and effective in teaching and learning outcomes (Abbas et al., 2022; Baskara, 2023; Hew et al., 2022).

Chatbots are useful in flipped learning environments, because it facilitates group discussions, offer personalized feedback, and promote active learning (Diwanji et al., 2018; Gonda & Chu, 2019). Chatbot despite its important role to students' autonomy in learning process, it should complement, not replace, human interactions, necessitating educators' proficiency in utilizing these technologies effectively.

Applications of AI Tools in Educational Assessment

AI has transformed education in recent years, this growing importance of AI has attracted the interest of many researchers who have actively explored different methods to integrate various AI tools into the school environment (Halaweh, 2023; Mena-Guacas et al., 2023; Papapicco, 2020). With the increasing availability of data and the increasing sophistication of machine learning algorithms, AI has the potential to revolutionize the way we teach, learn, and assess student progress. Many benefits of using AI in education are presented.

Personalized learning tools and systems based on AI have the potential to customize learning experiences, boost the

productivity of teachers, and heighten student engagement (Mena-Guacas et al., 2023). AI can help create personalized learning plans for individual students based on their learning progress, strengths, and weaknesses. AI can identify students' learning needs by analyzing data from multiple sources such as assessments, homework, and quizzes and provide targeted feedback. Besides preparing lesson contents and learning experiences, AI tools can also be used for individualized instruction (Adiguzel et al., 2023). This can help students learn at their own pace and focus on areas, where they need more support. AI-powered adaptive learning software such as DreamBox and Knewton use data analysis to create personalized learning plans for students based on their strengths and weaknesses. For example, students can complete a pre-assessment test that generates a personalized learning plan with specific goals and recommendations.

Intelligent tutoring systems (ITS) is an AI-powered tutoring systems that can provide personalized support and feedback to students. This system if it be adopted, can improve students' learning styles and provide a link to instruction and support, which helps the students to improve their learning outcomes. It can help students to be motivated and be serious in their learning which provide immediate feedback. Carnegie Learning's AI-powered mathematics tutoring system provides immediate feedback and customized learning paths based on students' strengths and weaknesses. Management of tertiary institutions in collaboration with educators can use ITS to introduce individualized instruction to monitor student progress, and observe areas where students need improvement and support. Examples include ALEKS, Carnegie Learning, and Knewton. (Valentine et al, 2023).

Automated grading is another AI that help automate the grading process, saving time for teachers and providing students with immediate feedback on their assignments. AI

can provide immediate result on reports and written assignments easily. Using automated grading systems, Instructors, lecturers and staff of tertiary institutions can focus more on important tasks like research writing, laboratory practical as a result of significant time savings (Adiguzel et al., 2023). AI tools help students to improve their writing skills and reduce the workload for staff of tertiary institutions. Like Turnitin's AI-powered software uses natural language processing (NLP) for essays writing, check grammar, syntax and spellings for better output.

AI tools assist in Predictive analytics which is used to analyze student attendance, engagement, and performance data to predict future outcomes. This result can be used to fetch out students who need extra support, therefore guiding the lecturers and teachers to monitor students' progress and provide a better method of solving the problems. (Valentine et al, 2023)

Adaptive assessments is also an AI tools that create adaptive assessments that adjust the difficulty of questions based on student performance in real time. This personalized approach improves engagement and provides a more accurate measurement of student abilities. Adiguzel et al. (2023). Plagiarism detectors like Turnitin and Grammarly are example of IA tools that help identify instances of plagiarism, thereby ensuring academic integrity. These tools analyze large databases to compare submitted work with existing content. (Valentine et al, 2023)

Natural language processing tools can help students learn languages and improve their writing skills by providing feedback on grammar, spelling, and punctuation. These tools can also help students develop critical thinking skills by analyzing and evaluating arguments and evidence. These tools also allow teachers to analyze and interpret natural language data, such as student texts, discussions, and social media posts, to gain

insights into student learning and engagement. For example, Grammarly's natural language processing software provides real-time feedback on writing, including suggestions for grammar, punctuation, and sentence structure. This can help students improve their writing skills and produce higher-quality written work. Other examples include Google Cloud Natural Language, IBM Watson, and Microsoft Azure Cognitive Services. (Valentine et al, 2023).

Automatic Essay Scoring (AES) Software uses NLP algorithms to score and grade essays and writing assignments. Teachers can use AES software to provide students with immediate feedback on their writing, save time on grading, and ensure consistent and objective assessment. Examples include e-Assessment, Grammarly, and Turnitin. Adiguzel et al. (2023)

Computer-Based Testing (CBT) Platforms is a platform that allow teachers to administer online assessments, including multiple-choice, true/false, and quizzes. Teachers can use CBT platforms to assess student knowledge, save assessment time, and provide students with immediate feedback (Bassey et al., 2020). Examples include ExamSoft, JAMB CBT, UNICAL postgraduate e-exams, ProProfs and Questions.

Finally, Virtual Reality (VR) and Augmented Reality (AR) Tools VR and AR tools use immersive technologies to provide students with interactive and experiential learning experiences. Teachers can use VR and AR tools to engage students in hands-on learning activities, provide them with real-world experiences, and improve their learning outcomes. Examples: Google Expeditions, Merge Cube, and Nearpod VR. Adiguzel et al. (2023).

Benefits of AI Tools in Educational Assessment

Artificial intelligence (AI) is beginning to contribute to the development of best practices in educational assessment in the education

system. AI uses algorithms or neural networks to perform tasks that require intelligent behavior and can help analyze large amounts of educational data (Hamon, 2022)

1. Efficiency: AI can empower automated mechanisms to efficiently develop fair, valid, and reliable assessments, helping to meet the growing demand for quality assessments. AI automates repetitive tasks, allowing educators to save time and focus on teaching and mentoring.

2. Objectivity and consistency: Unlike human assessors, AI eliminates bias, ensuring fair and consistent assessments across diverse student populations.

3. Scalability: AI tools can assess large volumes of student work simultaneously, making them ideal for massive open online courses (MOOCs) and other large-scale educational programs. Unlike human intelligence, AI can be deployed and used to design and deliver assessments at scale in diverse contexts around the world.

4. Personalization: As educational assessments become automated, intelligent machines are better positioned to design and deliver personalized assessments that can facilitate learning. By analyzing individual learning patterns, AI tools deliver personalized learning journeys, ensuring that assessments are aligned with each student's unique needs.

5. Data-driven insights: Artificial intelligence is also capable of analyzing a vast amount of educational data, including student performance, engagement, and behavior. This data analysis can provide valuable insights into student learning patterns, identify areas for intervention, and help educators make data-driven decisions to improve instructional strategies and curriculum design.

6. Automated Grading in Assessment: AI can automate the grading process of assignments, quizzes, and exams. Using machine learning algorithms, AI systems can

assess and provide feedback on student work, saving teachers time and providing instant feedback to students. This allows teachers to focus more on personalized instruction and encourages timely feedback on student growth, such as suggesting corrections and identifying student errors (Memarian, 2023)

Challenges in Implementing AI for Assessment

Despite the benefits, there are still valid challenges of AI for educational assessment. Data Privacy and Security is critical problems are the violation of privacy and the uncertainty brought by AI. negative effects of ridesharing technology adoption (Cheng et al., 2022). Data organisation, collection, control, storage, use, archival, and destruction are all aspects of data governance. A specialised programme, defined policies and processes, as well as communication from organisational leadership and management, all work together to establish data governance. In general, the regulations must give the tools required to uphold the general standards, which include auditability, security, accessibility, availability, completeness, accuracy, integrity, and consistency (Owoc et al., 2019). The application of the characteristics associated with each technology is crucial for the efficient use of big data analytics and AI. The person has the knowledge and analytical abilities necessary to use comprehensive data analysis to aid in analysis and decision-making (Tong-n et al., 2022). The use of AI tools involves handling sensitive student data, raising concerns about privacy and data protection.

AI systems can inadvertently perpetuate biases present in their training data, leading to unfair assessments. The adoption of AI tools may exacerbate existing inequalities in education, as not all institutions or students have equal access to the required technologies used for assessment in tertiary institutions. There are also drastic changes in educational sector and institutions because some institutions may resist the integration of AI due

to lack of training, awareness or trust in the technology. The introduction of ChatGPT in tertiary institutions has raised a lot of concerns to the academic integrity, where issues like inaccuracies, biases, and the high-level plagiarism (Liu et al., 2023). The disadvantages of AI technology, like inability to form opinions, reliance on outdated information, lack of access to external databases, lack of referencing, prone to mathematical errors, and low creative and critical thinking, present significant challenges (Sullivan et al., 2023)

Future Implications and Recommendations

Educational assessment is currently undergoing a profound transformation due to the infiltration of AI. The existing literature reflects various trends regarding the development and application of AI in educational assessment. These trends can serve as a basis for further studies and research regarding the role of AI in assessing student learning and skills. To facilitate the specific application of AI in education, there is now There is a growing need to determine the trends and direction of AI applications, especially in the field of educational assessment. However, the effectiveness, innovation, validity and fairness of formal assessments in educational systems will crucially depend on a comprehensive understanding of the potential of AI tools and instruments (Kakungulu, 2024).

Investing in ethical AI development policymakers and developers must prioritize fairness, transparency and accountability in AI systems to ensure their equitable application in education for a better ethical and sanity in the system.

In addition, professional development programs should be introduced to equip educators with the skills to effectively use AI tools and interpret their results. There should also be a collaborative development for partnerships between educators, technologists

and policy makers to foster the development of AI tools suitable for different educational contexts. Continuous evaluation AI tools should be evaluated and updated regularly to meet new challenges and improve their accuracy and effectiveness.

Conclusion

The exploration of artificial intelligence (AI) in educational assessment has garnered significant interest, yet several gaps remain in understanding its full potential and implications. Here are key areas where further exploration is needed: In the area of equity and fairness, AI models in assessment often rely on historical data that may embed biases, leading to unfair evaluations. For instance, marginalized groups could be disadvantaged if the algorithms are trained on biased datasets. For this reasons fair and unbiased assessment ensures equity in education and maintains trust in AI system.

Human-AI collaboration is also a gap to be filled because the interplay between AI and educators in assessment processes remains underexplored. The questions about the balance of responsibility, trust and interpretability of AI recommendations persist. So, AI should be enhanced and not to replace the role of educators in assessments and ensuring human oversight. Ethical and Data Privacy for the use of students' data for AI assessments raises ethical concerns about consent, data ownership, and potential misuse. There should be clear guidelines and robust data governance frameworks needed for a responsible AI integration.

Finally, there is limited research on how IA-driven assessments influence students' motivation, self-perception and autonomy. Understanding this effect can help design AI systems that positively engage learners and support their growth. Addressing these gaps requires a concerted effort involving technological innovation, ethical considerations, and collaboration among stakeholders to ensure that AI-driven

educational assessment is effective, fair, and widely beneficial.

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