Vol.6 No.2 (2023)

Journal of Applied Learning & Teaching

ISSN : **2591-801X**

Content Available at : **http://journals.sfu.ca/jalt/index.php/jalt/index**

Rethinking online assessment strategies: Authenticity versus AI chatbot intervention

Augustine Osamor Ifelebuegu[A]

[A] *Professor, Institute of Education and Lifelong Learning, Victoria University Kampala, Uganda*

Keywords

Academic integrity;
AI;
chatbots;
ChatGPT;
conversational agents;
generative AI;
online assessment.

Correspondence

augustine.ifelebuegu@vu.ac.ug [A]

Article Info

Received 23 June 2023
Received in revised form 29 June 2023
Accepted 29 June 2023
Available online 3 July 2023

DOI: https://doi.org/10.37074/jalt.2023.6.2.2

Abstract

As artificial intelligence (AI) and chatbot technologies like ChatGPT continue to evolve, educators grapple with the risks and benefits these advances bring to online assessment. The democratisation of AI-based technologies, while offering personalised learning experiences, threatens online assessment legitimacy and academic integrity. This paper critically examines the intersection of AI chatbots and online assessments, in the context of their impact on the design of authentic online assessments. The widespread usage of AI chatbots has caused serious problems for the validity of online tests because of the possibility of student abuse. This underlines the need for 'authentic assessments' that concentrate on higher-order cognitive skills, problem-solving, creative thinking, and collaborative talents and calls for a reevaluation of conventional assessment methods. These types of assessments not only align with the evolving pedagogical needs of the 21st century but also present tasks that are significantly challenging for AI chatbots to replicate, thereby preserving their integrity. Conversely, the paper also explores how AI can facilitate the assessment process by automating certain tasks, providing personalised learning experiences, and supporting collaborative assessments. The era of AI chatbots presents an opportunity to rethink and enhance online assessments, making them more authentic, meaningful, and resistant to AI-assisted malpractice.

Introduction

In the realm of education technology, few innovations have been as intriguing and controversial as artificial intelligence (AI) and its application in chatbots. To contextualise the ensuing discussion, it is important to define what AI chatbots are. They are essentially programmed entities capable of interacting with humans in natural language and performing tasks that ordinarily require human intelligence (Daniel, 2020). In November 2022, OpenAI, a California-based company released the ChatGPT-3.5 language model which was followed by an updated version (GPT4) in March 2023. These Generative Pre-trained Transformers are able to perform language related tasks including answering questions, generating texts and many more (Rasul, et al. 2023). Since the release by OpenAI, several other chatbots have hit the markets and more continue to emerge on a weekly basis. These chatbots and AI tools are permeating educational landscapes, offering personalised learning experiences and immediate feedback (Zhao et al., 2021). However, they concurrently pose challenges to the authenticity of learning outcomes, as they can be misused to automate or assist in traditional assessments (Daniel, 2020, Rudolph et al., 2023a, Sullivan et al., 2023).

With the increasing prevalence of remote learning and online education, concerns over cheating in assessments have also risen. As an important component of online learning, assessments are crucial in assessing students' progress and understanding. However, online assessments can be vulnerable to various types of academic misconduct such as plagiarism, use of unauthorised aids, and repeated attempts. AI chatbots have precipitated significant shifts in pedagogical landscapes, offering unparalleled interactive capabilities (Abdelghani et al., 2022; MacNeil et al., 2022; Daniel, 2020). However, they also introduce new threats to the integrity of online assessments by providing means to automate or assist assignment completion (Daniel, 2020). Before the rise of AI chatbots, online assessment was already linked to greater instances of academic dishonesty (Clarke et al., 2023) as well as increased threats to academic integrity (St-Onge et al., 2022). The Covid-19 pandemic also produced a distinct set of circumstances that correlates with an increased number of academic dishonesty cases (Perkins, 2019; Henderson et al., 2022; Lancaster & Cotarlan, 2021) and the perceptions of academic dishonesty among students or academic staff (Amzalag et al., 2021; Reedy et al., 2021; Walsh et al., 2021). The rise of the use of AI chatbots in exam malpractice is expected to see a significant increase during online assessments, if educators do not rethink their assessment strategies. Hence, there is an urgent need for an overhaul of traditional assessment strategies. The thoughts expressed in this paper are based on a critical review of the existing and emerging body of literature.

AI chatbots: A double-edged sword

AI chatbots offer the promise of personalised, adaptive learning and immediate feedback (Zhao et al., 2021). Yet, they also pose challenges to the authenticity of learning outcomes, as they can be misused to bypass conventional online assessments (Daniel, 2020), creating both unethical and inequalities issues (Rasul et al., 2023). This duality raises the question of how to benefit from the potential of AI without compromising assessment integrity.

The promising edge: Advantages of AI chatbots

AI chatbots in education can contribute significantly to personalised learning experiences, providing adaptive instruction that adjusts to individual learners' needs (Daniel, 2020). By doing so, they can cater to a range of learning styles and paces, offering a more inclusive and accessible learning experience (Cheng & Chau, 2016). The immediacy of feedback that AI chatbots can provide is another advantage, allowing students to assess their understanding and adjust their learning strategies promptly (Zhao et al., 2021).

Moreover, AI chatbots can engage students in dialogic learning, simulating conversational interactions that promote active learning (Wegerif, 2006, Rudolph et al., 2023b). For instance, chatbots can ask probing questions to challenge students' understanding, fostering critical thinking and deep learning. They can also assist in formative assessments, providing immediate feedback on students' progress and guiding them towards improvement (Siemens et al., 2015). According to Rasul et al., (2023), the utilisation of chatbot technology has demonstrated beneficial impacts on various aspects of the learning process, including the enhancement of explicit reasoning capabilities, improvements in learning outcomes and knowledge retention, as well as a heightened interest and engagement in the learning process.

AI technologies can be utilised to automate and enhance various aspects of assessment design, delivery, and grading. For instance, AI can automate the generation of diverse, complex questions that assess higher-order cognitive skills, thereby reducing the manual workload for educators (Bridgeman et al., 2023; Gierl & Lai, 2013). Also, AI can be used to personalise assessments based on individual students' needs and progress, thus facilitating differentiated instruction and personalised learning (Vandewaetere et al., 2011; Stahl, 2023). Chatbot technology can also be seamlessly incorporated into assessment activities. For instance, students can critically analyse and refine text or essays generated by chatbots, thereby stimulating their existing conceptual frameworks and fostering critical thinking skills (Dennick, 2016). This method equips students with vital skills for interacting with systems like ChatGPT in future professional environments. AI can also assist in the grading of certain types of assessments. Automated essay scoring systems, for instance, can provide quick, objective grading and feedback on student essays (Shermis & Burstein, 2013). Similarly, AI systems can assist in the evaluation of complex tasks like coding assignments (Piech et al., 2015). These technologies can free up educators' time, allowing them to focus on other, more critical aspects of the teaching and learning process.

Notably, AI can play a role in supporting collaborative assessments as well. AI-based analytics can track and analyze individual contributions to group tasks, making it easier to evaluate each student's performance (Ferguson, 2012). Furthermore, AI can monitor and guide online

discussions, ensuring that all students participate equally and promoting critical thinking and effective collaboration (Chan et al., 2023). However, the use of AI in facilitating authentic assessments is not without challenges. Concerns include the potential for AI to make errors, the difficulty of programming AI to appreciate nuances in human responses, and the risk of over-reliance on technology. Moreover, the implementation of AI requires significant investments in technology and training, potentially exacerbating the digital divide and increasing inequality in education (Reich & Ruipérez-Valiente, 2019).

The perilous edge: Risks of AI chatbots

Despite the promising capabilities of chatbots powered by artificial intelligence, their misuse poses significant challenges to academic integrity. The same technology that facilitates personalised learning can be applied to tasks designed to assess a student's comprehension. An AI chatbot can be readily programmed to respond to multiple-choice questions, complete fill-in-the-blank tasks, and even generate brief written responses, thereby undermining the authenticity of assessments (Daniel, 2020). Moreover, students may become overly reliant on AI chatbots to answer their queries or solve their problems, impeding the development of critical thinking and problem-solving skills. Students may forsake the deep learning process in favour of AI-generated answers (Rasul et al., 2023; Pellegrini & Quellmalz, 2010), which could result in a rudimentary understanding of course content. According to Seo et al. (2021), if ChatGPT and other AI models are used for rapid and superficial learning, they may hinder the development of graduate-level skills such as critical thinking and problem-solving.

The difficulties posed by AI chatbots are not restricted to students alone. Educators may also become excessively reliant on AI for tasks such as grading, disregarding subtleties in student responses or missing opportunities to provide valuable feedback (Brusso et al., 2012). Concerns exist regarding factual bias and information falsification by these chatbots (Dwivedi et al., 2023; Firat, 2023). Inadequate data set training, for instance, can result in skewed AI models and outputs that reinforce learners' preconceived notions rather than assisting them in acquiring accurate knowledge.

Recalibrating assessment design: strategies and recommendation

With their capacity for personalised instruction and instantaneous feedback, AI chatbots can transform the educational experiences of students. The difficulty resides in maximising the potential of AI chatbots while mitigating the dangers they pose. This necessitates a reconsideration of assessment design and an emphasis on cultivating higher-order cognitive skills that are resistant to AI manipulation (Pellegrino & Quellmalz, 2010). Assessment designs should therefore engage students with specific tasks that require critical thinking which cannot be easily replicated by Large Language Models like ChatGPT (Rasul et al., 2023; Crawford et al., 2023; Iordanou et al., 2019).

Educators must also endeavour to maintain a human element in their instruction and evaluation, recognising that AI, despite its power, cannot replace human insight and sensitivity (Brusso et al., 2012). In addition to reevaluating pedagogical strategies, regulations and guidelines are required for the ethical use of AI in education. Institutions should educate educators and students about the advantages and disadvantages of AI and devise guidelines to prevent its misuse. To navigate the challenges presented by AI chatbots, evaluations must go beyond simple recall and comprehension tests (Pellegrino & Quellmalz, 2010). Assessments should target higher-order cognitive skills to ensure a realistic measurement of a student's comprehension and reduce the likelihood of AI-assisted responses.

Therefore, to safeguard the authenticity of online assessments in this AI era, a fundamental shift from traditional assessment paradigms is needed. The assessment design should shift away from evaluating students' end outputs, which have a high potential of being repeated by AI chatbots to assessing the students' learning process. Here, we examine some strategies to construct robust, Chatbot-resistant assessments:

Higher-order cognitive skills assessments

The design of our assessments has a significant impact on how students learn and interact with course materials. Traditional assessments frequently emphasise lower-order cognitive abilities, such as recall and comprehension, which are becoming increasingly susceptible to AI chatbot intervention (Pellegrino & Quellmalz, 2010). In a world where knowledge is readily available at our fingertips, or, more precisely, at the command of an AI assistant, these types of assessment tasks are swiftly becoming obsolete.

Higher-order cognitive skills assessments are an effective way to counteract this issue. They focus on skills like analysis, synthesis, evaluation, and creation – skills central to Bloom's revised taxonomy of educational objectives (Anderson & Krathwohl, 2001). Unlike lower-order skills, higher-order skills require a deep understanding of course content, creative and critical thinking, and complex problem-solving abilities (Anderson & Krathwohl, 2001). These skills, thus, are beyond the current capabilities of AI chatbots, reducing the risk of AI-assisted responses in online assessments.

Assessments designed to evaluate higher-order cognitive skills require students to actively engage with the learning material, encouraging deep learning (Marton & Säljö, 1976). For instance, students may be tasked to critique a theoretical perspective, design an experiment to test a hypothesis, or synthesize information from multiple sources to propose a solution to a real-world problem. Such tasks are complex, context-dependent, and often yield multiple viable solutions, rendering them resistant to current AI technology.

Notably, the advantages of evaluating higher-order cognitive abilities go beyond resistance to AI intervention. These assessments are more in line with the ultimate purpose of education, which is to prepare students for a world that is complex and swiftly changing (Reimers & Chung, 2018).

In today's knowledge-based economy, the capacity to analyse complex problems, generate novel solutions, and perpetually learn and adapt is more crucial than ever before (Autor et al., 2003). By emphasising higher-order cognitive skills, assessments not only maintain their authenticity in the age of AI chatbots, but also better prepare students for the challenges of the twenty-first century.

Contextual, problem-based assessments

Contextual, problem-based assessments are a practicable approach to authentic assessment design, especially in light of the growing use of AI chatbots (Gulikers et al., 2004). These assessments require the application of learned concepts to real-world scenarios, a task that requires a unique combination of knowledge, creativity, and critical thinking. Problem-based assessments anchor learning within a context, making it pertinent and meaningful for the learner (Hmelo-Silver, 2004). These duties require students to bridge the distance between theoretical knowledge and practical application, which necessitates a comprehensive and nuanced understanding of the subject. Due to their complexity and context-dependence, these evaluations are resistant to AI interventions, as they require a level of creativity and contextual reasoning that exceeds the capabilities of current AI.

While problem-based assessments offer substantial benefits, they also pose notable challenges. The design of these assessments is significantly more complex than traditional assessment types, requiring careful alignment of problems with intended learning outcomes (Boud & Feletti, 1997). Furthermore, grading can be challenging due to the open-ended nature of responses and the diversity of valid solutions

To mitigate these challenges, educators might consider using rubrics that specify criteria for different levels of performance, allowing for a more objective and structured evaluation of students' work (Jonsson & Svingby, 2007). Further, the use of AI technology could be explored to aid grading by identifying patterns of effective problem-solving or detecting elements of critical thinking within student responses (Siemens et al., 2015). Problem-based assessments, thus, serve as a critical tool in preserving the integrity of online assessments in the era of AI chatbots. Despite their challenges, their value in fostering deeper learning and inherent resistance to AI intervention make them a compelling choice for assessment design in a digital education landscape that is becoming increasingly pervasive.

Portfolio-based assessments

Portfolio-based assessments provide a comprehensive view of a student's learning journey, as they capture progress over time and demonstrate the student's capability across a variety of tasks and contexts (Paulson et al., 1991). Their personalised and longitudinal nature inherently adds complexity to the assessment process, making them more resistant to AI-assisted cheating (Barrett, 2007). However, portfolio-based assessments also present challenges that must be evaluated critically.

A portfolio is a purposeful collection of a student's work that showcases their efforts, progress, and achievements in one or more areas. It might contain a variety of work products, such as essays, projects, self-reflections, peer feedback, and evidence of skill application. In the era of AI chatbots, portfolios offer a unique advantage: they are highly individualised, grounded in the student's personal learning experience, and often involve complex tasks that require higher-order cognitive skills. This makes it difficult, if not impossible, for an AI chatbot to convincingly replicate or assist in creating.

Moreover, portfolios can also provide a multifaceted perspective of student learning, capturing not just what students know, but how they think and how their understanding evolves over time (Barrett, 2007). This is particularly important in a world where the ability to learn, adapt, and apply knowledge in diverse contexts is more valued than the mere acquisition of static knowledge (Dochy, 2001). However, there are several challenges associated with portfolio-based assessments. First, the evaluation of portfolios can be complex and time-consuming, as it requires a holistic review of diverse work products and often involves subjective judgements (Herman & Winters, 1994). Second, developing a meaningful portfolio requires a significant investment of time and effort from students, which may not be feasible in all educational contexts (Snadden & Thomas, 1998). Despite these challenges, portfolio-based assessments offer a robust means of preserving the authenticity of online assessments in the face of AI chatbots. They align with a comprehensive view of student learning, where the focus is not only on what students know, but also on how they think, learn, and apply knowledge.

Collaborative assessments

Collaborative assessments can serve as an effective approach to maintain the integrity of online assessments in the age of AI. They emphasise the social nature of learning, fostering an environment where students construct knowledge through dialogue and mutual engagement (Vygotsky, 1978). Despite their unique potential, collaborative assessments also introduce distinct challenges that need critical evaluation.

Collaborative assessments refer to those where students work together to complete a task or solve a problem. This type of assessment, underpinned by Vygotsky's theory of social constructivism, fosters a rich learning environment where students share ideas, challenge one another's reasoning, and construct knowledge collectively (Vygotsky, 1978). In the context of AI chatbots, collaborative assessments offer an additional layer of complexity. The collaborative process involves negotiation of ideas, empathy, conflict resolution, and mutual engagement – areas where AI chatbots are currently limited (Wooldridge, 2018). Collaborative assessments can manifest in various forms, such as group projects, peer assessment, and collaborative problem-solving tasks. The emphasis is on process as much as product, rewarding students for their collective effort, negotiation skills, and ability to reach consensus (Gillies

& Boyle, 2010). Collaborative assessments align well with 21st-century skills such as teamwork, communication, and intercultural competence, which are vital in our increasingly interconnected and diverse world (Trilling & Fadel, 2009).

However, implementing collaborative assessments comes with its challenges. Accurately assessing individual contributions to a group task can be difficult, potentially leading to 'free-rider' problems where some students benefit from others' efforts (Piech et al., 2013). Furthermore, collaboration may be hindered by issues such as unequal participation, groupthink, and conflicts (Davies, 2009). Finally, the logistics of coordinating group work can be challenging, particularly in large classes or in cases where students are geographically distributed.

Despite these challenges, the benefits of collaborative assessments make them an important consideration for authentic assessment design in the current era of technological advancement. When implemented thoughtfully, they offer a compelling solution to promote deep learning, develop critical 21st-century skills, and uphold the integrity of online assessments.

Implications and future considerations

AI's continual evolution mandates a dynamic approach to authentic assessment design. It falls to educators, institutions, and AI developers to build a balanced ecosystem where technology aids learning, rather than sabotage it. Institutions need to provide training and resources to help educators adapt their assessment designs to this evolving context. Simultaneously, AI developers need to consider educational needs and ethics when designing AI chatbots for educational use (Zhao et al., 2021). As we explore the future of online assessments in the era of AI chatbots, there are several key implications and considerations that educators, administrators, and policymakers must keep in mind:

Pedagogical shift: As technology continues to develop, so must our understanding of learning and evaluation. Authentic assessments that value higher-order cognitive skills, problem-solving, creativity, and collaborative abilities are increasingly necessary to replace rote learning and recall-based assessments (Binkley et al., 2012). This transition will necessitate modifications to the curriculum, instructional methods, and evaluation criteria.

Embracing technology: Educators should not view artificial intelligence chatbots as a threat to the integrity of online assessments, but instead consider how these technologies can be leveraged to improve learning and assessment. AI can automate repetitive tasks, provide personalised learning experiences, and aid in evaluating complex tasks, for instance. However, it is crucial to maintain a balanced approach that employs AI as an instrument to augment human judgement rather than supplant it.

Digital literacy: The extensive use of AI and other digital technologies in education necessitates an increased emphasis on digital literacy. Students must be educated on the ethical use of technology, including the improper use of artificial intelligence chatbots to deceive (Park & Park, 2016). In addition, instructors need training and support to utilise AI tools effectively and comprehend their limitations.

Equity considerations: Concerns about digital divide and equity are raised by the implementation of AI and other advanced technologies in education. Reich and Ruipérez-Valiente (2019) state that not all students have access to the necessary technology, reliable internet, or the abilities to use these tools effectively. Therefore, efforts should be made to ensure that technological integration does not exacerbate existing inequalities.

Data privacy and security: As AI technologies often involve the collection and analysis of substantial amounts of data, concerns about data privacy and security arise. Schools and educational institutions must ensure compliance with applicable data protection laws and employ best practices to safeguard the privacy and security of student information.

Research and evaluation: As novel assessment approaches are created and implemented, ongoing research and evaluation are indispensable. This will enable educators to comprehend the efficacy of various instructional strategies, make well-informed decisions, and continuously improve their practices.

Cultural Context: Cultural contexts have a significant impact on the development and administration of educational assessments. For instance, in Singapore, a nation renowned for its high-stakes, exam-based assessments, this method is profoundly rooted in their Confucian heritage, which values academic achievement and effort. Education is revered as a means of social mobility and success, which explains the prevalence of a rigorous, exam-centered system. This system places a strong emphasis on objective assessments to evaluate students' subject knowledge and comprehension. In spite of the fact that this may foster a competitive academic environment and high global rankings, critics assert that it may hinder creativity and holistic development. Consequently, cultural contexts must be taken into account when designing assessments, as they have a direct impact on the educational values, practices, and expectations of a society.

Conclusion

The advent of AI chatbots has introduced a unique challenge to the integrity of online assessments, leading educators to reevaluate traditional assessment methods. As we navigate this landscape, it is clear that assessments must evolve to maintain their authenticity and effectiveness in promoting meaningful learning. This exploration has underscored the importance of reshaping assessments to value higher-order cognitive skills, problem-solving, creativity, and collaborative abilities. Authentic assessments such as open-ended tasks, project-based assignments, collaborative assessments, and portfolio-based assessments not only align with these values but also pose a significant challenge for AI chatbots to replicate or assist in, thereby preserving their integrity. AI may also aid assessment rather than just being a danger. It can automate repetitive processes, personalise learning,

evaluate complicated tasks, and facilitate collaborative evaluations. AI in education should enhance human judgement, not replace it. New issues arise from assessment design and AI application. Digital literacy, educator training, equity, and data privacy and security must be prioritised. Research and evaluation are essential as we alter online exams. This will assist instructors in making educated judgements by continuously refining practices. AI chatbots are not a danger but a chance to restructure our evaluations to make them more real, relevant, and robust. With careful design, thorough analysis, and ongoing evaluation, we can guarantee that our assessments support deep learning and integrity in the digital age.

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