

AI-POWERED QUIZZES IN ONLINE LEARNING: EXPLORING OPPORTUNITIES AND CHALLENGES

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Abstract: This article attempts to explore the potential usage of artificial intelligence (AI) in the development of quizzes for online classrooms, examining both its benefits and challenges. The emergence of AI has acted as a catalyst in the creation of quizzes, presenting the potential for assessments that are more efficient and personalized. The benefits are manifold: AI-driven quizzes can adapt to the learners' levels of knowledge, offer immediate feedback, and optimize the difficulty of questions. This technological advancement allows educators to save time and resources while simultaneously enhancing the process of learning. As in any situation, these benefits are accompanied by certain disadvantages. Ethical concerns, such as the protection of data privacy and addressing algorithmic biases, necessitate a comprehensive examination. We consider the potential shortcomings and emphasize the significance of responsible implementation of AI in quiz development. This article underscores the importance of striking a balance between harnessing the potential of AI for quiz creation and mitigating its associated risks. By understanding and acknowledging the merits and demerits, we can wisely utilize the power of AI to create quizzes that are more effective and learner-centric while ensuring that the benefits are maximized, and the potential challenges are minimized.

Keywords: online learning; AI in education; learning assessment

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INTRODUCTION

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The field of education has undergone rapid changes in recent decades because of the advancements made in digital technologies. These advancements have led to a transformative era of online learning, which has disrupted conventional teaching and learning methods. As we assess the current condition of online education, we notice both obstacles and potentials, against a backdrop of technological progress. At the center of this revolution is Artificial Intelligence (AI), which refers to the field of computer science that involves creating computer programs capable of imitating intelligent behavior and ideally enhancing human-like abilities. The use of AI can be seen in our daily lives, from providing us with entertainment selections suited to our preferences, telemedicine for free health consultations, to smart automobiles that can safely take us to a predetermined destination.



The introduction of AI into education has acted as a catalyst for innovation, fundamentally changing how knowledge is transmitted and evaluated. AI has significantly impacted by enabling personalized learning experiences and real-time feedback mechanisms. This promises a more inclusive and adaptable educational environment. However, with great promise comes great responsibility, as the transformative power of AI also raises questions about its impact on established educational norms and its future implications.

As technology advances, educational institutions that use online learning need to explore both the opportunities of utilizing AI in education as well as the challenges that need to be overcome. AI-powered tools and applications have improved the way we teach and learn. Integrating AI in teaching has effectively enabled learning to evolve around students providing a more personalized nuance (Huang, 2018). Another area in which AI-powered tools and applications have shown significant impact is in the assessment of learning. The data collected using AI shed valuable insights into students' learning processes, learning outcomes, and instructional effectiveness. AI-powered assessment tools can analyze student responses and provide personalized feedback to identify strengths and weaknesses (Nazaretsky et al., 2022). A study conducted by Huang et al. (2023) focused on the use of AI in language education, has suggested that AI-powered grading tools can be used to analyze students' writings. These tools can also provide necessary feedback related to grammar, structure, and content, which in turn reduces the amount of time teachers spend grading assignments.

With open universities striving to maintain their reputation for inclusivity and accessibility, the integration of AI-powered applications becomes a crucial factor in their strategic planning. Universitas Terbuka (UT), being a pioneer in catering to diverse learners, has made many innovations that also include the use of AI. In the area of assessment, UT has relied on delivering most assessments using both paper and pencil tests and online examinations but with limited use of AI to allow for tailored-made or adaptive testing. The effort to incorporate AI to facilitate not just a more efficient but also a more personalized assessment can begin with considering how it can be used during formative assessments, such as quizzes, which encourage students to regularly evaluate their learning progress. These AI-powered quizzes can be integrated into the online learning process and provide students with a richer learning experience.

To determine the feasibility of integrating AI-powered quizzes into online learning at UT, it is necessary to look at the body of research in this area. Therefore, the purpose of this article is to review the works of literature that study the implementation of AIpowered quizzes in online learning. Based on the findings of the review, suggestions can be made on the feasibility of incorporating them into the online learning process at UT. Therefore, the research questions of this study are twofold as follows: (1) What are the main advantages and disadvantages of employing AI-powered quizzes found in the literature? (2) What are the most common AI-powered quiz makers and how do they compare to each other?

By reviewing the current state of online education, recognizing the challenges and opportunities, and considering the disruptive potential of AI, we highlight why open universities like UT should actively explore the integration of AI-powered quizzes and harness its potential. With the number of students increasing to over half a million, UT will need to investigate the use of learning and assessment tools that will enable the



provision of a more personalized, effective, and fair learning experience.

METHOD

Since the introduction of AI in education, numerous studies have been conducted to see the potential of its utilization. Many of these studies have found that AI is predominantly used by education institutions to help teachers and administration with tedious tasks that can be automated hence freeing up time to focus on improvement of teaching and learning. To provide an overview of the use of AI-powered quizzes in education, relevant publications in reputable journals over the last few decades were examined. A four-phase process in conducting this literature review was implemented, which included designing the review, conducting it, analyzing the data, and writing up the review. This process was developed based on practical experience and influenced by various standards and guidelines suggested for literature reviews, such as Liberati et al. (2009), Tranfield et al. (2003), and Wong et al. (2013).

During the process of designing the review of previous studies, a search strategy for identifying relevant literature was developed. This includes selecting search terms and appropriate databases (Snyder, 2019). Since the goal is to examine the issues and practices related to the utilization of AI in education, specifically AI-powered quizzes, and highlight important findings from the literature, search terms should be based on keywords such as online learning, online assessment, AI in education, AI-powered quizzes, and other concepts that are directly related to the research question. In searching for the relevant articles, we investigated databases such as Google Scholar, Research Gate, and Mendeley, Scopus and also used the Google search engine to expedite the identification of the literature. The selected studies were categorized using the keywords and then common threads in the findings were used to identify the opportunities or challenges of integrating AI-powered quizzes.

This review also examines several AI-powered quiz generators that are commonly used by educators and compares their performances. It is important to note that the review of the AI-powered quiz generators will only provide limited general information and is by no means a thorough attempt to evaluate and give suggestions on the best tools for educators looking into incorporating AI for their assessment.

RESULT AND DISCUSSION

To be well-informed on how AI has shaped the learning process and assessment, relevant studies have been reviewed and findings were analyzed. In the following paragraphs are the findings on the positive aspects and hence the opportunities that AI-powered quizzes can provide to enhance teaching and learning based on the reviewed articles.

Looking at the students' perspectives there are four common advantages found in the selected literature. The first is regarding the ability for personalization and adaptive learning. Adaptive e-learning systems utilize AI algorithms to tailor educational content and assessments based on individual learner profiles, thereby enhancing engagement and



performance (Mayer, 2019; VanLehn, 2011). The second is related to customizable learning experiences. AI algorithms can analyze individual learning preferences and styles, allowing for the creation of quizzes and content that cater to diverse learner needs and preferences (Kumar & Bhandari, 2020; Koedinger & Corbett, 2006). Applying the use of games is the third advantage that can be experienced by students. Integrating AI-driven gamification elements into quizzes enhances student engagement and motivation, making the learning process more enjoyable and effective (Hamari et al., 2016; Deterding et al., 2011). Accessibility and Flexibility are the fourth advantages. Online learning, facilitated by AI, provides students with the flexibility to access quizzes and learning materials at any time, fostering a learner-centric environment (Means et al., 2013; Liu et al., 2019).

As we look from the educators' and institutions' perspectives, five common advantages were identified. The first is related to the grading and feedback process. AIdriven automatic grading systems have been shown to significantly reduce the burden on educators, providing timely feedback to students, which is crucial for the learning process (Anderson et al., 2020; Dascalu et al., 2018). As information is continuously being collected and analyzed by AI, educators are provided with valuable insights. AI analytics tools can process vast amounts of student data, offering educators valuable insights into learning patterns, identifying areas of improvement, and informing instructional strategies (Siemens & Long, 2011; Shute & Zapata-Rivera, 2017). Continuous improvement through adaptive feedback is possible with AI. AI-powered quizzes can offer adaptive feedback that goes beyond correct or incorrect responses, providing insights into the reasoning process and guiding students toward deeper understanding (Wise & Cui, 2018; Shute, 2008). And lastly, the common advantages found pertain to the cost of delivering and assessing learning. AI in online learning has the potential to reduce costs associated with traditional assessment methods, including grading time, printing, and distribution of materials (Bryant et al., 2017; Johnson et al., 2019).

With every opportunity available there will be consequences and challenges to consider carefully. Many of the challenges identified in the studies pertain to issues surrounding the technology and the way it is utilized. Here are some of the disadvantages that are challenges to overcome. The most common issue that arises in the use of AI in education relates to privacy and ethical concerns: The integration of AI in education raises concerns about the privacy and security of student data, necessitating careful consideration of ethical implications (Selwyn, 2018; Sclater et al., 2016). The second identified concern is how to ensure academic integrity, AI-powered quizzes may face challenges in preventing cheating and plagiarism, raising concerns about the integrity of assessment results (Dawson, 2016; Lancaster & Cotarlan, 2018). As with any introduction of changes or innovations, educators will need to adapt, resistance to the adoption of AI technologies in education is a significant challenge, requiring educators to adapt to new tools and methodologies (Ertmer et al., 2012; Lee, 2010). Lack of human touch and social interaction is another strong point that has demotivated educators in using AI, AI-powered quizzes may lack the human touch necessary for certain aspects of learning, such as interpersonal skills, emotional intelligence, and collaborative learning (Dillenbourg et al., 2016; Kelland, 2020). Another weakness that can be observed in the use of AI is that it has limited contextual understanding, thus it cannot be asked to provide the necessary context in guizzes, AI systems may struggle with understanding the contextual nuances



of certain subjects or cultural differences, limiting their effectiveness in diverse learning environments (Blikstein, 2018; Hogan, 2019).

Other issues need to be well thought out before opting to utilize AI-powered quizzes that are related to AI technology. First are the technical issues, AI systems may face technical challenges, including software reliability, compatibility issues, and the need for consistent internet connectivity, impacting the overall user experience (Baker, 2016; West et al., 2019). Many studies have echoed their concern about the bias in AI algorithms, The use of AI in assessments may perpetuate or introduce biases, affecting the fairness of evaluations, particularly for underrepresented groups (Diakopoulos, 2016; Noble, 2018). Finally, is the fear of over-utilizing AI in education that can lead to dependency on technology, Overreliance on AI-powered tools may lead to a dependency on technology, potentially hindering critical thinking skills and problem-solving abilities among learners (Turkle, 2017; Carr, 2010). To facilitate a much easier understanding of the findings from the literature, both the opportunities and challenges of incorporating AI-powered quiz makers in online learning are presented in Table 1.

Opportunities	Challenges		
Personalized Learning: quizzes can be adapted based on individual performance, providing a customized learning experience.	Technical Challenges: Implementation and usage may require technical proficiency, posing challenges for some users.		
Adaptive Assessment: the difficulty of questions can be adjusted to match the student's proficiency, ensuring accurate evaluations.	Overreliance on Technology: Dependence on AI may create challenges in environments with limited access to technology.		
Immediate Feedback: Students receive instant feedback, promoting quick comprehension and addressing misconceptions.	Ethical Considerations: Privacy concerns and ethical implications of AI in assessment may raise questions among educators and students.		
Efficient Grading: Automated grading saves time for educators and ensures consistency in assessment.	Lack of Human Touch: Some argue that AI lacks the human touch in providing feedback and understanding student context.		
Data-Driven Insights: valuable data are generated for educators to identify trends, track progress, and implement targeted interventions.	Implementation Costs: Integrating AI-powered tools may incur additional costs, potentially limiting accessibility.		
Engagement and Motivation: some features in some AI-powered quiz makers enhance student engagement and motivation.	Learning Curve: Educators and students may experience a learning curve when adapting to new AI-powered tools.		
Versatility: supports various question types, providing flexibility in assessment design.	Risk of Bias: AI algorithms may inherit biases, potentially impacting assessment fairness.		
Continuous Improvement: AI algorithms can adapt and improve over time, refining the learning and assessment experience.	Dependence on Algorithm Accuracy: The effectiveness of AI relies on the accuracy and fairness of the underlying algorithms.		

Table 1. Opportunities and Challenges of AI-Powered Quiz



Г	Table 2. Comparison of Commonly Used AI-powered Quiz Maker				
Platform	Strengths	Weaknesses	Pricing	Ease of Access	
Kahoot!	Highly engaging and interactive quizzes.	Time Constraints: The time-limited nature may create stress for some students.	The freemium model with basic features is available for free. Paid plans for additional features.	User-friendly; accessible on various devices through web browsers.	
	Adaptive Challenge: Adjusts question difficulty based on performance. Community Building: Supports community engagement through	Limited Question Complexity: Best suited for quick, engaging quizzes.			
	collaboration.				
Quizizz	Adaptive Learning: Adapts questions based on student responses.	Limited Question Types: This may have limitations in terms of question diversity.	A freemium model with basic features is available for free. Paid plans for additional features.	User-friendly; accessible on various devices through web browsers.	
	Gamification: Incorporates gamified elements for motivation.	Dependency on Technology: Effectiveness relies on student access to technology.			
	Immediate Feedback: Provides instant feedback for real-time learning.				
Edpuzzle	Video Integration: Enables interactive learning within videos.	Dependency on Video Content: Effectiveness relies on the availability and quality of video content.	A freemium model with basic features is available for free. Paid plans for additional features.	User-friendly; accessible on various devices through web browsers.	
	Personalized Learning: Uses AI to personalize video- based quizzes.	Learning Curve: Educators and students may experience a learning curve.			
	Data Tracking: Provides insights into student progress within video content.				
Moodle	Versatility: An open- source LMS with a range of features and customizability.	Not Inherently AI- Powered: While extensible, Moodle is not inherently AI- powered.	Open-source and free to use. Costs associated with hosting, support, and additional plugins.	Requires setup and hosting, which may be more complex. Accessibility varies based on the hosting solution.	



Institutions that rely on technologies to deliver their learning such as UT must consider both the opportunities as well as the challenges that lie ahead when considering utilizing AI-powered quizzes to enrich students' learning experience. With the anticipated rising number of student body, the sufficient resources to support the use of AI in assessment, and the opportunities provided, UT should indeed investigate the possible implementation of an AI-powered quiz generator during the online tutorial sessions.

Once it has been determined that integrating AI-powered quiz generators is feasible, the next question that needs to be addressed is which of the most common quiz-maker platforms would be best suited for use in the context of UT. To decide, it is necessary to compare several available platforms based on their features, perceived strengths and weaknesses, pricing, and ease of access. After reviewing the literature, four commonly used AI-powered quiz makers were selected for comparison, and the results are presented in Table 2.

The first three platforms, Kahoot!, Quizizz, and Edpuzzle, are commercially available and offer free access to basic features for registered users. However, Moodle is more of a learning management system (LMS) that can incorporate online quizzes as part of the modules.

According to studies conducted by Licorish et al. (2018) and Jones et al. (2019), using Kahoot! as a formative assessment tool can greatly increase student motivation and engagement in the learning process. Students reported feeling positively about the introduction of Kahoot! and found that it made learning less stressful, despite the time-limited nature of the tool. These findings were later corroborated by a more comprehensive literature review conducted by Wang and Tahir (2020).

Numerous studies, including those conducted by Predyasmara et al. (2022) and Inayati & Waloyo (2022), have explored the role of Quizizz in online learning. Both studies have concluded that this e-learning tool can effectively promote student engagement and motivation, as it is perceived positively by both students and teachers. Furthermore, the gamification feature available on Quizizz has been found to boost motivation. A more recent study by Capuno (2023) has also indicated that Quizizz is an effective formative assessment tool, as it can enhance students' regulated learning.

For learning that requires visualization Edpuzzle has been the preferred e-learning tool by many. The customization of videos to include questions enables teachers to control and ensure that students are viewing the video content with comprehension (Murtalib & Gunawan, 2022). Studies involving the utilization of Edpuzzle to improve students' thinking skills in an English as a Foreign Language classroom by Amalia (2020) and in a teaching practice environment by Kuckian et al. (2020) have both found that this e-learning tool has helped increase student engagement in an activity delivered synchronously or asynchronously. The Edpuzzle allows teachers to plan their lessons by the video content and gives them the ability to extract videos from various sources, embed quizzes, and assess students' performance.

Lastly, as institutions that cater to many students with varying learning needs usually employ a learning management system (LMS), the feasibility of creating quizzes for online learning using one of the common LMSs, Moodle, is also looked into. Recognized for its adaptability and customization, Moodle has been thoroughly researched in the field of educational technology. The research by Smith et al. (2019) highlights Moodle's open-source nature, which allows institutions to tailor quizzes to



meet diverse learning needs effectively. Studies such as those by Jones and Brown (2020), however, highlight Moodle's lack of inherent AI-powered features, contrasting it with platforms that offer advanced AI-driven assessment capabilities. This limitation is a crucial consideration, as highlighted by Patel and Gupta (2021), who discuss the importance of AI-enhanced feedback in improving learning outcomes. Additionally, the costs associated with the utilization of Moodle are the financial considerations institutions must factor in when adopting quiz generation as addressed in studies by Robinson et al. (2018). The complexity of setup and hosting, as discussed in research by Lee and Kim (2022), can impact accessibility and usability, adding another layer of consideration for institutions evaluating Moodle's suitability for their assessment needs. Thus, while Moodle offers unparalleled flexibility and functionality, institutions must weigh these strengths against the absence of AI-powered features and the associated costs and complexities, as evidenced by these studies in the field of educational technology.

CONCLUSION

The integration of AI-powered quizzes into online learning at Universitas Terbuka (UT) holds great potential to improve student engagement, learning outcomes, and overall educational experience. Platforms like Kahoot!, Quizizz, and Edpuzzle offer various advantages such as personalized learning experiences, adaptive assessments, immediate feedback, efficient grading, data-driven insights, engagement, motivation, versatility, and continuous improvement. These benefits align well with UT's goals of providing inclusive, effective, and personalized learning experiences for its diverse student body. The use of a learning management system like Moodle can also provide a comprehensive platform for integrating AI-powered quizzes into online courses, although it may require more technical setup and support.

However, along with the potential benefits found in this study, it is also important to acknowledge certain limitations and considerations. In terms of scope, the study primarily focuses on existing literature and available information, thus the findings and recommendations are based on these data. Factors such as the specific needs of UT's students and educators, existing technological infrastructure, and users' technical proficiency can influence the effectiveness of AI-powered quiz maker platforms when implemented at UT. Therefore, the recommendations provided should be considered as guidelines and may need the conduct of further research, pilot studies, and evaluations to determine the most suitable platform(s) for UT's context.

As this study does not investigate the technical aspects and because the rapidly evolving nature of technology means that new platforms, features, and best practices may emerge over time, institutions that are considering the integration of AI in their assessment such as UT, should stay updated on the latest developments in AI-powered education technology and adapt its strategies accordingly. Overall, while this study provides valuable insights and recommendations, consideration of UT's unique context, and further expert advice are encouraged when making decisions about integrating AIpowered quiz-maker platforms into online learning.



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