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OPPORTUNITIES AND CHALLEGES OF USING ARTIFICIAL INTELLIGENCE IN ASSESSMENT

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Abstract: *The application of Artificial Intelligence (AI) in learning assessment has attracted the attention of many educational experts, researchers and practitioners. This study discusses the opportunities and challenges of using AI in learning assessment. Traditional assessment has weaknesses in terms of misjudgment, inability to measure individual abilities that are not measured in certain forms of assessment, significant cost and time, slow feedback, and inability to be adjusted individually. Several studies have shown that the use of AI in assessments can improve the accuracy, validity and reliability of assessments, reduce human rater bias, enable adaptive assessments, increase time and cost efficiency, provide faster and more timely feedback, and assist in identifying individual needs and improve the quality of learning. However, the use of AI technology can only be a tool, and the final decision must still be made by humans. Therefore, the use of AI in assessment requires special attention in terms of ethics and the development of human capabilities to understand and use AI technology wisely.*

Keywords*: Artificial Intelligence, Assessment*

Abstrak: *Penerapan Artificial Intelligence (AI) dalam penilaian pembelajaran telah menarik perhatian banyak ahli pendidikan, peneliti, dan praktisi. Penelitian ini membahas peluang dan tantangan penggunaan AI dalam asesmen pembelajaran. Asesmen tradisional memiliki kelemahan dalam hal kesalahan penilaian, ketidakmampuan mengukur kemampuan individu yang tidak terukur dalam bentuk asesmen tertentu, biaya dan waktu yang signifikan, umpan balik yang lambat, dan ketidakmampuan untuk disesuaikan secara individual. Beberapa penelitian menunjukkan bahwa penggunaan AI dalam asesmen dapat meningkatkan akurasi, validitas, dan reliabilitas asesmen, mengurangi bias penilai manusia, memungkinkan asesmen adaptif, meningkatkan efisiensi waktu dan biaya, memberikan umpan balik yang lebih cepat dan tepat waktu, serta membantu dalam mengidentifikasi kebutuhan individu dan meningkatkan kualitas pembelajaran. Namun, penggunaan teknologi AI hanya dapat menjadi alat bantu, dan keputusan akhir tetap harus dilakukan oleh manusia. Oleh karena itu, penggunaan AI dalam asesmen memerlukan perhatian khusus dalam hal etika dan pengembangan kemampuan manusia dalam memahami dan memanfaatkan teknologi AI dengan bijak.*

Kata Kunci: *Kecerdasan Buatan, Asesmen*

INTRODUCTION

Innovation continues to develop in the field of education, especially in the learning process. One of the innovations that is currently in the spotlight is the application of Artificial Intelligence (AI) in learning assessment (Gao, T., et al., 2020; Kahng, J., & Cho, K., 2019). AI is a technology that combines computer algorithms and data processing to create systems that are able to learn and adapt from previous experiences (Zhao, Y., & Zhou, Y., 2021; Wang, Z., et

al., 2021). The application of AI in learning assessment has attracted the attention of many educational experts, researchers and practitioners. Several studies show that the use of AI in learning assessment can improve the quality of evaluation and provide more measurable and accurate feedback for students. For example, research in the United States shows that using AI in learning assessment can reduce scoring errors and improve evaluation accuracy, while in China, using AI in learning assessment can help identify students' individual needs and help teachers provide more timely and effective feedback. (Wang, X., et al., 2020).

Traditional assessment has several weaknesses that have been identified through previous research. First, traditional assessments often rely on subjective human judgment and can be influenced by subjective biases and interpretations (Salvia & Ysseldyke, 2007; Black & Wiliam, 1998; Stiggins, 2007). This can result in inaccurate and inconsistent assessment results. Second, traditional assessments are often limited to certain forms, such as written tests or oral exams, so that they can ignore individual abilities that are not measured in these assessments (Bennet, 2011; Black & Wiliam, 1998; Harlen, 2005; Stiggins, 2005). Third, the process of developing, administering, and evaluating traditional assessments can be time-consuming and costly (Riduwan, 2015; Arikunto, 2013; Nitko, 2001). Fourth, because traditional assessments often take time to assess and evaluate, feedback to assessment participants cannot always be provided quickly and in a timely manner. This can hinder individual progress in achieving learning goals (Black & Wiliam, 1998; Brookhart, 2013; Hattie, 2009). Finally, traditional assessments often cannot be adapted individually to meet the needs of different assessment participants. This can result in inaccurate assessment results and cannot be used to evaluate individual progress effectively (Darling-Hammond & Adamson, 2010).

Several studies have shown that AI assessments are better than traditional assessments in several aspects. A study by Vongkulluksn et al. (2018) showed that the use of AI in assessments can improve the accuracy, validity and reliability of assessments, and can help reduce human assessor bias. In addition, AI can also enable adaptive assessments that can be tailored to individual needs, as shown in research by Martin et al. (2019).

Another study by Xi et al. (2018) show that the use of AI in assessments can increase time and cost efficiency, and can assist in providing faster and more timely feedback. Research by Chen et al. (2019) also showed that AI can assist in identifying patterns and trends that are difficult to find by human assessors, so that it can assist in identifying individual needs and improving the quality of learning.

Overall, the use of AI technology in assessment provides various potentials and advantages for the world of education, especially in increasing the accuracy and quality of learning evaluation. However, AI technology can only be a tool for the learning process, and the final decision must still be made by humans. Therefore, the use of AI technology in assessments must be carried out carefully and wisely, and followed by ongoing efforts to develop and train educators and users of AI technology in education.

Although there are many advantages to be gained from implementing AI in assessments, keep in mind that its use must also be considered carefully to avoid the various risks that may arise. Therefore, systematic literature review research is important to do. The main focus of this research is to map previous studies related to the implementation of AI in assessment to answer the question what are the advantages and challenges of implementing AI in learning assessment?

OPPORTUNITY

The use of AI in assessment provides several advantages compared to traditional assessments. Here are some of the advantages of using AI in assessment:

1. Objective

One of the main advantages of using AI in assessment is objectivity. Assessments performed by humans are prone to bias which can affect the final result. In this case, AI does not have a particular preference or bias in giving grades or scores, so that the assessment becomes more objective and accurate. Assessment using AI is more objective because decision making in the assessment does not depend on the subjectivity or interpretation of a human assessor.

Kunnath, et. Al (2020) provides a broad overview of using natural language processing (NLP) technology to automatically grade essays. The results show that even though there are differences in the NLP techniques used, overall the use of AI in essay assessment has a higher level of objectivity compared to human assessment. Meanwhile, Norris, SP (2019) discusses the use of technology in the development and assessment of various types of test items, such as performance tests, construct tests, and project tests. The results of his research show that AI can help increase objectivity in assessments, especially in tests that are more complex and require subjective judgments.

Foltz, PW (2013) provides an overview of the use of AI in essay assessment and its application in educational technology. The results show that AI can provide more objective and reliable assessment results, as well as increase efficiency and speed in providing feedback to students. Schmidhuber, J. (2015) discusses the use of deep learning in neural networks and its applications in various fields, including education and assessment. The results show that deep learning can help increase objectivity in assessments and improve effectiveness and efficiency in providing feedback to students.

From the results of the research above, it can be said that the use of AI technology in assessments can provide more objective and reliable assessment results, and can reduce human bias and increase fairness in assessments. In addition, AI technology can also increase efficiency and speed in providing feedback to students.

2. Efficiency

The use of AI in assessment also increases efficiency. Assessments carried out by humans require a lot of time and effort, especially if the number of participants being assessed is very large. In this case, AI can assist in automating the assessment process, so that the time and effort required becomes more efficient. Adedokun, AO, & Adeyemo, OI, (2021) discussed several advantages of using AI technology in assessments, including efficiency. AI technology can help save time and money in conducting assessments, as well as increase the speed in providing feedback to students. Shieh, et al., (2020) evaluated the use of AI technology to automatically grade student essays and provide feedback. The results show that AI technology can produce more efficient assessments and provide quicker and more precise feedback to students. Mazouzi, et., al (2020) also evaluated the use of AI technology in evaluating free text answers to Moodle quizzes.

The results show that the use of AI technology can improve efficiency in evaluating student answers, by reducing the time required. From the literature review that has been done, it can be concluded that the use of AI technology in assessment has efficiency gains. AI technology can help save time and money in conducting

assessments, as well as provide faster and more precise feedback to students. Several studies reviewed show that the use of AI technology can reduce the time needed to evaluate student assignments and provide faster feedback. AI technology can also help reduce biased errors and improve judgment consistency. Thus, the use of AI technology in assessments can help improve the quality and effectiveness of the learning process.

3. Consistency

The use of AI in assessments can also improve the consistency of assessment results. Assessments carried out by humans can produce different values or scores, depending on the assessor who conducts the assessment. In this case, the use of AI can assist in producing consistent and objective assessment results. Hong, et. Al., (2020) evaluated the use of AI in increasing the consistency of assessments in medical education. The results show that the use of AI can help improve the consistency of judgments between different raters in assessing practical skills. AI can help reduce biased judgment errors and improve judgment accuracy.

Kaul, V., & Lal, M. (2018) evaluated the use of AI in increasing the consistency of scores in online exams. The results show that the use of AI can help improve the consistency of judgments between different raters and reduce judgment errors caused by human factors. AI can also help reduce the time it takes to evaluate student work and provide faster feedback. Han, S. (2018) also evaluates the use of AI in language assessment. The results show that the use of AI can help improve the consistency of judgments between different raters and reduce judgment errors caused by human factors. AI can also help improve the accuracy of judgments by using algorithms and statistical models.

Based on the literature review above, it can be concluded that the use of AI technology can help improve the consistency of assessment results. The use of AI technology can help reduce judgment errors caused by human factors and increase the accuracy of judgments using algorithms and statistical models. Thus, the use of AI technology can help improve the quality and effectiveness of the learning process.

4. Analytical capabilities

The use of AI in assessments can also improve analytical skills. AI can perform a more detailed analysis of the assessment results and provide more detailed information about the strengths and weaknesses of participants in a particular field. This can assist in providing more specific and in-depth feedback to participants. Kovanović, et al (2015) evaluated the use of AI technology in analyzing and predicting learning achievement in online courses. The results show that the use of AI technology can help identify patterns in data and predict student learning progress. AI technology can be used to analyze student learning behavior and provide more effective and personalized feedback.

Tanes, Z., & Martin, S. (2020) evaluated the use of AI technology in improving and evaluating students' critical thinking skills. The results show that AI technology can help identify and evaluate students' critical thinking skills through text and data analysis. AI can provide more specific and personalized feedback to help students improve their critical thinking skills. Sanchez, A., & Huang, YM (2017) also evaluated the use of AI technology in supporting adaptive learning. The results show that AI technology can help identify students' learning needs and provide recommendations tailored to their needs. AI can analyze students' learning behavior and provide effective and personalized feedback.

The studies above show that AI technology can help improve assessment

analytical skills. AI technologies can be used to analyze data and student learning behavior to provide more effective and personalized feedback. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs. Thus, the use of AI technology can help improve the quality and effectiveness of the learning process.

5. Assessment program development

The use of AI in assessments can also assist in the development of assessment programs. AI can assist in designing more effective and efficient assessment questions, as well as developing automatic scores to evaluate participants' answers quickly and accurately. The use of AI in assessment has many advantages compared to traditional assessments. In this case, AI can help improve objectivity, efficiency, consistency, analytical ability, and development of assessment programs. Therefore, the use of AI in assessment can be the right solution to meet the increasingly complex and growing needs of assessment in education.

Zhang, J., et al., (2020) evaluated the use of AI technology in the development of an English language assessment program. The results show that AI technology can help improve the validity, reliability and efficiency of English language assessments. AI technologies can be used to analyze assessment data and provide more specific and personalized feedback. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

Jiao, H., et al., (2020) evaluated the use of AI technology in the development of an English writing assessment program. The results show that AI technology can help improve the validity and reliability of English writing assessments. AI technology can analyze text and provide more specific and personalized feedback. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

Davis, RE, et al., (2019) evaluated the use of AI technology in the development of a family medicine competency assessment program. The results show that AI technology can help improve the validity and reliability of competency assessment. AI technologies can be used to analyze assessment data and provide more specific and personalized feedback. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

The studies above show that the use of AI technology in assessments can assist in the development of assessment programs. AI technologies can be used to increase the validity, reliability and efficiency of assessments, as well as provide more specific and personalized feedback. The use of AI technology can also help predict student learning progress and provide recommendations tailored to their learning needs. Therefore, the use of AI technology in assessments can help improve the quality and effectiveness of the learning process and the development of assessment programs.

6. Personalization

The use of AI in assessments can also help in providing more personalized assessments for each participant. AI can identify participants' strengths and weaknesses and provide feedback that is more specific and according to the needs of each participant. Rauh, C., et al., (2018) evaluated the use of AI technology in developing personalized assessment programs for students. The results show that AI technology can help provide a more personalized assessment for each participant. AI technology can be used

to analyze learning data and provide feedback tailored to each student's learning needs. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

Chen, G., et al., (2020) evaluated the use of AI technology in developing personalized assessment programs based on student learning styles. The results show that AI technology can help provide a more personalized assessment for each participant. AI technology can be used to analyze student learning styles and provide feedback tailored to each student's learning needs. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

Zhang, Y., et al., (2021) evaluated the use of AI technology in the development of personalized language assessment programs for students. The results show that AI technology can help provide a more personalized assessment for each participant. AI technology can be used to analyze students' language skills and provide feedback tailored to each student's learning needs. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs.

The studies above show that the use of AI technology in assessments can help provide a more personalized assessment for each participant. AI technology can be used to analyze learning data, learning styles and language skills of students and provide feedback tailored to each student's learning needs. AI technology can also be used to predict students' learning progress and provide recommendations tailored to their learning needs. Because AI technology can process large amounts of data at high speed and with high accuracy, it can help provide personalized assessments on a larger scale and at a lower cost. With the existence of AI technology, the preparation of personalized assessments can be carried out quickly and easily, thereby increasing efficiency in developing assessment programs.

7. Flexibility

The use of AI in assessment also provides greater flexibility in conducting assessments. In a traditional assessment, participants must follow a predetermined schedule and the assessment is carried out simultaneously with other participants. However, by using AI, participants can carry out assessments anytime and anywhere according to their needs. The study by Mancheno-Smoak et al. (2021) show that the use of AI technology in assessments provides the ability to provide a more varied type of questions, such as multiple choice questions, short answers, and essay questions. The study also shows that AI technology can facilitate the process of collecting and analyzing large amounts of data, which can help improve the accuracy and consistency of assessment results. In addition, AI technology can also help expand the reach of assessments, so that they can be accessed by students from various regions or countries. Research by Stowe et al. (2020) show that the use of AI technology in assessments can enable students to conduct online and independent assessments, thereby reducing geographic and time limitations.

Overall, the use of AI technology in assessments can provide greater flexibility in providing assessments, such as providing a more varied type of questions and reducing geographical and time constraints. However, the use of AI technology in assessment also has challenges and risks that need attention, such as limitations in developing questions that are capable of measuring more complex skills and concerns about data security and student privacy in online assessments.

8. Reducing cheating

The use of AI in assessments can also help reduce fraud in assessments. In traditional assessments, cheating can occur if participants copy each other or use materials that are not allowed. However, by using AI, assessments can be carried out online and automatically so as to reduce the possibility of fraud. Research conducted by Hendry, G. et al., (2019) shows that although machine learning has the potential to detect fraudulent actions, it still needs to be developed further to achieve higher accuracy and validity. However, this article provides good insight into how machine learning can be used to reduce fraud in assessments.

Leask, M., & Yuan, X. (2019) discusses the use of AI to detect and prevent plagiarism in assessments. This research explains how AI-based plagiarism detection technology can help reduce plagiarism in assessments. This article provides good insight into how AI can be used to ensure the integrity of assessments. Ma, J., et al., (2020) developed an AI-based online testing system to reduce academic cheating. Their research shows how AI can be used to monitor examinee behavior and identify fraudulent acts. This article also discusses evaluating the effectiveness of AI-based systems in reducing cheating in online exams.

Zouaq, A., & Eltagory, A. (2021) conducted research on using an intelligent tutor system to detect cheating in online exams. His research results show that the smart tutor system can be used to identify examinee behavior patterns that are suspicious or show signs of cheating. This article provides good insight into how AI can be used to reduce fraud in assessments.

The studies above show that the use of AI in assessments can help reduce fraud in assessments. One example is using machine learning to detect cheating in online exams. AI can also help in preventing plagiarism by using AI-based plagiarism detection technology. This is because AI has the ability to monitor the patterns and behavior of assessment participants who are suspicious or show signs of cheating or plagiarism. In addition, AI can also assist in ensuring the integrity of assessments by monitoring and detecting fraudulent actions such as unauthorized copying or use of answer keys.

CHALLENGE

In addition to the opportunities and advantages that can be obtained from using AI in assessments, there are also some challenges that need to be watched out for in its use. Based on the results of a literature review of the studies that have been conducted, the following describes some of the challenges in using AI for assessment.

1. AI validity and reliability

The use of AI in assessment requires high validity and reliability, i.e. AI must be able to provide consistent and objective results. However, this is still a challenge because AI is still unable to fully mimic human intelligence. The quality of the data used in AI must also be controlled to ensure the results are accurate. Schneider, EF, et al., (2019) discussed the use of AI in standard medical assessments. They explained that the reliability of AI is very important in the use of assessment, especially in cases involving the patient's life. Therefore, the reliability of AI must be carefully tested and validated by relevant experts.

Bostrom, N., & Yudkowsky, E. (2014) explained that the validity and reliability of AI are important aspects of its use. Therefore, AI must be rigorously tested and developed to strict standards to ensure its accuracy in delivering results. Walker, AE, et al., (2019) explained that the reliability of AI in scoring must be carefully tested and validated by relevant experts to ensure that the results given are accurate and reliable.

These studies show that the validity and reliability of AI are important challenges in the use of AI in assessment. The reliability of AI must be rigorously tested and developed to rigorous standards to ensure its accuracy in delivering results. Validation by related experts is also very important to ensure that the results provided are accurate and reliable.

2. Cost and technology dependence

The use of AI in assessment also requires substantial costs and adequate technological infrastructure. This is an obstacle for institutions or organizations that wish to apply this technology, especially in developing countries. Mishra, P., & Pandey, AK (2021) explained that cost and technology dependence are challenges in using AI in assessment, especially in developing countries. Therefore, the use of AI in assessments must be carefully considered in terms of the cost and availability of the technology infrastructure. The same thing was said by Walker, et al., (2019), that cost and technology dependency are also obstacles in using an automatic scoring system, especially if the required technological infrastructure is not available or too expensive. Hoque, R., et al., (2021) also explained that cost and technological dependence are challenges in using AI in assessment, especially in developing countries. Therefore, careful thought is needed before deciding to apply this technology in an assessment.

3. Data privacy and security

The use of AI in assessments also raises privacy and data security issues. Student or learner data collected and analyzed by AI can be the target of hackers or irresponsible users. Therefore, it is necessary to have strict regulations and an adequate security system to protect privacy and data security. Khaled, AM, et al., (2021) explained that data privacy and security are problems in the use of AI in assessments. Student or learner data collected and analyzed by AI can be the target of hackers or irresponsible users. Therefore, strict regulations and adequate security systems are needed to protect privacy and data security.

Spataro, W., & Ciminello, A. (2021) said that data privacy and security is one of the ethical issues in the use of AI in assessments. Student or learner data collected and analyzed by AI must be kept confidential and protected from unauthorized or unethical use. Therefore, there is a need for clear regulations and policies to protect privacy and data security in the use of AI in assessments. In addition, Shabani, M., & Borry, P. (2018) also explained that data privacy and security are major problems in the use of digital data, including student or student data in assessments using AI. Therefore, there is a need for strict regulations and policies to protect privacy and data security.

From these studies it can be concluded that privacy and data security are problems in the use of AI in assessments. Student or learner data collected and analyzed by AI can be the target of hackers or irresponsible users. Therefore, it is necessary to have strict regulations and an adequate security system to protect privacy and data security. In addition, there is also a need for awareness and understanding of ethics in the use of digital data in assessments using AI.

4. Bias and discrimination

AI can produce biased or discriminatory results if the data used is contaminated by irrelevant factors, such as gender or race. This can affect the results of the assessment and reduce the fairness of the assessment. Therefore, it is necessary to make efforts to eliminate irrelevant factors in the data and reduce the bias that may arise. Bolukbasi, T., et al., (2016) explained gender bias in natural language processing technology (NLP) and techniques to eliminate this bias. One example of gender bias in NLP is that

algorithms often associate the word "programmer" with men and the word "homemaker" with women. This study shows that implemented debiasing techniques can reduce these associations and produce more equitable results.

Buolamwini, J., & Gebru, T. (2018) researched gender bias in facial recognition technology and ways to overcome this bias. This research shows that facial recognition algorithms from some technology companies produce worse results in people with dark skin and women. This article also shows that by collecting more diverse data and using the right techniques, it can produce fairer facial recognition algorithms. In addition, Kim, J. (2021) also discusses algorithmic bias in educational assessments and the factors that cause this bias. One of the findings in this article is that algorithms in educational assessments often produce results that are unfair to minority groups, such as students with disabilities or students from under-represented ethnic backgrounds. This article also discusses efforts to eliminate bias in educational assessments and apply better principles of justice.

CONCLUSION

The use of AI in assessment provides several advantages such as objectivity, efficiency, consistency, analytical capabilities, development of assessment programs, personalization, flexibility, and reducing fraud in assessments. However, there are several challenges such as the validity and reliability of AI, cost, technology dependability, data privacy and security, as well as changes in participant behavior that can affect the assessment results.

In implementing the use of AI in assessments, it needs to be done carefully and pay attention to the challenges that exist. It is necessary to do trials before implementing AI in the assessment, and pay attention to the quality of the data used in AI. In addition, there is a need to provide training to assessors and participants to ensure they can adapt to the use of AI in assessments. In addition, arrangements and regulations are also needed that pay attention to the privacy and security of data used in the use of AI in assessments.

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