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Use of Artificial Intelligence in Teaching, Learning and Assessment

Rahul Kumar[1]; & Dr Ajeet Kumar Rai[2]

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Abstract: Artificial intelligence (AI) is set to revolutionize the intelligence sector by developing innovative techniques for teaching, learning, and assessment. AI enables faster personalization of student learning experiences. Real-time feedback helps gauge student progress more accurately. Grading and assessment are also streamlined. These systems can track the student's development and adjust difficulty levels and content. Chatbots that integrate with AI can provide 24/7 support to students handling their queries. Assessment, too, is an area where AI could make a big difference. Automated grading systems can save teachers time and resources. This efficiency in evaluating students' work gives teachers more freedom to focus on other tasks. Automatic systems can evaluate structured questions in various formats. They can also assess free-response answers in natural language. This allows for feedback tailored to areas where students need improvement. Artificial intelligence can be used to detect areas where students are facing challenges or are having an easy time. This enables teachers to tailor their teaching methods to the effect they have on each student. However, there are risks in using AI in education. Concerns include data privacy, bias, and the potential to worsen existing inequalities. AI can significantly transform teaching, learning, and assessment. Yet, any AI product used should be implemented cautiously, considering these risks.

Key-words: AI in education, AI in Teaching, AI in learning, AI in assessment, AI in evaluation

Introduction: Artificial intelligence (AI) has been gaining importance and changes how humans' function in everyday activities, workplaces, and schooling (Cope et al., 2021). Regarding education, AI is expected to significantly enhance the teaching, learning, and assessment methods (Kannan & Munday, 2018). AI technology equips teachers and learners with tools to customize learning experiences, develop flexible teaching strategies, and evaluate performance in real time (Kem, 2022). AI-generated learning enables teachers to analyse each student's learning preferences, strengths, and deficiencies, allowing them to adjust opportunities accordingly (Marin et al., 2019). This personalization allows students to learn independently while educators provide targeted support as needed (Kim et al., 2022). AI helps teachers identify struggling students and provide timely interventions (Murphy, 2019). AI creates systems that engage students, answer questions, and provide directions (Jensen et al., 2022). These chatbots are beneficial, especially for learners who are shy or embarrassed about seeking assistance from their teachers directly.

Artificial intelligence: Artificial intelligence (AI) is a field of Computer Science focused on creating machines that perform tasks requiring human intelligence (Murphy, 2019). These AI systems use cognitive processes, like learning and reasoning, to automate various tasks (Pokrivcakova, 2019). Technology has existed for a while, but advancements in machine learning and natural language processing have broadened its capabilities. AI is used in healthcare, finance, manufacturing, transportation, and education (Mageira et al., 2022; Park et al., 2022; Sathish

[1]Research Scholar, Faculty of Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India. *(Corresponding author)*
[2]Associate Professor, Faculty of Education, Banaras Hindu University, Kamachha, Varanasi, Uttar Pradesh, India.

& Dhanabalan, 2018). One of AI's primary advantages is its ability to process and analyse vast amounts of data quickly and accurately (Mehriddin et al., 2021). This creates AI-driven tools to help businesses and organisations make informed decisions based on data insights. AI is a rapidly evolving domain that can transform many facets of our lives (Asmar, 2022).

Pedagogy and AI: Pedagogy is the art and science of teaching, while AI (artificial intelligence) involves machines mimicking intelligent behaviour (Jiao & Ouyang, 2021). Integrating pedagogy and AI could revolutionise education by offering personalised, adaptive learning experiences (Apoki et al., 2022). AI-driven educational tools analyse student data to identify struggling areas and provide tailored materials and activities for improvement. AI assists teachers in evaluating student performance and providing feedback, thereby enhancing teaching efficiency and effectiveness (Bond et al., 2019).

AI in Teaching: AI provides teachers with the latest tools and resources to enhance teaching (Luceno-Massaro et al., 2021). It examines students' performance, finds out what has not been learned, and suggests teaching methods (Jiang et al., 2020). AI-based virtual tutors and digital assistants help instructors answer students' questions, provide feedback, or grade their work (cf. Zawacki-Richter et al., 2019). It also aids curriculum development by analysing large datasets and identifying patterns to help teachers create better strategies (Blanchard, 2018).

Personalised learning experiences in education are one of AI's significant benefits (Jaiswal & Arun, 2021). AI algorithms can process diverse student data, including learning styles, preferences, and past performance, to quickly identify individual needs (Dilyorjon et al., 2021). More individualised learning enhances memory retention and leads to sustained academic improvements. Every student learns differently, so AI-powered systems help teachers create personalised learning paths (Axrorjon et al., 2021). Adopting this personalised model boosts student quality and motivation, leading to better academic achievements (Han et al., 2020).

AI in Learning: Learning in education is currently undergoing a major 360-degree revolution with artificial intelligence (AI). AI in learning refers to the use of intelligent machines with human-like cognitive abilities, i.e., reasoning, problem-solving, and decision-making (Fitria, 2021). AI-powered systems can also aid in creating personalised learning environments, improve student engagement and help students and instructors provide immediate feedback (Jaiswal & Arun, 2021). This is one significant advantage of AI in learning: its adaptive nature, targeted at learners' individual needs, interests, and preferences (Kannan & Munday, 2018). AI-powered systems can store details of a student's learning history, behavioural aspects, and performance data, thus enabling personalisation to some extent (Kannan & Munday, 201). For example, AI-based tutoring systems can adjust the difficulty of questions based on a student's proficiency level, while chatbots can provide personalised support and guidance.

AI in learning can also enhance student engagement and participation (Salas-Pilco et al., 2022). Emerging AI-enabled virtual/augmented reality technologies create highly interactive and engaging learning environments (as mentioned in Arya et al., 2020). Furthermore, AI-based gamification methods and procedures may efficiently encourage learners' engagement and help them enjoy the learning process (Suman et al., 2022). It has been used to address the learning gap and support students with disabilities (Arulprakash et al., 2022). More specifically, artificial intelligence-based tools can power assistive technologies such as text-to-speech and speech-to-text,

which can help students with visual or hearing disabilities in their classwork (Radhakrishnan et al., 2022). AI can even provide tailored lessons for students who find learning challenging, e.g., those with dyslexia or ADHD, so that they can learn in their own way and at a pace suitable to them (Devi et al., 2022).

AI in Assessment: Artificial intelligence (AI) has made remarkable advances across various industries in recent years, and the education sector is not excluded from this transformation (Sathish & Dhanabalan, 2018). Assessment is one area where AI is applied. Assessment in AI involves using a range of automated technologies to evaluate learners' skills and knowledge (Matsui et al., 2021). Assessments using AI may offer teachers valuable insights into each student's performance and pinpoint areas where students need remedial instruction. Using AI, we can analyse student data such as test scores, assignments, and other performance metrics to enable educators with real-time feedback on students' progress (Chen et al., 2021). Additionally, AI-based grading tools can enable educators to grade assignments more efficiently and accurately (Asmar, 2022).

One of the more significant uses of AI in this realm is in objectivity and fairness, as it provides an inherently less subjective grading system than human experts (Merhi, 2023). Artificial Intelligence algorithms evaluate student assignments based on predefined guidelines rather than on new feelings that might arise during traditional human grading. It may possibly offer a solution for more bias-free evaluations and assessments of student performance (Kalantzis et al., 2021). For example, AI assessment tools can digitally assess essay writing and coding assignments for a wide range of more complex tasks (Gouverneur et al., 2019). AI grading systems provide instant feedback on written assignments and essays, freeing up a teacher's time. In addition, AI can process student data to deliver information on performance and learning patterns, enabling a teacher to pinpoint domains where more help could be provided (Gouverneur et al., 2019). The assessment tools aim to evaluate the learner's critical thinking, problem-solving, and creativity in their responses (Fitria, T. N., 2021). The AI algorithms analyse the writing style, grammar, and punctuation of learners, giving feedback for their literacy skills. (Strobl et al., 2019).

One of the most significant advantages of using AI for assessment is that it can essentially eliminate cheating (Cronan et al., 2018). During the examination, AI tools can track their behaviour, linking, for example, activities related to plagiarism (Douglas et al., 2018). Given this, plagiarism is harder to do, and the evaluation becomes fairer (Mullins et al., 2018).

Challenges and Concerns: It has many dilemmas regarding the use of AI, which is increasingly entering the frontiers of education. AI dramatically shapes teaching, learning, and assessment by providing customised learning experiences, simplifying administrative burdens, and enhancing learning outcomes (Arun & Jaiswal, 2021). There are also risks associated with the introduction of AI into the educational setup.

Algorithmic bias is one of the most prominent challenges when integrating artificial intelligence into education. AI systems are essentially dependent on the data they use in training; therefore, if the data are biased, the AI will eventually reflect those biases (Carter, 2020). For example, if an AI system trained mainly on data from a specific demographic underperforms, it can lead to disparities in educational outcomes. This calls for diversity and inclusion in AI systems, as well as ongoing assessments to identify and correct biases (Silberg & Manyika, 2019).

This is accompanied by the technical know-how required to develop and maintain AI systems, which is also a challenge (Krawczyk, 2016). Many educators and educational institutions lack the technical know-how for the

development and maintenance of AI systems, and therefore may be unprepared to cope with these changes. AI systems require ongoing maintenance and updates to remain efficient and secure. Another challenge that AI systems are likely to face relates to the privacy and security of student data. To deliver a more personalised learning experience, AI systems require access to pretty large amounts of student data, which leaves open the possibility of misuse and compromise of such data. Data protection and cybersecurity measures should thus be strong enough to protect student data and privacy.

Another critical concern is the future use of AI in education. The advanced AI might replace human teachers and administrators, leading to a massive loss of jobs. Encouragement of collaboration with human experience rather than substitution, and faculty training in adapting to new technologies, would be necessary.

Conclusion: AI can change how education is delivered to students, from offering individualised learning experiences to providing real-time feedback and objective assessment. It poses challenges and concerns, but they are manageable with careful design and implementation. The more AI develops and improves, the more important it is for educators and policymakers to consider its impact on teaching, learning, and assessment, and to use it in ways that benefit all students.

AI in learning systems will likely lead to a more interactive and engaging learning experience, provide personalised feedback, and facilitate support for students with disabilities. Nevertheless, there is an urgent need to address concerns around biases in the algorithms used within AI systems and make learning systems powered by AI that are trained on diverse and unbiased datasets. Generally, AI in teaching will contribute to better outcomes for students and to the development of an inclusive and equitable education system.

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