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AI TOOLS FUNCTIONS IN EDUCATION: A NARRATIVE OVERVIEW

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Abstract: *Artificial Intelligence (AI) is now being applied in the field of education, leading to significant improvements compared to traditional methods. Learning activities are becoming more stimulating and engaging than in the past. This paper highlighted eight functions of AI Tools in education consists of Intelligent Tutoring Systems (ITS), AI Algorithm, Virtual Reality (VR) and Augmented Reality (AR), Natural Language Processing (NLP), Educational Data Mining (EDM), Learning Analytics (LA), and Multimodal learning analytics (MMLA). The AI-assisted tool offers numerous impressive results and potential, enhancing learning experiences with an abundance of advantages. AI tools in education enable tailored educational adventures by identifying the abilities and shortcomings of learners, customizing the educational program, and modifying curriculum to meet specific demands. Individualized teaching permits learners to move forward at their own velocity, which leads to a greater understanding of the subject at hand. Artificial intelligence (AI) technologies boost evaluation procedures by automating assessments giving immediate responses to learners, while assisting learners in quickly determining opportunities for advancement. Although the advantages they offer, artificial intelligence (AI) tools in education bring security hazards arising from the acquisition of significant information about learners. It is critical to give priority to privacy and security of information to maintain confidence among educators, and learners, along with systems powered by AI. Furthermore, educators require proper guidance and assistance to effectively incorporate AI tools throughout the learning environment. Educators should develop the fundamental skills necessary to utilize advanced technologies and integrate them into their*

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teaching methods. AI solutions can replace traditional educational methods via designed education, comprehensive evaluations, and informative material delivery. Overcoming issues with privacy and providing sufficient support for educators are key measures for maximizing the positive aspects of AI in education.

Keywords: *AI tools, Learning Activities, Higher Education, Learning Methods, Educators*

Introduction

The tremendous existence of AI Tools has significantly impacted how people work, study, and live in more meaningful ways. In education, AI Tools cannot be hindered and are continuously used by the community. Policymakers and educators are beginning to recognize the value of integrating artificial intelligence (AI) into education. Harry (2023) stated that AI can improve learning results, encourage critical thinking abilities, and support continuous learning, especially in equipping pupils for the challenges of the 21st century. However, the adoption of AI in education has barriers. Contemporary educational approaches embracing entertainment and AI must have solid proof of how effective they are in accomplishing specified learning objectives (Chen et al., 2020). With these challenges, the potential benefit of making use of natural language processing to objectively and autonomously evaluate the quality of oral case presentations shows the broad potential for artificial intelligence in academic environments (Calatayud et al., 2021).

In addition to personalized learning platforms, the use of AI technologies in education includes real-time feedback tools and automated reviews of students' theoretical comprehension (Karaca et al., 2021). Moreover, by handling obstacles and limitations with the aim build enhanced and effective learning user experience solutions, AI educational platforms can turn into more powerful and crucial tools for language acquisition (Sudjitjoon et al., 2022). The necessity to incorporate new technologies and teaching methods into the regular educational process becomes particularly significant to the dynamic nature of modern-day reality (Xiang, 2023).

Therefore, it is crucial to examine the broad function of artificial intelligence (AI) in the field of education, exploring the potential benefits, challenges, and effects of AI tools that certainly benefit learners as well as educators. According to Pham & Sampson (2022), practitioners, policymakers, and educators can collaboratively seek a more constructive broad, and competitive educational system by attaining an in-depth knowledge of how these technological advances are transforming the direction of future learning and teaching. Although there are obstacles and restrictions, AI can enhance learning outcomes and develop critical thinking abilities, which highlights its importance in preparing students for the demands of the twenty-first century (Harry, 2023).

Holmes & Tuomi (2022) examined the significant contributions of Artificial Intelligence in the field of education. It focuses on addressing the potential benefits, barriers and implications of AI that could enhance educators' and students' involvement in the educational environment. Establishing an even more equitable, inclusive, and effective educational system should be the primary goal of practitioners, policymakers, and scholars who acquire a comprehension of the various contexts of how these technologies are altering the future of educational instruction and learning (Pham & Sampson, 2022).

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The use of AI tools paired with human expertise will produce learning in future generations more advantageous in reaching present objectives as well as aims throughout the field of education as it drives toward the establishment of more comprehensive learning environments which also affect more complex duties. The future of education will be more favorable when AI tools are used in conjunction with human creativity to advance current achievements and targets throughout the field of education to the establishment of more comprehensive educational systems that will involve more responsibility.

Literature Review

AI for Personalization in Learning

One of the most widely recognized contributions of AI in education is its ability to personalize learning. AI-powered platforms have evolved from rules-based systems to deep-learning approaches that analyze student interactions, performance, and progress to tailor content and recommendations (Kumar et al., 2019; Chen et al., 2020). Such systems adapt to individual learning styles, speeds, and preferences, thereby increasing engagement, motivation, and knowledge mastery (Crompton & Song, 2021). Gupta and Bhaskar (2020) argue that personalization is not only beneficial for student learning outcomes but also for enhancing teaching quality by allowing educators to deliver more targeted instruction. However, while the benefits are consistently highlighted, challenges remain. Some studies stated that overreliance on automated personalization may reduce opportunities for peer interaction, potentially limiting the social dimension of learning (Chan & Zary, 2019).

AI for Assessment and Feedback

AI has also transformed assessment practices by enabling adaptive, real-time evaluation of student performance. Adaptive assessment systems can adjust question difficulty in response to student answers, providing immediate and individualized feedback (Chan & Zary, 2019). Research suggests that such tools not only enhance academic outcomes but also improve learner motivation when compared to traditional assessment methods (Fidan & Gencel, 2022). Chatbots and peer-feedback tools powered by AI further expand assessment beyond grading, supporting formative evaluation and encouraging reflective learning. Yet, there is an ongoing debate about the reliability of AI-driven grading systems, particularly in contexts requiring subjective evaluation such as essay writing (Holmes & Tuomi, 2022). This highlights the need for AI to complement, rather than replace, human judgment in educational assessment.

AI for Accessibility and Inclusion

AI also plays a crucial role in expanding educational access. Tools such as text-to-speech, speech recognition, and automated captioning promote inclusivity for learners with disabilities or language barriers (Mina et al., 2023). Integrating these tools within learning platforms can help bridge gaps and create more equitable opportunities (Paranjape et al., 2019). While evidence suggests strong benefits for marginalized groups, concerns remain about the affordability of such technologies in lower-income regions, particularly in Southeast Asia where digital divides persist (SME Corp Malaysia, 2021). Without targeted policies to ensure equitable implementation, AI adoption risks reinforcing existing inequalities rather than alleviating them.

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AI for Teaching Innovation

Beyond personalization and accessibility, AI encourages innovative teaching approaches. Virtual reality (VR), augmented reality (AR), and gamification create immersive learning experiences that stimulate curiosity, creativity, and collaboration (Simonsen & Almeida, 2020; Singh & Riedel, 2016). Nazaretsky et al. (2022) further emphasize how AI-driven learning analytics can empower teachers to redesign pedagogy, making instruction more student-centered. However, not all evidence is uniformly positive. Some studies caution that novelty effects in AI-based innovations may fade over time if not supported by robust pedagogical frameworks (Børte et al., 2020). This underscores the importance of integrating AI tools into broader teaching strategies rather than treating them as stand-alone solutions.

Trends, Contradictions, and Gaps

Across these domains, a consistent trend emerges: AI is most effective when it complements rather than replaces human teaching. While most studies report positive effects on motivation, engagement, and learning outcomes, contradictions remain regarding the scalability and reliability of AI systems. For instance, although adaptive assessment tools improve feedback speed, their ability to measure complex skills like critical thinking remains contested (Holmes & Tuomi, 2022). Similarly, while AI promises inclusivity, regional disparities in infrastructure and training create uneven adoption.

AI Adoption in Malaysia and Southeast Asia

In the Malaysian and broader Southeast Asian context, adoption of AI in education has been gradual. Reports highlight that while policymakers recognize AI's potential, integration at the institutional level is constrained by infrastructure, costs, and a shortage of digitally skilled educators (MDEC, 2021; Park & Kwon, 2023). In Malaysia, studies indicate that teachers show cautious optimism toward AI tools but often lack adequate training to implement them effectively (Ng et al., 2023). At the regional level, Southeast Asia faces similar challenges, with uneven digital readiness across countries and a persistent urban–rural digital divide (ASEAN, 2022). This context highlights the urgent need for capacity building, professional development, and policy alignment to ensure AI adoption translates into improved educational outcomes.

Problem Statement

Education systems worldwide continue to rely predominantly on teacher-centered approaches such as lectures, rote memorization, and textbook-driven instruction. These methods have historically formed the cornerstone of knowledge delivery, but their limitations are increasingly evident in today's dynamic learning environments. Traditional teaching tends to emphasize content transmission rather than active engagement, leaving students in passive roles with limited opportunities to question, analyze, or apply knowledge in practical contexts (Patel et al., 2021). Consequently, learners often experience difficulties in retaining information and developing higher-order cognitive skills such as critical thinking, creativity, and problem-solving (Gayathridevi, 2019).

A major drawback of teacher-centered methods is the lack of interactivity and timely feedback. Studies have shown that conventional lectures rarely incorporate mechanisms for immediate evaluation of student understanding, resulting in delayed identification of misconceptions and missed opportunities for improvement (Almanasef et al., 2020). Similarly, the overemphasis on repetition and rote learning fosters shallow comprehension and reliance on memorization rather

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than genuine mastery (Chen, 2022). Such practices ultimately undermine students' capacity to transfer knowledge across contexts, collaborate effectively with peers, and prepare for complex, real-world challenges.

Artificial Intelligence (AI) technologies have been widely recognized as a potential solution to address these pedagogical shortcomings. Tools such as intelligent tutoring systems, adaptive assessment platforms, and learning analytics can personalize instruction, provide real-time feedback, and create interactive learning environments that promote engagement and self-directed learning (Holmes & Tuomi, 2022). These capabilities align closely with the goals of 21st-century education, which emphasizes student-centered learning, digital literacy, and critical thinking skills. By tailoring content to individual learning needs, AI has the capacity to transform classrooms into more dynamic, inclusive, and effective spaces for learning (Crompton & Song, 2021).

Despite this promise, the adoption of AI in education remains slow and fragmented. A UNESCO global report (2023) highlighted that fewer than 10% of schools worldwide have systematically embedded AI tools into teaching and learning practices. The majority of institutions continue to operate within conventional pedagogical frameworks, citing barriers such as inadequate infrastructure, insufficient funding, lack of teacher training, and resistance to change (Børte et al., 2020). Similarly, Gupta and Bhaskar (2020) noted that while educators acknowledge the potential benefits of AI, hesitancy persists due to concerns over technical complexity, ethical issues, and uncertainty about its effectiveness. This gap between potential and practice signals a pressing challenge for education stakeholders.

The implications of this slow adoption are profound. Without embracing innovative, AI-supported approaches, education systems risk perpetuating outdated teacher-centered models that fail to prepare learners with the skills demanded by the digital age. Students may continue to graduate with strong recall abilities but inadequate problem-solving, creativity, and adaptability—competencies essential for navigating future careers and societal challenges (Harry, 2023). In this context, it becomes crucial to investigate both the barriers to AI adoption and its potential role in reshaping educational practices, so that teaching and learning can be transformed into more interactive, equitable, and future-oriented experiences.

Methodology

This study employed a narrative review approach to synthesize literature on the functions of Artificial Intelligence (AI) in education. The review process was guided by systematic steps to ensure transparency and reliability in identifying, selecting, and analysing relevant sources.

Source Selection and Databases

The literature search was conducted across multiple academic databases including Scopus, Web of Science, IEEE Xplore, and ScienceDirect to capture a broad range of interdisciplinary studies on AI in education. These databases were chosen due to their wide coverage of educational technology, computer science, and applied social science research.

Search Strategy

A combination of keywords and Boolean operators was used to retrieve relevant studies. The primary keywords included: *"artificial intelligence in education"*, *"AI tools in learning"*, *"AI*

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personalization", *"AI assessment"*, *"AI accessibility"*, and *"AI teaching innovation"*. Context-specific terms such as *"Malaysia"*, *"Southeast Asia"*, and *"developing countries"* were also incorporated to identify regional literature. Searches were limited to publications between 2015 and 2024 to capture contemporary developments in AI technologies.

Inclusion and Exclusion Criteria

Articles were considered eligible for inclusion if they focused on the application of AI within educational contexts such as primary, secondary, or higher education. Priority was given to studies that reported empirical findings, systematic reviews, or conceptual discussions directly related to teaching, learning, or educational management. In addition, only publications appearing in peer-reviewed journals, reputable conference proceedings, or other recognized academic outlets were included to ensure the reliability and quality of evidence. Conversely, studies were excluded if they examined AI primarily in non-educational domains such as healthcare, engineering, or finance, or if they emphasized purely technical aspects of AI without linking them to pedagogical practices. Publications not available in English were also excluded to maintain consistency in the review process.

Data Analysis Approach

Following the identification of eligible sources, a thematic analysis was applied to synthesize the literature. Studies were first grouped descriptively into four major domains reflecting the functions of AI in education: (i) personalization, (ii) assessment and feedback, (iii) accessibility and inclusion, and (iv) teaching innovation. Within each domain, findings were compared, highlighting commonalities, contradictions, and emerging trends. Particular attention was given to regional studies from Malaysia and Southeast Asia to contextualize global insights within local adoption challenges.

This thematic approach provided a structured framework for organizing the literature while allowing for critical synthesis rather than simple summarization. By contrasting findings across contexts, the review was able to identify not only the potential of AI tools in education but also the gaps and limitations that remain in implementation, especially in developing educational systems.

Discussions

AI Tools in Education

AI technologies have revolutionized education by introducing innovative applications like personalized learning platforms, intelligent tutoring systems, adaptive assessment tools, virtual reality simulations, natural language processing interfaces, and educational data analytics. These technologies enable educators to create responsive, adaptive, and personalized learning environments that cater to diverse learners' needs and preferences, enhance engagement and motivation, and optimize learning outcomes in the digital age (Romero & Ventura, 2020).

Personalized learning platforms utilize technologies like deep learning, artificial intelligence, and multimedia computer technology to develop personalized teaching systems, analyze student data, and recommend appropriate learning resources (Yan, 2020). These platforms can improve accessibility and personalization by integrating adaptive features.

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The integration of artificial intelligence into e-learning models further enhances the personalization of online teaching, enabling adaptive learning experiences based on individual needs and preferences (Mouna et al., 2023). By analysing factors like learning interests, behaviour features, and emotional recognition, personalized learning management systems can be optimized to enhance learning outcomes (Wang, 2021). Ensuring equal learning opportunities requires individual fairness in personalized recommendations, particularly with the abundance of resources available on online platforms (Marras et al., 2021). Understanding the influencing factors of online education platform acceptance among college students, such as personal value, course satisfaction, and teacher quality, is crucial for designing effective personalized learning experiences (Wen et al., 2020).

Intelligent Tutoring Systems (ITS)

According to Chaudhry & Kazim (2021), Intelligent Tutoring Systems (ITS) mimic human tutors by analyzing individual student characteristics and tailoring instruction to meet their specific needs. These systems offer substantial learning gains and enhance the overall learning process. Research has focused on designing and developing ITSs using data mining and ontology-driven approaches, incorporating advanced technologies and methodologies to improve the quality of educational experiences (Hasan et al., 2020).

The pedagogical benefits of ITSs include improved learning outcomes, student motivation, and support for collaborative learning environments. The continuous evolution of ITSs has led to the development of innovative applications like RadarMath, an ITS for math education, and deep discourse analysis for personalized feedback (Lu et al., 2021). By leveraging AI and advanced technologies, ITSs have the potential to revolutionize the way students learn and interact with educational content, ultimately enhancing learning outcomes and student engagement.

AI Algorithms

Adaptive assessment tools use AI algorithms to adjust the assessment process based on individual responses, leading to more personalized evaluations (Connor et al., 2022; Zhou, 2020; Hamal et al., 2022; Renz & Vladova, 2021). In education, AI tools like ChatGPT have been shown to enhance student learning, prompting educators to adapt their teaching and assessment methods to incorporate AI-driven technologies (Ng et al., 2023). The integration of AI in educational technologies aims to create inclusive and flexible learning environments that cater to individual needs, complementing traditional formats.

Virtual Reality (VR) and Augmented Reality (AR)

Virtual Reality (VR) and Augmented Reality (AR) are advanced technologies that create immersive learning environments that enhance student engagement and understanding (Hashim et al., 2022). These technologies are being integrated into libraries, industrial applications, and the field of geospatial applications. AR is increasingly used in vocational education, tourism, and retail to provide interactive experiences.

Putra et al., (2021) stated that AR can bring virtual elements into the real world, creating an immersive learning experience. AR is increasingly being used in vocational education, to create disruptive learning media that enhance the quality of distance learning (Putra et al., 2021). AR is being utilized in tourism, where it is employed to introduce interactive applications that

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combine natural and virtual objects to provide engaging experiences (Fitriani et al., 2022). In retail, the combination of AR and VR, known as Mixed Reality (MR), is being leveraged to enhance the customer buying experience by providing interactive perspectives on products (Goyal, 2022). These technologies are also being explored in the field of geospatial applications, where AR is used to visualize and synthesize virtual objects and information in real-world settings (Chung et al., 2020).

Natural Language Processing (NLP)

Natural Language Processing (NLP) is a branch of artificial intelligence that focuses on understanding human language and enabling computers to interpret and process it (Hamilton & Lahne, 2022). In education, NLP methods are used for feedback analysis, sentiment analysis, and automatic summarization. Chatbots powered by NLP enhance student engagement and offer personalized assistance, while NLP algorithms automate the grading process in eBooks. Sentiment analysis is vital in understanding students' opinions and experiences, and NLP and deep learning approaches have been used to analyze sentiment in the education field. By employing NLP techniques, researchers have advanced the understanding of text mining and its applications in educational contexts, resulting in more effective teaching and learning strategies.

Educational Data Mining (EDM), Learning Analytics (LA) and Multimodal learning analytics (MMLA)

Educational Data Mining (EDM) and Learning Analytics (LA) tools are essential in predicting student performance and behavior in Learning Management System (LMS) platforms like Moodle and Canvas. These tools provide insights into student learning behaviors and performance, enabling the development of effective teaching strategies and improved learning outcomes (Sagarika et al., 2021). LA dashboards offer a comprehensive view of student engagement, participation, and performance, enabling educators to track progress and implement targeted interventions. Moodle, an AI-powered chatbot platform, supports independent student work and provides detailed analytics on teaching and learning processes (Flores-Piñas et al., 2022). Its speech recognition system, Informatized Caption, and Watson Personality Insights (PI) service can enhance the learning experience. IBM Watson Assistant's capabilities extend to content analysis and natural language understanding (NLU) for educational scenarios.

Multimodal learning analytics (MMLA) is a discipline that collects, analyzes, and represents multimodal data to enhance student learning outcomes (Moon et al., 2022). It combines data from digital and physical learning environments, predicting student performance and interest accurately, providing insights for real-time adaptive scaffolding during learning activities. MMLA has shown promise in tracking students' distress during educational gameplay and analyzing collaborative learning patterns during activities like pair programming (Xu et al., 2023).

Challenges and Considerations

AI tools in education use student data, such as personal information, academic performance, and behavioural tendencies, to customise instruction and offer insights. Data privacy and security concerns stem from the gathering, retention, and distribution of delicate student data, leading to inquiries around consent, clarity, and data possession. Educational institutions must

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adhere to stringent data protection legislation and security processes to safeguard student privacy and mitigate the risk of data breaches or unauthorised access (Velev & Zlateva, 2023).

AI algorithms can add prejudice and perpetuate inequities in educational attainment if they are trained on biassed or incomplete datasets. This bias can affect algorithmic decision-making processes in student assessment, grading, placement, and recommendations, resulting in discrepancies influenced by criteria like race, gender, socio-economic position, and language competence. Educators and developers must evaluate AI algorithms for fairness, transparency, and accountability to combat bias and promote values of justice and inclusivity in educational processes (Ferrara, 2023).

AI technologies in education must be aligned with existing educational systems, curriculum standards, and teaching methods. Educational stakeholders may encounter opposition, doubt, and worries while considering the implementation of AI technologies, especially if they are seen as disruptive or not in line with current practices. Effective incorporation of AI in education necessitates cooperation, communication, and involvement of stakeholders to connect the divide between technology implementation and educational innovation (Cheng et al., 2021).

Educators require specialised training, ongoing professional development, and consistent support to effectively integrate AI tools into their teaching methodologies. Some educators may not possess the technical abilities, digital literacy, and pedagogical expertise needed to effectively use AI technologies for personalised instruction, data analysis, and evaluation. Educational institutions should allocate resources towards professional development programmes, workshops, and resources to provide educators with the essential knowledge, abilities, and confidence needed to ethically and successfully utilise AI tools in various educational environments (Wang, 2021).

Educational stakeholders need to prioritise transparency, accountability, and ethical decision-making to address challenges and ethical considerations related to AI technologies in order to improve teaching and learning experiences, promote equity and inclusivity, and respect the rights of students and educators. The revolutionary promise of AI in education can be realised by promoting responsible innovation and cooperation, while also addressing associated risks and constraints (Araujo et al., 2020).

Future Directions and Implications

The evolving patterns in AI-enhanced education could revolutionise teaching and learning methods, encourage creativity, and tackle enduring issues in educational institutions. AI technologies enable tailored and flexible learning experiences that meet the unique requirements, preferences, and learning styles of each student, enhancing learning outcomes and comprehension of subject. Labunets et al. (2021). Utilising AI-driven analytics and learning management systems, data-driven decision-making provides educators with valuable insights and predictive analytics to support evidence-based instructional planning and intervention (Veale et al., 2018). Innovative teaching methods including virtual reality (VR), augmented reality (AR), and gamification involve students in immersive learning experiences that encourage active learning and creativity (Wang, 2021). AI tools support enhanced accessibility and inclusivity in education by catering to various learning demands and cultural backgrounds,

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thereby guaranteeing fair access to educational resources (Antoniuk et al., 2022). AI-driven systems provide personalised learning routes for instructors and lifelong learners, supporting ongoing learning and professional development possibilities (Lee et al., 2019).

The ethical and societal impacts of implementing AI in education highlight the significance of tackling issues related to data privacy, algorithmic bias, digital equity, and obstacles in human-computer interaction. Collaboration among educators, policymakers, and technology developers is crucial to guarantee responsible and fair utilisation of AI technologies in educational environments (Bespartochna et al., 2021). The implementation of AI technologies in education is advancing digital transformation and technology integration by optimising administrative processes, automating operations, and improving operational efficiency (Shevchenko et al., 2021). Education is evolving due to the incorporation of AI technology. It is essential to focus on ethical considerations, promote digital literacy, and guarantee equal access to AI tools for all students.

Conclusion

AI tools can revolutionise education by customising learning experiences, giving immediate feedback and evaluation, improving accessibility and diversity, delivering data-driven information for educators, and automating administrative duties (Sapci & Sapci, 2020). By employing AI technologies, educators may create interactive, stimulating, and tailored learning settings that enhance student involvement, drive, and success. Successful implementations of AI tools like DreamBox Learning, Carnegie Learning's Cognitive Tutor, and ALEKS have shown enhancements in arithmetic competency, problem-solving abilities, academic performance, and student involvement (Huang et al., 2021).

Future research may concentrate on investigating personalised learning algorithms and adaptive assessment strategies to improve learning results for various student demographics (Reiss, 2021). Studying the ethical, social, and cultural impacts of AI technologies in education, such as data privacy, algorithmic bias, digital equity, and human-computer interaction, is essential (Akgün & Greenhow, 2021). Creating novel teaching methods like virtual reality simulations, augmented reality experiences, and gamified learning environments can enhance active learning, cooperation, and creativity (Zhai et al., 2021). Studying AI-driven analytics and predictive modelling techniques can help in making decisions based on evidence, designing education, and developing curriculum (Bozkurt et al., 2021). It is crucial to improve professional development opportunities and support systems for educators to successfully incorporate AI tools into their teaching methods and promote digital literacy among students (Chaudhry & Kazim, 2021). AI tools can revolutionise education, improve learning results, and empower educators and learners in the digital era. To fully utilise AI technology in education and create inclusive, engaging, and empowering learning environments, it is essential to embrace the benefits offered while addressing challenges and ethical concerns.

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