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SYSTEMATIC REVIEW OF ARTIFICIAL INTELLIGENCE IMPLEMENTATION FOR CONTINUOUS LEARNING: BENEFITS, IMPACTS, AND CHALLENGES

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Abstract— *Artificial Intelligence (AI) is believed to be a crucial driver and force for realizing sustainable learning, so there is an urgent need to consolidate existing research to provide a clear and structured understanding of its tangible benefits, broader impacts, and ongoing challenges. This systematic literature review (SLR) aims to fill this gap by offering a concise overview of the role of AI in supporting sustainable learning in terms of benefits, impacts, and challenges in the era of society. Through a periodic review (SLR) of studies published between 2023 to 2025, this paper summarizes evidence on how AI enhances student learning engagement. This synthesis outlines the challenges, impacts, and pitfalls of using AI. The findings reveal that AI-driven tools—including intelligent tutoring systems, chatbots, emotion recognition systems, and adaptive learning platforms—significantly enhance personalized learning experiences and student motivation. This review synthesizes the technological landscape, outlining its benefits, impacts, and persistent challenges. Despite its potential, ethical, technical, and pedagogical hurdles remain. Consequently, this study lays the groundwork for future research and development in AI-based continuous learning. This study has several limitations. The literature review does not cover the specific designs and methodologies for measuring student engagement with AI. It also focuses on explicit outcomes like engagement and motivation, potentially overlooking unintended consequences or long-term impacts of AI integration. Furthermore, the analysis is constrained by the varying methodological quality and reporting transparency of the primary studies included.*

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Keywords: *Artificial Intelligence, Benefit, Challenges, Impact, Systematic Literature Review.*

Intisari— *AI diyakini sebagai pendorong dan kekuatan penting untuk mewujudkan pembelajaran berkelanjutan, sehingga ada kebutuhan mendesak untuk mengkonsolidasikan penelitian yang ada untuk memberikan pemahaman yang jelas dan terstruktur tentang manfaat nyata, dampak, dan tantangan. Tinjauan pustaka ini bertujuan untuk mencari kesenjangan ini dengan menawarkan ikhtisar ringkas tentang peran AI dalam mendukung pembelajaran berkelanjutan dari segi manfaat, dampak, dan tantangan di era society. Melalui SLR berdasarkan makalah yang terbit tahun 2023 hingga 2025, makalah ini mensintesis bukti tentang bagaimana Kecerdasan Buatan (AI) meningkatkan keterlibatan belajar siswa. Sintesis ini menguraikan aplikasi AI, metodologi yang digunakan, dampak dan tantangan penggunaan AI.. Temuan ini mengungkapkan bahwa perangkat berbasis AI—termasuk sistem bimbingan belajar cerdas, chatbot, sistem pengenalan emosi, dan platform pembelajaran adaptif—secara signifikan meningkatkan pengalaman belajar yang dipersonalisasi dan motivasi siswa. Tinjauan ini mensintesis lanskap teknologi, menguraikan manfaat, dampak, dan tantangan dihadapi. Meskipun potensial, masih terdapat kendala etika, teknis, dan pedagogis. Oleh karena itu, studi ini meletakkan dasar bagi penelitian dan pengembangan pembelajaran berkelanjutan berbasis AI di masa mendatang. Studi ini memiliki beberapa keterbatasan. Tinjauan pustaka ini tidak mencakup desain dan metodologi spesifik untuk mengukur keterlibatan siswa dengan AI. Tinjauan pustaka ini juga berfokus pada hasil eksplisit seperti keterlibatan dan motivasi, sehingga berpotensi mengabaikan konsekuensi yang tidak diinginkan atau dampak jangka panjang dari integrasi AI. Lebih lanjut, analisis ini dibatasi oleh beragamnya kualitas metodologi dan transparansi pelaporan dari studi-studi utama yang disertakan.*

Kata Kunci: *Kecerdasan Buatan, Manfaat, Tantangan, Dampak, Tinjauan Literatur Sistematis.*

INTRODUCTION

Increasing teacher workload, the need for personalised learning, demands for up-to-date and engaging content, and limited time to create content. Student engagement in learning is a key indicator of the success of the learning process. Student engagement is positively correlated with learning outcomes, student retention, and academic satisfaction. In the digital era, technology has a strategic role in creating more meaningful engagement. One of the rapidly developing technologies in this context is Artificial Intelligence (AI). AI can analyse big data, adjust teaching materials individually, and provide real-time feedback. This allows for the creation of an adaptive, personalised, and interactive learning process. Although various studies have explored the role of AI in education, a systematic study is still needed that discusses explicitly the contribution of AI to learning engagement. The high demand for personalized learning, coupled with ever-diversifying content, makes the power of AI essential**.** Able to provide a personalised experience without having to study 24 hours a day. Numerous studies indicate that integrating AI and LMS can reduce time consumption by 50% and lead to more effective time allocation. Automation of tasks given to students becomes easier. AI is the solution for automating repetitive tasks, mass content personalisation, real-time learning analytics, and achieving time efficiency of up to 60%.

Increasing engagement is a top priority in enhancing the quality of education in higher education, encompassing not only academic engagement but also social, emotional, and cognitive engagement, which has a direct impact on student achievement. Universities that successfully build engagement can create an inclusive, innovative, and collaborative learning environment that is inseparable from the use of the latest technology, including Artificial Intelligence (AI). Engagement itself is the time and energy invested by students in their learning experience, facilitated through the principles of active learning and interaction between students and lecturers, as key elements of engagement. Various studies confirm that the success of engagement is closely related to institutional, pedagogical and psychosocial factors.

The use of AI to enhance student interaction and engagement through more personalised learning and engaging content, thereby increasing student enthusiasm and motivation to learn. Knowledge, skills, problem-solving, and collaborative learning can be achieved with the help of AI [1]. Faster access and more interactive communication, as well as increased satisfaction and learning outcomes, because AI can help improve learning efficiency [2]. The role of AI technology is very strong, positive, and constructive, such as ChatGPT, DeepSeek, Gemini, and Copilot in supporting increased student motivation and interest in learning, which has a

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positive impact on improving student academic achievement.

The practical and efficient implementation of AI in higher education will enhance classes and improve learning performance, facilitating personalised learning. However, the use of AI must also be strictly regulated to prevent academic violations when using the platform [3]. Innovation in assessment, distance learning, research development and assisting campus administrative processes and student productivity [4]

Based on an extensive review, this study demonstrates that Generative AI tools (such as ChatGPT, Gemini, and Copilot) present a range of opportunities for higher education. These include fostering assessment innovation, providing personalized instructional support, enhancing distance learning, aiding research design, assisting academic writing, and streamlining administrative tasks. However, these technologies also introduce significant challenges related to academic integrity, data privacy, over-reliance on AI, the validity of learning assessments, and information accuracy. This study offers a series of recommendations for the effective and ethical integration of AI in higher education. The conclusion is that while the implementation of AI offers substantial benefits, it must be approached with a clear strategy to mitigate its associated challenges.

Fun, engaging, and interactive learning is crucial for universities to enhance student involvement, motivation, and academic achievement [1]. AI technologies, particularly generative AI tools such as ChatGPT, Gemini, and Claude, can significantly facilitate these learning experiences. These tools can streamline the creation of teaching materials, lesson planning, student services, and the assessment process [6]. When applied to teaching and assessment, AI offers considerable potential for personalization and adaptability. However, these technologies also pose serious risks, including academic integrity violations, if their use remains inadequately supervised [7].

Effective engagement can enhance decision-making and foster continuous, equitable learning. It has been found that digital learning engagement provides new experiences and increases relevance quite well [8]. This literature review was conducted to identify AI technologies implemented in education to support student engagement in learning and to identify the benefits, impacts, and challenges of using AI to support student engagement in learning.

This paper presents a literature review study on sustainable learning, examining its benefits, impacts, and challenges in the current societal context. The first part of this study is structured using the SLR method, drawing on various research sources, both journals and relevant proceedings. The second part reviews literature related to the research topic. The third part presents the research methods used to collect the literature sources for analysis. The fourth part discusses the results and conclusions, as well as a future research agenda.

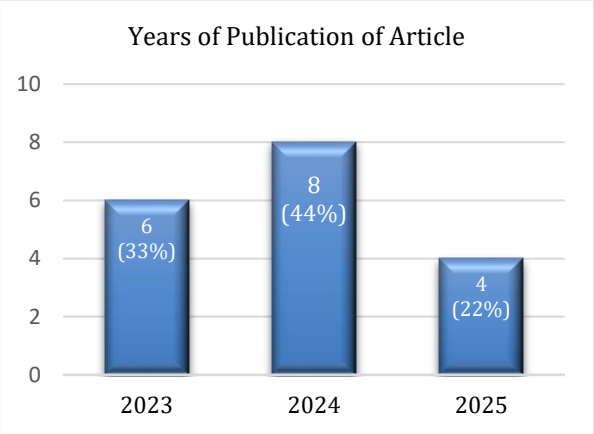
MATERIALS AND METHODS

The strategy for writing a systematic literature review is carried out by determining the problem and the purpose of conducting an SLR, determining keywords that are appropriate to the research topic, selecting a database for searching for information sources, searching for appropriate and systematic articles, conducting a strict selection of selected articles, and conducting an analysis.

The inclusion criteria are indexed scientific articles that focus on formal education from Elementary School to College and explicitly explain the relationship between AI and student learning engagement. This literature does not specifically focus on student engagement, but it is still generally applicable.

Paper with a qualitative approach with a literature review using the Kitchenham method [9]. The stages involved planning and formulating the problem, as well as developing a review protocol. This process began with defining the review objectives, formulating research questions, identifying relevant keywords, selecting the database to be used, determining the inclusion and exclusion criteria, and selecting the synthesis method. Next, the author determined the literature strategy, study selection, data extraction, and data synthesis. The next stage involved reporting by analyzing and writing the literature results in a transparently manner.

The reference selection procedure for a total of 30 articles was then further selected based on the title, abstract, and content of the articles. A total of 18 selected articles were subjected to further analysis. This began with a search for reference sources from 2023 to 2025 through searches on IEE-Explore, ScienceDirect, Google Scholar, and IoP Publishing. Literature sources focused on research published in journals and proceedings and did not draw from other reference sources. Search strategy with databases derived from Scopus, IEEE Explore, Science Direct, Google Scholar, and IoP Publishing sources with keywords: "Artificial Intelligence", "Learning", "Education", "Adaptive Learning", "Benefits", "Impact", "Challenges". “AI”.



Source: (Research Results, 2026)

Figure 1 Years of Publication of Article

Based on Figure 1, there are 18 papers used in conducting the systematic literature review: 6 papers published in 2023 (33%), 8 papers published in 2024 (44%), and 4 papers published in 2025 (22%). The references used were published in the last three years on average and are relevant to current conditions.

Identified studies are located by searching for and gathering all research relevant to the predetermined keywords. Candidate studies are obtained by screening these identified studies using defined inclusion/exclusion criteria. Selected studies are determined through a thorough and in-depth appraisal to choose the articles that will be used in the final analysis, with a focus on the depth, methodological quality, and relevance of the research.

Table 1 Number of Studies in Selected Sources

Sources	Studies Found	Candidate Studies	Selected Studies
IEEE-Explore	2	2	2
Science Direct	12	10	8
Google Scholar	15	12	7
IoP Publishing	1	1	1
Total	30	25	18

Source: (Research Results, 2026)

Based on the number of studies identified in the selected sources, the reference search yielded 30 papers, which were subsequently narrowed down to 25 candidate studies. Meanwhile, from the papers collected, as many as 18 papers were selected. The most frequently cited studies were obtained from Google Scholar sources, namely 7 papers, ScienceDirect with 8 papers, and IoP Publishing namely 1 paper and IEE-Explore with 2 papers.

The researchers initiated a broad keyword search, ultimately yielding 18 high-quality and relevant articles after a rigorous screening process. The search process applied Inclusion/Exclusion Criteria to articles published between 2023 and 2025, from both journals and proceedings. In the full-text critical appraisal stage, the researchers read 30 candidate articles and applied a more in-depth quality and relevance check. From this final screening process, 18 articles were selected as highly relevant and high-quality for inclusion in this SLR analysis

Table 2 Research Reference Sources

Sources	Number of Paper	Amount	%
Journal	[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [16], [17], [18]	17	94%
Proceeding	[15]	1	6%
Total		18	100%

Source: (Research Results, 2026)

Most research reference sources originate from journals, specifically 17 papers (94%), while references from proceedings comprise 1 papers (6%). This shows that research on AI tends to be published in journals rather than proceedings, although this is not an absolute measuring tool

RESULTS AND DISCUSSION

Research on the implementation of artificial intelligence to support learning in the world of education, seen from the country of origin, can be seen in Table 3.

Table 3 Number of Authors

Authors	Country	Profession	Σ
Winanti	Indonesia	Academic	3
Sucipto Basuki		Academic	
Nurasiah		Academic	
Jürgen Rudolph	Singapore	Academic	3
Samson Tan		Academic	
Shannon Tan		Academic	
Weize Ouyang	UK	Academic	16
Caitlin Hafferty		Academic	
Mark S. Reed		Academic	
Beth F.T. Brockett		Academic	
Scott Orford		Academic	
Robert Berry		Academic	
Chris Short		Academic	
Joshua Davis		Academic	
Elochukwu Ukwandu		Academic	
Omobolanle		Academic	
Karl Jones		Academic	
Simon Thorne		Academic	
Mike Castle		Academic	
Sheila Shennan		Academic	
Craig Smith		Academic	
Hazel M. Chapman		Academic	
Yingyi An	China	Academic	4
Fu Zhu		Academic	

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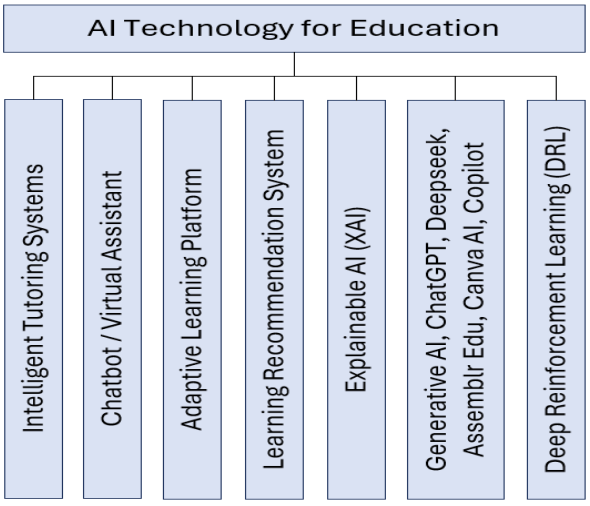
Authors	Country	Profession	∑
Abdul Khalique Khoso		Academic	
Wang Honggang		Academic	
Abdulaziz Al-Shammari	Kuwait	Academic	2
Sharefah Al-Enezi			
		Academic	
Enaam Youssefa	United	Academic	11
Mervat Medhat	Arab	Academic	
Soumaya Abdellatiff	Emirates	Academic	
Mahra Al Malek		Academic	
Medha Mohan Ambali P.		Academic	
Jaloliddin Rustamov		Academic	
Soha Galalaldin Ahmed		Academic	
Zahiriddin Rustamov			
Ali Ismail Awad		Academic	
Nazar Zaki		Academic	
Fady Alnajjar		Academic	
		Academic	
Sarin Sok	Cambodia	Academic	2
Kimkong Heng		Academic	
Tomás Matos	Portugal	Academic	6
Walter Santos		Academic	
Eftim Zdravevski		Academic	
Paulo Jorge Coelho		Academic	
Ivan Miguel Pires		Academic	
Filipe Madeira		Academic	
Anna Y.Q. Huang	Taiwan	Academic	3
Owen H.T. Lu		Academic	
Stephen J.H. Yang		Academic	
Mansoor Ali Darazi	Pakistan	Academic	1
Olaf Zawacki-Richter	Germany	Academic	4
Victoria I. Marín		Academic	
Melissa Bond		Academic	
Franziska Gouverneur		Academic	
Mohd Rushidi Mohd	Malaysia	Academic	4
Amin Ismaanzira Ismail		Academic	
Vinesh Maran			
Sivakumaran		Academic	
		Academic	
Craig Van Slyke	USA	Academic	6
Richard D. Johnson		Academic	
Jalal Sarabadani		Academic	
Ting Wang		Academic	
Brady D. Lund		Academic	
Nishith Reddy Mannuru		Academic	
Oluwafemi J. Sunday			
Olusola O. Adesope		Academic	
Dai Shenghai		Academic	
Kira Carbonneau		Academic	
		Academic	
Agostino Marengo	Italy	Academic	3
Alessandro Pagano		Academic	
Zoë A. Teel		Academic	
Jenny Pange	Greece	Academic	1
Francisco de Arriba-Pérez	Spain	Academic	3
Silvia García-Méndez		Academic	
Francisco J. González-C.		Academic	
Elyjoy Micheni Tom	Kenya		3
Jackson Machii		Academic	
Julius Murumba		Academic	
		Academic	
Kohei Ohashi	Japan	Academic	4
Kosuke Nakanishi		Academic	
Yuji Yasui		Academic	
Shin Ishii		Academic	

Source: (Research Results, 2026)

Based on Table 3, it is observed that the countries of origin of the authors who conducted research on AI for education are side by side. From the 20 references used, it is evident that the authors are from 18 countries. The countries with the most authors are the UK, with 16 authors, and the United Arab Emirates, with 11 authors. The countries of origin, Portugal, and the USA, are represented by six authors each. Furthermore, the authors from China, Germany, Malaysia, and Japan are each represented by four authors. Indonesia, Singapore, Taiwan, Italy, Spain, and Kenya each have three authors. Followed by Kuwait and Cambodia with two authors each, and finally Pakistan and Greece with one author each.

a) Types of Artificial Intelligence Technology used in learning.

Based on the results of the literature review, five types of AI technology are often used to increase student engagement, ranging from intelligent tutor systems, chatbots and conversational agents, emotion detection systems, adaptive learning platforms, and learning recommendation systems. Previous research shows that various AI technologies used in education, ranging from intelligent tutor systems, chatbots and virtual assistants, adaptive learning platforms, learning recommendation systems, explainable AI, generative AI, ChatGPT, DeepSeek, and DRL, have been utilized in learning both in and outside of education. Moreover, AI technology continues to develop and is utilized in the world of education for learning, automation, monitoring, and evaluation, as well as the creation of adaptive, innovative, and effective teaching materials (content).



Source: (Research Results, 2026)

Figure 2 Artificial Intelligence Technology for Education

Integrating AI into learning for student engagement and more creative outcomes that

deliver a rich learning experience [20]. The presence of AI in academic, institutional, and administrative services with profiling and prediction, assessment and evaluation, adaptive systems, and personalization [10]. Distance learning is one sector that AI has influenced through intelligent tutoring [21]. ChatGPT and similar AI systems, such as Bard (Google) and Bing (Microsoft), are directly impacting the learning process [12]—including assessment innovation, instructional support, design, research, academic writing, and administrative assistance [4]. Personalized learning, adaptive testing, predictive analytics, and Chatbots make learning more effective [13], with the CAKE feature providing flexibility regarding the language used [14].

The use of AI facilitates easy access to learning materials, provides fast capabilities, and offers personalized feedback and recommendations tailored to students' levels of understanding, making learning more relevant and personal. Learning is more interactive and engaging, as students participate in discussions on specific concepts, and teachers can adjust their teaching methods and materials to accommodate students' varying abilities. AI can enhance the educational environment and resources for the better [18]. AI is also used for threat detection, authentication, and data security [19]. The system for predicting the worst action with deep reinforcement learning (DRL) technology with AI produces consistent automatic control. [15].

b) Impact of Artificial Intelligence Implementation on Student Engagement and Challenges of AI Implementation in Education

The impact of implementing artificial intelligence on learning engagement includes increased student behavioral engagement, with a higher frequency of access to materials, discussion forums, and online learning activities [18]. This leads to emotional engagement of students, characterized by increased self-confidence, motivation, and satisfaction due to timely support and feedback. In addition, AI also has an impact on cognitive engagement by increasing focus, enhancing understanding of concepts, and developing critical thinking through the personalization of materials. Student learning experiences and motivation encourage the creation of relevant student learning performance [11] . AI technology enhances more personalized learning, fosters critical thinking, and develops practical skills [16]. However, we need to be aware of data privacy issues and bias in algorithms, so training is necessary for teachers to continue paying attention to students in their use of AI.

Despite its potential, the implementation of Artificial Intelligence (AI) faces several significant challenges. Two of the most crucial are the adaptation gap among specific demographics, such as the elderly, who often encounter digital literacy barriers, and infrastructure inequality among students and educational institutions. If not addressed strategically, this lack of readiness has the potential to widen the digital and social divide.. Real challenges arise from the issue of ethics and student privacy in the use of student personal data, which must be strictly regulated.

Limited technology with the accuracy of the emotion recognition system, which is still low in the context of today's very complex learning. Another challenge is the integration of curriculum and pedagogy, which has not been fully integrated into the continuous learning strategy in accordance with the national curriculum set by the Ministry of Education. The implementation of AI also has an impact on the lack of critical reflection and ethical violations [10]. Challenges of security, privacy, dependability, and accuracy of information [4]. Data privacy, fairness, and transparency are essential considerations when utilizing AI [19].

The implementation of Artificial Intelligence (AI) in continuous learning provides substantial benefits by automating and personalizing educational experiences. AI generates quizzes, worksheets, and adaptive learning materials tailored to individual needs, saving educators time and providing students with customized resources [15]. Additionally, AI-powered analytical insights and automated assessments efficiently track student progress, while virtual assistants deliver immediate support. These features streamline the learning process and enhance both accessibility and efficiency in education [2].

The impacts of AI implementations are substantial, enhancing both the quality and structure of the learning process. AI supports improved mentoring and guidance, which fosters more meaningful teacher-student interactions [18]. By enabling personalized learning paths, AI increases student engagement, motivation, and satisfaction. Furthermore, AI encourages creative and innovative thinking while strengthening students' confidence and critical thinking skills. These outcomes contribute to a more dynamic and effective educational environment [20].

The implementation of AI in higher education has a significant impact on student engagement, such as more personalized, interactive, and adaptive learning tailored to individual needs. AI

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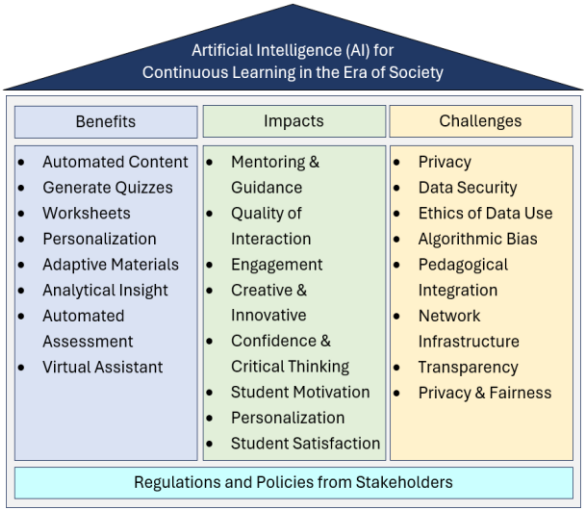
can increase learning motivation, provide rapid feedback, and help students understand material at their own pace and learning style. However, the implementation of AI also faces various challenges, including the limitations of technological infrastructure at each campus, the readiness of teachers and students, privacy and data security issues, over-reliance on technology, and potential disparities in educational access. Therefore, an appropriate implementation strategy is needed to maximize the benefits of AI without neglecting ethical, pedagogical, and educational equity aspects



Source: (Research Results, 2026)

Figure 3 Benefits, impacts and challenges of AI implementation in the era of society.

Despite these advantages, integrating AI in education presents several challenges. Key concerns include privacy, data security, and ethical data use, all of which must be addressed to safeguard students. The risk of algorithmic bias threatens fairness and equity, potentially exacerbating existing inequalities [10]. Additionally, effective implementation requires overcoming practical obstacles such as integrating AI into pedagogy, establishing robust network infrastructure, and ensuring system transparency. Addressing these challenges is essential for stakeholders to develop regulations and policies that maximize AI's benefits while minimizing associated risks [4].

The development of AI technology encourages the world of education to adopt learning methods using AI, one of which is the creation of personalized videos with AI, particularly in learning programming languages [11]. Opportunities for academic integrity violations, such as plagiarism, are prevalent, and students often rely on AI [17]. This needs to be understood by all stakeholders, including educators, administrators, curriculum departments, and other relevant parties, to prioritize ethics in the use of AI. AI technology will alter student behavior and offer new experiences.

Additionally, cultural differences and student characteristics also influence the implementation of AI in learning. Not all students share the same cultural background, so the positive and negative impacts of AI utilization depend on the specific context. Social values and norms, language, and communication, particularly with specific language datasets, often result in local languages being underrepresented and less relevant. In collectivist cultures, AI supports group interactions; in individualistic cultures, personalization is more effective. Integrating AI in accordance with culture through materials and AI interactions with language, digital literacy, continuous evaluation, and local values by involving stakeholders.

The successful implementation of AI for student engagement depends on the synergy between institutional, pedagogical, and individual factors. Effective strategies include supportive leadership, active learning, social support, technology utilization, and efforts to enhance students' emotional and cognitive engagement. Universities need to adopt a holistic and sustainable approach to enhancing engagement, enabling optimal continuous learning.

CONCLUSION

The research results show that an AI-integrated adaptive learning system can create a more personalized and interactive learning experience and increase student engagement, as described in previous research papers. However, there are still challenges such as data usage ethics, algorithmic bias, and pedagogical integration that need to be addressed. This study is expected to be the basis for further development and research in the field of AI-based learning technology. The benefits, impacts, and challenges have been explained based on references collected from a systematic literature review (SLR) of 18 papers used as references in the SLR, which were identified through keywords related to the discussed topics.

The application of Artificial Intelligence in education shows great potential in increasing learning engagement. Various AI technologies, such as chatbots, intelligent tutoring systems, and adaptive learning, have been proven effective in supporting cognitive, affective, and behavioral engagement. A more holistic and ethical approach is needed in the development and implementation of this initiative. Visionary and supportive leadership

is needed to create a campus culture that supports innovation, active student participation, and is ready to adopt and criticize AI technology responsibly. Leadership that can adapt to technological advances and implement them in various forms of activities can encourage high engagement in all elements of higher education. Likewise, if campus leadership is not visionary and does not want to adapt to the latest technology, it will be abandoned by students. AI technology has a direct impact on the policies and decisions of higher education leaders.

The direction of further research will be to develop an AI model that combines emotional and cognitive data in real time. Measuring the impact of AI on long-term learning needs to be taken into account while still prioritizing a more comprehensive ethical and policy framework in the world of education. This involves involving all elements in designing AI systems to ensure pedagogical relevance.

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