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Artificial Intelligence-Based Learning Innovations: A Systematic Review of the Influence of AI Technology in Education

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Abstract

In the past decade, the global education landscape has undergone a fundamental transformation along with the massive penetration of Artificial Intelligence (AI) technology. This shift is marked by a transition from conventional teaching methods to a sophisticated adaptive learning ecosystem, where technologies such as machine learning, natural language processing, and learning analytics work synergistically to create a learning experience that is not only personalized but also highly responsive to each student's unique needs. To comprehensively dissect this phenomenon, this article applies the Systematic Literature Review (SLR) approach by critically examining selected research indexed in the Scopus database. The goal is not just to map trends, but to identify existing research gaps and analyze the real impact of AI on learning outcomes. The findings of this review underscore the revolutionary potential of AI in democratizing access to education; This technology is able to increase students' cognitive engagement and motivation through materials tailored to their respective learning speeds and styles. However, this narrative of technological advancement does not come without complexity. Behind this optimism, the adoption of AI in the education sector is facing a significant wall of structural challenges. Crucial issues such as inequality of digital access that can widen the social gap, ethical dilemmas related to student data privacy, and the level of pedagogical readiness of educators in integrating these new tools, are the main highlights of this study. Therefore, this article exists as an effort to provide in-depth strategic insights for educators and policymakers, encouraging the design of AI-based education systems that are not only technically sophisticated, but also inclusive, ethical, and sustainable for the future.

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Keywords: Artificial Intelligence, Learning Innovation, Learning Personalization, Educational Technology, Education Quality

Introduction Section

The development of artificial intelligence (AI) in the past decade has shown significant growth and has a direct impact on the education sector. Scopus-based bibliometric reports show that the number of scientific publications is themed *Artificial Intelligence in Education* increased sharply from less than 500 articles in 2015 to more than 3,000 articles per year in the period 2022–2024, with an average annual growth rate of above 25% (Zawacki-Richter et al., 2019; Chen et al., 2020; UNESCO, 2023). Moreover, the global market for AI in education is expected to reach a value of more than USD 20 billion by 2027, driven by the adoption of adaptive learning technologies, learning analytics, and intelligent tutoring systems across various levels of education (Holmes et al., 2019; Pedro et al., 2019). This data shows that AI is no longer at an experimental stage, but rather has become an integral part of the transformation of the modern education system (López-Minotta et al., 2025) .

The transformation of AI-based education is characterized by a paradigm shift in learning from a uniform conventional approach to more personalized, adaptive, and data-driven learning. AI technology enables large-scale processing of learning data to map individual learners' characteristics, needs, and achievements. Through the application *Machine Learning*, *Natural Language Processing*, and *Learning Analytics*, AI-based learning systems are able to provide real-time feedback, customized material recommendations, and ongoing learning support (Luckin et al., 2016; Roll & Wylie, 2016). This innovation is seen as a potential solution to various classic educational problems, such as low student engagement, learning achievement gaps, and limitations of personalization in large-scale classrooms (Rabab'H & Almoray, 2025).

A number of empirical studies indexed by Scopus report that the application of AI in learning has a positive impact on cognitive learning outcomes, motivation, and student engagement. A study by Chen et al. (2020) shows that the use of AI-based adaptive learning systems can improve student learning outcomes by up to 20–30% compared to conventional methods. Similar findings were also reported by Viberg et al. (2020), who affirmed that AI contributes significantly to improving *self-regulated learning* and a more meaningful learning experience. However, the effectiveness of AI technology is highly dependent on the context of implementation, pedagogical design, and the readiness of educators and educational institutions to integrate it appropriately (Hijriyah et al., 2025) .

On the other hand, the literature also uncovers various challenges and risks in the adoption of AI in the field of education. Ethical issues, data privacy, algorithmic bias, and inequality of access to technology are still major concerns in

many studies (Williamson & Eynon, 2020; Holmes et al., 2022). Some studies have even highlighted the trend *techno-solutionism*, namely the assumption that AI technology can automatically solve educational problems without paying attention to the broader social, cultural, and pedagogical dimensions (Selwyn, 2019). This condition shows that AI-based learning innovations cannot be separated from the policy framework, educational values, and readiness of the learning ecosystem as a whole (Rabab'H & Almoray, 2025).

Although the number of studies on AI in education continues to increase, studies that systematically map the influence of AI technology on learning processes and outcomes are still relatively limited and thematically dispersed. Many studies focus on specific applications or contexts, without providing a comprehensive picture of the patterns of findings, research trends, and research gaps. Therefore, Scopus-indexed article-based systematic reviews are essential for synthesizing available scientific evidence, identifying the key impacts of AI-based learning innovations, and formulating theoretical and practical implications for future educational development.

Referring to the urgency and complexity of the dynamics described earlier, this article is specifically designed to conduct a comprehensive examination of the integration of artificial intelligence technology in the realm of education. Through the application of the *strict Systematic Literature Review* (SLR) protocol to the Scopus indexed corpus of scientific articles, this study seeks to go beyond surface descriptions to dissect the anatomy of the influence of AI in depth.

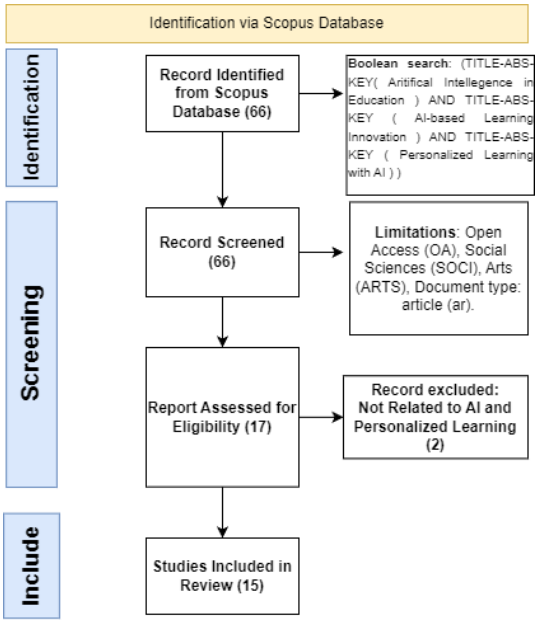
The main focus of this study is not only oriented towards mapping the contribution of AI as a catalyst for pedagogical innovation, but also critically deconstructing the various structural and technical challenges that accompany it. Furthermore, the synthesis of these findings is expected to be able to become a solid conceptual foundation in formulating future research agendas, providing a clear strategic direction for the development of a more mature, directed, and wide-ranging intelligent technology-based education ecosystem.

Research Methodology

This study uses the Systematic Literature Review (SLR) approach to collect, select, and synthesize scientific evidence on Artificial Intelligence-Based Learning Innovations: A Systematic Review of the Influence of AI Technology in Education in the field of Social Sciences and Arts and Humanities studies. All stages of study selection and reporting are carried out transparently by referring to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, so that the process of identification, screening, eligibility determination, and inclusion of articles can be systematically traced back through a clear flow.

The data source used in this study is Scopus as a single database. The search strategy is designed using the following Boolean strings: (TITLE-ABS-KEY (Education) AND TITLE-ABS-KEY (AI-based Learning) AND TITLE-ABS-KEY (Personalized Learning with AI)) AND PUBYEAR > 2020 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English"))) AND (LIMIT-TO (OA , "all"))

Table 1. PRISM diagram.



The inclusion criteria are strictly set so that only articles that are relevant and in line with the research objectives are maintained. The article must be an empirical study, meaning that the study presents the use of data (primary or secondary) and an explicit method of analysis to evaluate the phenomenon being studied. In addition, the article must be open access, indexed by Scopus in the field of Social Sciences or Arts and Humanities, in the form of a journal article, and substantially discuss the relationship or influence of AI and/or digital education on student performance through measurable learning performance indicators (e.g. grades, test scores, competency achievements, or similar academic outcomes). Articles are issued if they are in the form of a purely conceptual study without data testing, do not include the category of documents that are determined, are outside the subject area of SOCI/ARTS, or do not place AI/digital education and student performance as the focus of relevant analytical relationships.

The article selection process follows the PRISMA stage. At the identification stage, the initial search results on Scopus yielded 66 articles. Furthermore, the articles are filtered through the application of inclusion criteria attached to the search filter (e.g. open access, subject area, document type, source type, language, year range, and keyword accuracy), reducing the number of articles to 17. The next stage is follow-up screening to ensure a tighter fit with the focus of the discussion, which is to verify that the article is truly an empirical study and directly discuss AI/digital education in relation to student performance according to the scope of the title and the purpose of the research. Through relevance screening based on reading the title, abstract, and verifying the content of the article, the number of studies that met all the criteria and was judged to be most in line with the discussion ended up being 15 articles.

Once the included study is established, structured data extraction is carried out to ensure consistent synthesis. The information collected included the identity of the study (author, year, title, and context), research design and method, sample characteristics and educational setting, how to operationalize AI and digital education, student performance indicators used, analysis techniques applied, and key findings related to the direction and pattern of intervariable relationships. The results of the extraction are then synthesized narratively (narrative synthesis) considering the possibility of variations in the research design, context, and form of learning performance measurement in each article. With this procedure, the methodology of this study ensures that the analyzed articles not only meet the administrative requirements (open access and subject area), but also meet the substantive requirements as relevant empirical evidence to answer the focus of the study.

Table 2. Number Of Publication

Country	Number of Publications
United Kingdom	1
Jordan	3
Slovakia	1
India	1
Greece	1
Türkiye	1
Indonesia	2
Colombia	1
Australia	1
Bahrain	1
Saudi Arabia	1
China	1

Result and Discussion

Table 3. Inclusions

Authors	Title	Year	Journal	Country	Author Affiliation	Subject or Educational Level
Bulathwela, S.; Pérez-Ortiz, M.; Holloway, C.; Cukurova, M.; Shawe-Taylor, J.	*Artificial Intelligence Alone Will Not Democratise Education: On Educational Inequality, Techno-Solutionism, and Inclusive Tools*	2024	*Sustainability*	UK	University College London, Global Disability Innovation Hub, Institute of Education, University College London	Higher Education, AI and Educational Inequality
Sallam, M.; Al-Salahat, K.	*Below Average ChatGPT Performance in Medical Microbiology Exam Compared to University Students*	2023	*Frontiers in Education*	Jordan	University of Jordan, Jordan University Hospital	Higher Education, Medical Education, AI in Assessment
Annuš, N.	*Education in the Age of Artificial Intelligence*	2024	TEM *Journal*	Slovakia	J. Selye University	Higher Education, AI in Pedagogy
Gupta, K. K.; Bhushan, B.; Goel, P.; Sanders, J.; Munshi, A. P.; Kumar, A.	*Educational Value of AI-Powered Folk Art Repositories*	2025	*ShodhKosh: Journal of Visual and Performing Arts*	India	Noida Institute of Engineering and Technology, Chitkara University, Noida International University, ATLAS Skill Tech University	Art Education, Cultural Heritage

Katsarou, D. V.; Mantsos, E.; Papadopoulou, S.; Sophology, M.; Efthymiou, E.; Vasileiou, I.; Megari, K.; Theodoratou, M.; Kougioumtzis, G. A.	*Exploring AI Technology in Grammar Performance Testing for Children with Learning Disabilities*	2025	*Education Sciences*	Greece, UAE	University of the Aegean, University of Thessaly, University of Ioannina, Zayed University	Special Education, Learning Disabilities, AI
Ghnemat, R.; Shaout, A.; Al-Sowi, A. M.	*Higher Education Transformation for Artificial Intelligence Revolution: Transformation Framework*	2022	*International Journal of Emerging Technologies in Learning*	Jordan, USA	Princess Sumaya University for Technology, University of Michigan, University of Jordan	Higher Education, AI in Educational Transformation
Carakose, T.; Tülübaş, T.	*How Can ChatGPT Facilitate Teaching and Learning*	2023	*Educational Process: International Journal*	Turkey	Dumlupinar University	Higher Education, AI in Pedagogy
Hijriyah, U.; Edi, R. N.; Aridan, M.; Hashim, H. U.; Erlina; Kesuma, G. C.	*How Effective Is SUNO. AI in Enhancing Arabic Listening*	2024	*International Journal of Information and Education Technology*	Indonesia, Malaysia	Raden Intan State Islamic University Lampung, University of Malaya, WISE Education Indonesia	Language Education, AI in Language Learning
López-Minotta, K. L.; Chiappe, A.; Mella-Norambuena, J.	*Implementation of Artificial Intelligence to Improve English Oral Expression*	2025	*Multidisciplinary Journal of Educational Research*	Colombia, Chile	University of La Sabana, University of the Americas	Primary Education, AI in Language Education
Zhai, X.; Zheng, L.;	*Is Artificial Intelligence*	2023	*International Journal of*	China, USA	No specific affiliation	Higher Education,

Jeon, M.; Lee, S.	*Really the Next Big Thing in Learning and Teaching in Higher Education? A Conceptual Paper*		*Educational Development*		mentioned in the document	AI in Teaching and Learning
Rahiman, H. U.; Kodikal, R.	*Revolutionizing education: Artificial intelligence empowered learning in higher education*	2023	*Cogent Education*	India, Bahrain	Kingdom University, Graphic Era Deemed to be University	Higher Education, AI in Teaching and Learning
Rabab'h, B. S.; Almoray, N.	*Jordanian Teachers' Perceptions of Employing Artificial Intelligence in the Educational Process*	2024	*International Journal of Information and Education Technology*	Bahrain	University of Bahrain	Higher Education, AI in Teacher Training
Abdelmagid, A. S.; Al-Mohaya, A.; Ibrahim, A. M.; Treb, A. A.; Jabli, N. M.	*The Impact of Artificial Intelligence Applications on Developing Levels of Cognitive Depth of Information among Postgraduate Students*	2025	*International Journal of Learning, Teaching and Educational Research*	Saudi Arabia	King Khalid University	Postgraduate Education, AI in Cognitive Development
Nirwana, A. N.; Rifai, A.; Ali, M.; Mustofa, T. A.; Vambudi, V. N.;	*SWOT Analysis of AI Integration in Islamic Education: Cognitive,*	2025	*Qubahan Academic Journal*	Indonesia, Saudi Arabia	University of Muhammadiyah Surakarta, Qassim University	Islamic Education, AI in Religious Education

Maksum, M. N.; Budihargo, M. U.	*Affective, and Psychomotor Impacts*					
Li, L.; Zhang, W.; Zhang, K.; Yang, Y.; Wang, L.; Zuo, L.; Sun, Y.; Peng, Q.	*The Role of Generative AI Tools in Case-Based Learning and Teaching Evaluation of Medical Biochemistry*	2025	BMC *Medical Education*	China	King Khalid University, Other Academic Institutions	Medical Education, AI in Case-Based Learning

Trends and gaps in research results related to Artificial Intelligence-Based Learning Innovation

In the academic discourse raised by Annuš (2024), there is a strong affirmation of the revolutionary capacity of artificial intelligence (AI) in redefining the pedagogical landscape, where this technology is considered to be able to go beyond conventional '*one-size-fits-all*' teaching methods towards a precise and highly personalized learning experience through sophisticated adaptive mechanisms. Nevertheless, behind the utopian promise of modernization, Annuš's findings inject critical realism by revealing that technological exclusivity is still a ghost that looms over global implementation; This transformative potential is in fact still shackled by the classic chain of inequality in the form of infrastructure access disparities and data privacy vulnerabilities. This confirms the serious implication that without radical intervention at the policy and equity levels, AI adoption will not function as an *equalizer*, but rather risks becoming a catalyst that widens the stratification of education, specifically threatening to further marginalize vulnerable communities in developing countries that do not yet have adequate digital readiness.

Going further into the dimension of educational inclusivity, an empirical study conducted by Katsarou et al. (2025) offers an in-depth exploration of the usefulness of artificial intelligence as an intervention instrument for students with specific cognitive needs, such as dyslexia and ADHD. In the context of grammar competency testing, this study validates the comparative advantages of AI-based tools over conventional instructional methods; Intelligent algorithms are able to provide mechanisms *scaffolding* through feedback that is not only personalized but also delivered in a timely manner *real-time*, thus enabling students to navigate their learning barriers more independently and effectively. However, amid these operational effectiveness, Katsarou et al. critically identified significant scope limitations, where current AI architectures are still not fully able to accommodate a broad and complex spectrum of neurodiversity. These findings imply an urgent urgency for educational technology developers to move beyond generic solutions, demanding a design reorientation towards the development of more adaptive and holistic systems to be able to serve a more diverse variety of learning difficulties in a fair and precise manner.(Katsarou et al., 2025).

Expanding the spectrum of discussion into the realm of cultural preservation and education, Gupta et al. (2025) explore the pedagogical value of folk art repositories empowered by artificial intelligence, where the function of this technology goes beyond mere digital archives to facilitators of immersive and personalized cultural learning. Through intelligent curatorial capabilities, AI is able to weave aesthetic elements of art with its sociocultural context, creating interactive dialogue spaces that allow students to deconstruct meaning and deeply appreciate cultural diversity. However, the study also provides a stark warning note about the accessibility paradox; Although AI brings the potential for massive knowledge democratization, the realization of this vision still hits a thick wall of digital divides, especially in developing countries and marginalized social strata. This indicates that without a radical and inclusive implementation approach to breaking down these barriers to access, these advanced technologies risk becoming the privilege of only a handful of elites, rather than becoming a public asset that can be enjoyed equally by the entire spectrum of society.(Gupta et al., 2025).

Analysis of the latest literature trends reveals a dominant pattern, namely the crystallization of learning personalization as the main axis of AI intervention in language education. This phenomenon is clearly recorded in the study by Hijriyah et al. (2025) which explored the utility of the SUNO platform. AI in the acquisition of Arabic listening skills; The technology demonstrates its capacity to automatically calibrate material and provide precise instant feedback, ensuring each pedagogical intervention is aligned with each student's unique level of proficiency. The resonance of these findings is reinforced by the research of López-Minotta et al. (2025) in the context of English oral expression, which also validates the effectiveness of AI-based applications in delivering a responsive and adaptive learning environment. The synthesis of

these two studies confirms the fundamental shift from conventional methods that tend to be rigid and static towards a rich, fluid, and highly individualized learning ecosystem, where technology serves not only as a tool, but as a partner that understands the specific needs of each learner. (Hijriyah et al., 2025).

Moving from the cognitive aspect to the affective dimension, the literature reviewed also underlines positive trends regarding the role of AI in revitalizing students' motivation and intrinsic engagement. This is comprehensively illustrated in the research of Karakose and Tülübaş (2023), which dissects ChatGPT's capacity in transforming a static classroom into an interactive and dynamic learning environment. Through its high adaptability, ChatGPT not only functions as an information provider, but also as a dialogue partner that is able to tailor its pedagogical support to the unique preferences and needs of students, thus fostering a sense of belonging (*sense of ownership*) that is greater in the learning process. This responsive, personalized feedback has proven effective in breaking the deadlock of traditional methods that often fail to spark interest, transforming the learning experience into immersive and relevant activities, while offering concrete solutions to chronic challenges of student motivation deficits and passivity in the classroom (Karakose & Tülübaş, 2023).

However, while there have been many positive developments in the application of AI, there are some gaps that still need to be addressed. One of the most significant gaps is related to technological accessibility. In a study by Ghnemat et al. (2022) that discussed the application of AI in the transformation of higher education, it was revealed that although AI technology can improve the personalization of learning, its adoption is often hampered by infrastructure issues and unequal access to technology, especially in developing countries or regions with limited resources. This is a major obstacle in optimizing the benefits of AI, as not all students have an equal opportunity to access AI-based learning tools (Ghnemat et al., 2022).

In addition, ethical issues in the use of AI in education are also still an issue that needs to be addressed. Several studies, such as those revealed by Gupta et al. (2025), highlight concerns about potential bias in AI algorithms, which can exacerbate inequities in the presentation of educational content. While AI has great potential to democratize access to education, the issue of bias and inequity in the data used to train AI systems needs further attention so that these technologies do not exacerbate existing inequalities (Gupta et al., 2025).

Additionally, despite numerous studies highlighting the benefits of AI, the integration of AI with pedagogical theory is still a challenge to consider. As described in the study of López-Minotta et al. (2025), although AI tools such as SUNO. AI can help in improving listening skills, the design of the tool must be more adapted to effective pedagogical principles so that the learning suggested by AI is truly effective in an educational context. This shows that there is a gap between the potential of AI technology and its application within a broader pedagogical framework (López-Minotta et al., 2025).

One of the main trends seen is **Improving the quality of learning through personalization** made possible by AI technology. In the context of higher education, the use of AI platforms such as ChatGPT has been shown to increase students' cognitive depth, especially in terms of high-level thinking skills such as analysis and evaluation. A study conducted by Abdelmagid et al. (2025) shows that the use of AI can speed up the learning process and improve understanding of complex concepts. In addition, AI serves to provide faster and more precise feedback, which makes it easier for students to master the material in a more efficient way. This trend illustrates how AI can enhance the learning experience by providing an approach tailored to students' individual needs and abilities (Abdelmagid et al., 2025).

However, despite significant developments in the use of AI to improve cognitive and psychomotor skills, there are **large gaps in terms of the development of affective aspects**. An article written by Nirwana et al. (2024) shows that while AI can improve knowledge-based learning and technical skills, it cannot replace human interaction, particularly in the moral and character development aspects. Islamic education, which strongly prioritizes moral, character, and spiritual guidance aspects, faces challenges in making the most of AI because this technology has not been able to replace the role of value-based and ethical teaching that is often taught by educators. This gap is a problem that must be solved to ensure that AI can support the development of students' character, not just technical and cognitive abilities (Andri Nirwana et al., 2025).

Digging deeper into the layers of implementation challenges, Ghnemat and Shaout (2022) reveal the reality of infrastructure inequality that is a fundamental barrier to AI adoption globally. While theoretically AI offers sweet promise in terms of learning personalization and feedback efficiency, the study highlights the wide gap between these potentials and the material conditions of educational institutions, especially in developing countries. These barriers manifest in two crucial dimensions: the difficulty of accessing adequate hardware and software, and the deficit in the competence readiness of teachers to operate such advanced technologies. As a result, these limitations not only hinder technical integration, but also create a sharp educational asymmetry; where resource-rich institutions are able to shoot with the help of AI, while disadvantaged institutions are increasingly lagging behind. This dynamic confirms that without equal access and training, AI risks exacerbating educational segregation based on socio-economic background, instead of becoming a tool for equitable quality of learning for all students. (Ghnemat et al., 2022).

The benefits and challenges faced by educators and learners in the use of AI technology in the learning process

The use of artificial intelligence technology (AI) in the learning process presents various benefits that are directly felt by educators and students, especially in the aspects of personalization, efficiency, and learning engagement. AI allows for adaptive learning systems that are able to adjust materials, difficulty levels, and feedback based on individual needs of students, making the learning process more responsive and inclusive. This is evident in the use of AI in testing grammar

abilities for children with learning disabilities, where AI technology acts as a quick and specific feedback provider that has an impact on improving student learning performance and motivation (Katsarou et al., 2025). In addition, AI also encourages a more interactive learning experience through the application of adaptive learning, AR/VR-based simulations, and contextual content exploration that makes learners more active and engaged in the learning process (Annuš, 2024). In the context of cultural and art learning, AI even functions as a curator of knowledge through AI-based folk art repositories that expand students' access to learning resources, enrich cultural literacy, and encourage creativity and cross-disciplinary understanding (Gupta et al., 2025).

Placing educators as the primary subjects in this ecosystem, AI integration is proving to have a transformative impact in reconstructing professional efficiency and pedagogical praxis. As outlined by Annuš (2024), AI-facilitated automation of the evaluation and administrative assessment process is not just a time saver, but a liberating mechanism that restores the autonomy of teachers to focus on the essence of education: empathic mentoring and reflective pedagogical decision-making. This empowerment narrative is deepened by the findings of Bulathwela et al. (2024), which highlight the dimension of technological inclusivity; through the adoption of the *low-code/no-code* and assistive technology, AI breaks down technical barriers, allowing educators without complex programming backgrounds to remain adaptive learning architects. Thus, the position of AI as a supporting instrument is strengthened (*Support System*) that vitally, expand the capacity of educator agencies to design a responsive and student-centered learning orchestration (Bulathwela et al., 2024).

However, various challenges also arise in the implementation of AI in the world of education. One of the main challenges is the inequality of access to technology which has the potential to widen the educational gap, especially for students from disadvantaged socio-economic backgrounds. Bulathwela et al. (2024) emphasized that AI does not automatically democratize education, because limited infrastructure, digital literacy, and non-inclusive policies can actually reinforce existing injustices. In addition, the reliability and accuracy of AI outputs are important issues, especially when AI is used as a learning resource or evaluation tool. Research by Sallam and Al-Salahat (2023) shows that ChatGPT's performance in microbiology exams is still below students, so the use of AI without supervision risks misleading students and lowering the quality of academic assessments (Sallam & Al-Salahat, 2023).

Other challenges relate to ethical issues, data privacy, and algorithmic bias. The use of AI in learning opens up the risk of violating the privacy of learners and educators, as well as the potential for biased representation of knowledge, including cultural homogenization in the context of learning local arts and culture (Gupta et al., 2025). On the educator side, challenges also arise in the form of pedagogic readiness, training needs, and techno-solutionism tendencies, which are the assumption that technology alone can solve educational problems that are actually structural and social (Bulathwela et al., 2024). Without institutional support, the right policies, and capacity building of educators, the implementation of AI risks becoming a symbolic and unsustainable innovation (Gupta et al., 2025).

In a macro review of the higher education landscape, the integration of artificial intelligence (AI) is no longer seen as merely the adoption of technical aids, but rather as a manifestation of a transformational framework that overhauls pedagogical fundamentals. Referring to the conceptual study of Ghnemat et al. (2022), the presence of AI facilitates the creation of a highly adaptive learning ecosystem, where the curriculum is no longer static, but responsive to students' speed, style, and cognitive needs in a meaningful way *real-time*. This transformation marks a significant paradigmatic shift: moving away from conventional one-way lecture methods to a dynamic approach based on real problem-solving, competency development, and a spirit of lifelong learning (*lifelong learning*). The implications of this shift are vital in bridging the gap between academia and the demands of industry; AI enables educators to design more contextual and precise learning scenarios, specifically geared towards instilling essential 21st-century skills, thus ensuring the relevance of graduates amid the ever-changing dynamics of the world of work(Ghnemat et al., 2022).

The benefits of AI are also evident in the use of chatbot-based systems such as ChatGPT in the learning process. Karakose and Tülübaş (2023) show that ChatGPT can serve as a learning assistant that provides personalized feedback, diverse learning resources, and cognitive and metacognitive support for learners. For students, this technology helps the process of self-reflection, understanding the material independently, and strengthening critical and creative thinking skills. Meanwhile, for educators, ChatGPT contributes to the preparation of lesson plans, the development of teaching materials, and support in assessment and evaluation. Thus, AI plays a role as a pedagogic support tool that expands the capacity of educators, not replaces their role (Karakose & Tülübaş, 2023).

In the context of language learning, the benefits of AI seem more concrete and measurable. Research on the effectiveness of SUNO. AI in improving Arabic listening skills shows that AI is able to provide personalized exercises, real-time feedback, and exposure to various dialects, which significantly improves students' learning outcomes (Hijriyah et al., 2025). Similar findings are also seen in studies of the implementation of AI to improve English speaking skills, where the use of AI-based applications increases students' motivation, participation, fluency, and confidence through an adaptive learning environment free of social pressure (López-Minotta et al., 2025). In this case, AI helps learners practice intensively and safely, something that is difficult to achieve in conventional classroom learning with time constraints and teacher-student ratios (Hijriyah et al., 2025).

Nonetheless, the five articles also highlight a range of serious challenges in the use of AI in education. The main challenge that consistently arises is the readiness of educators and educational institutions to adopt AI pedagogically, not just technologically. Conceptual articles on AI in higher education emphasize that without changes in academic culture, institutional policies, and educator training, AI risks becoming just a symbolic innovation that has no real impact on the

quality of learning (Ghnemat et al., 2022). This is reinforced by Karakose and Tülübaş (2023) who highlight educators' concerns regarding plagiarism, students' over-reliance on AI, as well as the potential for a decline in independent thinking skills if AI is used without clear pedagogic guidance (Ghnemat et al., 2022).

Other significant challenges relate to access gaps, digital literacy, and technological competence. Study on SUNO. AI reveals that although AI is effective in improving language skills, there are still obstacles in the form of limited infrastructure, low confidence of educators in using technology, and gaps in technological abilities between students (Hijriyah et al., 2025). In the context of AI-based English learning, López-Minotta et al. (2025) also emphasized that the success of AI implementation is highly dependent on mature learning design and teacher mentoring, since without it AI does not automatically address long-standing pedagogic problems (Hijriyah et al., 2025).

In addition to technical and pedagogical aspects, ethical issues and learning evaluation are also important challenges. Conceptual articles on AI in higher education highlight the risks of algorithmic bias, the privacy of learners' data, and the unclear boundaries of responsibility between humans and AI systems in the assessment process (Is Artificial Intelligence Really the Next Big Thing..., 2023). For educators, this challenge demands ethical and critical literacy skills towards AI, while for learners, learning is needed that emphasizes the responsible and reflective use of AI, rather than just an instant tool to complete academic tasks.

Artificial intelligence can support personalization of learning and improve the learning experience of students at various levels of education

Artificial Intelligence Alone Will Not Democratise Education by Bulathwela et al. (2024), discussing the ways in which AI can change the educational landscape, especially through personalized learning. AI has the potential to build individualized curriculums and offers opportunities to democratize education. However, the authors warn that AI alone cannot bridge the education gap and can even exacerbate existing inequalities if not carefully integrated. They emphasize the need for a collaborative approach in which AI works in conjunction with open education resources, such as Wikipedia and open source tools, to make education accessible and equitable for all learners (Bulathwela et al., 2024).

A similar focus on the potential of AI in personalization education is explored in the study *Below Average ChatGPT Performance in Medical Microbiology Exam* by Sallam and Al-Salahat (2023). This study compared the performance of AI models, such as ChatGPT, with university students in answering multiple-choice questions (MCQs) of medical microbiology. The study found that AI can indeed provide a personalized learning experience by answering questions and offering feedback tailored to students' individual needs. However, AI performance was found to be lower than that of college students in terms of accuracy and cognitive abilities, particularly in high-level thinking skills such as analysis and evaluation. This underscores the importance of continuous evaluation and refinement of AI models to ensure they effectively meet educational goals (Sallam & Al-Salahat, 2023).

In the *book Education in the Age of Artificial Intelligence*, Annuš (2024) highlights how AI has become a significant force in reshaping the education system. This article discusses the potential of AI-based adaptive learning systems that create personalized learning paths, which are critical in meeting the diverse needs of students. AI also plays a role in automating assessments, making learning more efficient and accessible. Annuš emphasized that while AI offers great potential for individualized learning, it is crucial for teachers to continue to play a central role in supporting and guiding students, ensuring that AI remains a tool to enhance, rather than replace, the human aspect of education.

Article titled "Values *Education from AI-Based Folk Art Repository"* The work of Gupta et al. (2025) presents a unique perspective on how AI can be leveraged for personalized learning, not only in traditional subjects, but also in arts and culture education. This article explores AI-based folk art repositories that use machine learning and computer vision to curate and recommend artwork based on individual students' interests. The repository allows students to engage with cultural history interactively, tailoring the learning experience to their preferences and creating opportunities for personalized artistic exploration. The study also highlights the importance of using AI responsibly to preserve cultural integrity and avoid homogenizing traditions (Gupta et al., 2025).

Lastly, *research titled "Exploring AI Technology in Grammar Performance Testing for Children with Learning Disabilities"* by Katsarou et al. (2025) investigated the use of AI in addressing specific learning challenges, particularly for children with learning difficulties. This study shows how AI can be used to deliver personalized grammar instruction through adaptive assignments that fit the individual needs of students. The results showed a significant improvement in grammar performance for students who used AI tools compared to conventional methods. The study underscores the effectiveness of AI in offering tailored interventions for students with special needs, supporting their academic growth in ways that traditional methods may not be able to (Katsarou et al., 2025).

Higher Education Transformation for Artificial Intelligence Revolution by Ghnemat et al. (2022), proposing a framework for implementing AI-based learning in higher education. In this article, the author highlights how AI can enhance a personalized learning experience by tailoring learning materials according to the needs of each student. By using a competency-based learning system, AI can help students achieve learning outcomes more easily and quickly. This will increase student engagement as well as prepare them to face the challenges of the evolving industrial world. AI is also expected to reduce the gap between educational outcomes and industry needs, creating lifelong learners who are ready to take on the dynamic professional world (Ghnemat et al., 2022).

Through an in-depth investigative lens, Karakose and Tülübaş (2023) dissect the capacity of ChatGPT as a catalyst instrument in the education ecosystem, particularly in facilitating precisely personalized learning. This study outlines how ChatGPT is able to reconstruct students' learning experiences through adaptive mechanisms; By providing *real-time feedback* and access to an expansive repository of materials, the technology enables the formation of a learning structure that is harmoniously calibrated to each individual's level of cognitive proficiency. Beyond the personalization aspect, ChatGPT's role extends as an incubator for the development of 21st-century essential competencies—namely collaboration, communication, critical thinking, and creativity—by stimulating an interactive dialectic that challenges students to think deeper. The significance of this technology has also penetrated to the teaching side, where ChatGPT does not replace the role of teachers, but transforms into an intellectual partner that enriches the pedagogical repertoire through the provision of innovative solutions and creative ideas, thereby simultaneously improving instructional quality and student learning experience holistically.

Moving more specifically into the realm of applied linguistics, the third article by Hijriyah et al. (2023) presents empirical evidence on the efficacy of the SUNO platform. AI in accelerating the mastery of Arabic listening skills. This study illustrates the shift from static practice methods to a dynamic approach, where AI functions to curate precisely calibrated practice materials to each student's unique level of proficiency. Through the instant feedback mechanism (*Real-time feedback*), the platform not only succeeded in significantly escalating auditory comprehension, but also revitalized the cognitive engagement and motivation of students that often dim in conventional methods. This narrative of effectiveness is strengthened and expanded by the findings of López-Minotta et al. (2025) who examine the implementation of artificial intelligence in the context of the development of verbal expression. This research confirms that the adaptive environment created by AI is able to provide a safe psychological space for students to practice, while ensuring that the material provided is always relevant to their learning development curve, thus creating a continuous and targeted cycle of language competency improvement (Gupta et al., 2025).

Closing this series of literature reviews with a macro synthesis, the seminal article by Katsarou et al. (2024) asks provocative and essential questions about the urgency of AI as the 'next big thing' in the higher education landscape. Through a comprehensive investigation, this study validates that the integration of intelligent systems is not just a momentary trend, but a fundamental pillar in realizing true educational personalization. AI is proven to be capable of designing 'adaptive learning pathways' (*Adaptive Learning Pathways*) that dynamically modulates content to match each student's unique cognitive rhythm and preferences, giving them full autonomy to learn at their own pace. The implications of this integration are profound; It not only elevates the standards of teaching quality and efficiency, but also offers elegant systemic solutions to accommodate the heterogeneity of student needs—a complex challenge that has been difficult to reach by conventional pedagogical methods that tend to be linear and rigid(Katsarou et al., 2025).

Shifting the analytical lens to the humanist dimension and subjectivity of educational actors, the study conducted by Rabab'h and Almoray (2025) captures the landscape of educators' perceptions in Jordan that shows an affirmative reception to the integration of artificial intelligence. Teachers do not view AI as a threat, but rather as a strategic asset capable of optimizing a broad spectrum of educational praxis; From assessment accuracy, instructional planning, to complex student behavior management. While there is consensus that AI holds the key to opening the door to more personalized and participatory learning, this study critically establishes an absolute prerequisite: the success of this implementation does not occur in a vacuum, but rather relies heavily on investment in sustainable professional development. These findings confirm that the sophistication of algorithms is only half of the solution; the other half lies in the readiness and digital literacy of educators, which is the determining variable of whether the adaptive potential of AI can be translated into the reality of effective learning in the classroom (Rabab'H & Almoray, 2025).

Carrying a narrative of revolution in the higher education landscape, the study elaborated by Rahiman and Kodikal (2024) critically dissects the contributory mechanisms of AI technology in reconstructing the learning ecosystem to be more personalized and efficient. Through the integration of intelligent instruments such as adaptive learning systems, *chatbots*, and intelligence tutors, AI is present as a facilitator that allows students to have full autonomy to calibrate their own learning rhythms (*self-paced learning*), supported by the intake of specifically curated content and *real-time feedback*.

On the other hand, the author also highlights the systemic impact of this technology on the educator profession; AI's ability to automate repetitive administrative workloads provides a valuable 'time dividend' for lecturers. This allows for the reallocation of teachers' attention resources back to the fundamental pedagogical essence, which is to build deep student involvement and provide humanistic mentoric guidance. These dynamics emphatically underscore the strategic dual role of AI: acting as an architect of a precise learning experience for students, while also serving as a catalyst that strengthens the interactional capacity and quality of teaching for educators.

Through an evaluative approach based on SWOT analysis, Nirwana et al. (2025) map a sharp dichotomy between technical capabilities and spiritual deficits in the integration of AI in Islamic education. On the one hand, this study confirms that AI functions as a very effective instrument in strengthening the cognitive and psychomotor domains; This technology is able to facilitate personalized learning that is precise in mastering technical skills, such as the accuracy of reading the Qur'an (tajweed) and understanding the rules of Fiqh. However, this study draws a firm demarcation line on the affective dimension, revealing that AI has fundamental limitations in reaching the 'taste' and 'spirit' aspects of education. The absence of emotional intelligence and spiritual awareness in machines makes it incompetent in providing *moral guidance* which is the heart of Islamic education. Therefore, these findings conclude a pedagogical synthesis: although AI can optimize the

acquisition of knowledge and skills, the existential role of human educators as *murabbi* (spiritual guides) remains irreplaceable in the process of internalizing ethical values, the formation of noble morals, and the spiritual development of students

Exploring the dynamics of cognition in the advanced education stratum, the study conducted by Abdelmagid et al. (2025) highlights the strategic role of artificial intelligence applications, especially ChatGPT, in accelerating '*cognitive depth*' among postgraduate students. This research proves that AI integration goes beyond basic utility functions; it acts as an intellectual *scaffolding* instrument that enables students to navigate the process of higher *order thinking skills (Higher Order Thinking Skills*), especially in the aspects of critical analysis and synthesis evaluation. The study's findings indicate that dialectical interaction with AI significantly strengthens students' capacity to engage deeply with academic content, sharpens strategic thinking acumen, and enhances sophistication in complex problem-solving. Thus, AI is positioned not as an academic shortcut, but rather as an essential cognitive partner in promoting '*deep learning*', a prerequisite competency for researchers and academics at the postgraduate level who are required to manage the ambiguity and complexity of science.

The effect of the application of artificial intelligence (AI) in learning innovation on improving the quality of education
The use of artificial intelligence technology (AI) in the learning process

In another dimension, the contribution of artificial intelligence manifests significantly in the revitalization of management and the dissemination of digital knowledge resources. This is deeply reflected in the discourse on *AI-Powered Folk Art Repositories*, which highlights the technology's capacity to go beyond passive storage functions to an active role in the curation, taxonomy, and contextualization of cultural content. Through the intervention of intelligent algorithms, learning materials are not only democratized in accessibility, but also reconstructed so that they have a strong resonance of meaning and contextual relevance for learners. This transformation makes cultural artifacts more than static objects, but rather living pedagogical instruments, which in turn enrich the landscape of learning experiences, deepen conceptual understanding, and stimulate active engagement that is essential for the holistic elevation of educational quality.

However, the narrative of optimism about the efficacy of AI in escalating the quality of education cannot be understood in a vacuum; It is intrinsically intrinsically tied to the social ecosystem and the macropolicy framework that surrounds it. This crucial point is sharply articulated in the criticism of Bulathwela et al. (2024) through the article *'Artificial Intelligence Alone Will Not Democratise Education'*, which dismisses the myth of technocentrism that AI is the *panacea* (cure for all diseases) for the complexity of educational problems. The authors make a fundamental argument that without an inclusive policy foundation and equitable structural interventions, the adoption of this technology risks becoming a double-edged sword: instead of democratizing knowledge, it has the potential to widen the gap in education stratification due to gaping digital access and literacy disparities. Thus, the proposition of improving quality through AI is a contingent variable; Its realization depends heavily on ethical prerequisites and equity strategies applied in the architecture of the education system itself, not solely on the sophistication of its algorithms. (Bulathwela et al., 2024).

However, balancing the discourse of technological optimism, the validity of the quality of education cannot be separated from the inherent limitations that are still inherent in the capabilities of AI itself. This reality is empirically captured in the comparative study of Sallam and Al-Salahat (2023), which juxtaposed ChatGPT's performance with students in the complexity of microbiology exams; The findings reveal that despite its promise as a tool, the algorithmic performance of AI is still sub-optimal and below the threshold of the average cognitive achievement of students. This fact is a firm demarcation that validates that AI has not been able to replicate, let alone replace, high-level thinking processes and human critical reasoning that are full of nuances. Therefore, the ontological position of AI in education must be redefined: not as a substitute entity (*substitute*), rather as a supporting instrument (*Adjunct Tool*) that serve for exploration of initial concepts, repetitive exercises, or material enrichment. Within this framework, the improvement of the quality of education is not born from the automation of the role of teachers, but rather from an augmentation process in which AI reinforces, rather than negates, the learning process that remains facilitated by the human intellectual touch (Sallam & Al-Salahat, 2023).

More broadly, the article *Education in the Age of Artificial Intelligence* by Annuš (2024) views AI as a catalyst for educational transformation in the digital age. Through technologies such as personalized learning, automated assessments, educational chatbots, and learning analytics, AI drives pedagogic innovation and data-driven decision-making. However, the results of the qualitative survey in the study emphasized that the role of teachers remains crucial as facilitators, companions, and directers of the learning process. In other words, improving the quality of education through AI occurs when this technology is used to reinforce pedagogical interactions, not replace them

The application of artificial intelligence (AI) in learning innovations has been proven to have a significant influence on improving the quality of education, both from pedagogical, cognitive, and managerial aspects. Various studies show that AI not only plays a role as a technological aid, but also as a catalyst for the transformation of the education system that is more adaptive, personalized, and effective.

In the context of higher education, AI is seen as the main foundation in the transformation of learning towards the era of the industrial revolution 4.0. AI allows for personalized learning, which is a system that is able to adjust the material, speed, and learning style according to the individual needs of students. Through the analysis of student learning data, AI can identify weaknesses, strengths, and learning patterns so that lecturers can design learning interventions that are more targeted. This has an impact on improving the quality of learning because the learning process becomes more efficient, adaptive, and based on the real needs of students.

Furthermore, the use of AI such as ChatGPT in learning activities also shows a positive contribution to the quality of education. ChatGPT can act as a virtual assistant that helps students understand concepts, provide additional explanations, and facilitate academic discussions. The presence of AI encourages active learning, because students no longer only depend on lecturers, but can explore material independently with the support of AI. As a result, students' critical thinking skills, concept understanding, and learning independence have increased significantly.

In the realm of language learning, AI has also been proven to improve the quality of students' language skills. Research on the use of SUNO. AI in Arabic listening learning shows that AI is able to provide audio material that is varied, interactive, and tailored to the student's ability level. AI provides feedback directly so that students can correct mistakes in real-time. This has an impact on increasing student motivation, confidence, and learning outcomes significantly compared to conventional methods.

In addition, the implementation of AI in English language learning, especially in oral expression skills, also showed a positive influence. AI is able to simulate conversations, provide pronunciation corrections, and automatically evaluate students' sentence structures. Thus, students gain a safe and flexible learning environment to practice without fear of making mistakes. This improves the quality of learning because students are more active, confident, and have more intensive practice opportunities.

Conceptually, AI is seen as a strategic innovation in education because it is able to integrate data, technology, and pedagogy simultaneously. AI not only improves learning efficiency, but also supports data-driven decision-making in education management. Educational institutions can leverage AI to monitor student performance, predict the risk of learning failure, and improve the overall quality of academic services. Thus, the quality of education improves not only in terms of learning outcomes, but also in terms of systems, governance, and sustainability of learning.

In the midst of great enthusiasm for technological advances, we need to realize that the validity of educational quality cannot be separated from the inherent limitations of artificial intelligence, a reality that is clearly captured in the study of Sallam and Al-Salahat (2023) where ChatGPT's performance in microbiology exams was proven to be below the average of students' cognitive abilities. This empirical fact is a firm marker that AI has not been able to replicate critical reasoning and nuanced human high-level thinking processes, so its position in education must be fundamentally redefined not as a *substitute* entity, but as an *adjunct tool*) which functions for initial exploration and material enrichment. Thus, improving the quality of education is actually not born from efforts to automate the role of teachers, but through an augmentation process where technology is present to strengthen the learning process that remains centered on intellectual touch and human facilitation.

In the modern university environment, the presence of artificial intelligence (AI) plays a very vital role, especially in encouraging a learning paradigm that truly focuses on the needs of students. As explained by Rahiman and Kodikal (2024), this technology integration allows the creation of an adaptive learning system that is able to dissect and analyze the unique learning needs of each individual in depth. Through the use of various advanced instruments such as *chatbots* and virtual assistants, students can now experience a much more interactive and personalized learning experience, no longer limited to rigid one-way methods. Not only does AI benefit the student side, AI also functions as a strategic partner for lecturers in conducting more accurate performance evaluations and providing instant feedback, which makes the entire academic process run more effectively and efficiently. This synergy ultimately leads to an overall improvement in the quality of education, where students are given space to absorb knowledge according to their own cognitive style and speed, while teachers have more flexibility to concentrate on designing more substantive and meaningful learning strategies.

Furthermore, the urgency of digital transformation in learning is strengthened by the empirical findings of Nirwana et al. (2025) which confirm that the integration of artificial intelligence in the educational ecosystem, including specifically in the realm of Islamic education, has substantial positive implications for the development of students' cognitive and psychomotor capacities. Through the implementation of an adaptive learning system that manifests in the form of *Chatbot* and various intelligent digital platforms, this technology has been proven to be able to optimize memory retention, deepen conceptual understanding, and sharpen students' practical skills significantly. While it must be acknowledged that there are inherent limitations in the affective domain due to the absence of emotional intelligence and human intuition in its algorithm structure, AI's contribution to the elevation of learning quality in aggregate—especially in terms of substantive material mastery and acceleration of competency development—remains undeniable. In this configuration, AI manifests as a strategic innovative instrument that not only enriches pedagogical dynamics, but also plays a crucial role in democratizing and expanding access to high-quality educational services (Andri Nirwana et al., 2025).

The validation of the transformative impact of technology is further strengthened by the research of Abdelmagid et al. (2025), which specifically affirms that the use of AI, especially ChatGPT, is able to escalate the cognitive depth of

graduate students to a more substantial level. The role of this technology has been proven to go beyond just improving academic achievement, but also to the stimulation of high-level thinking skills (*Higher Order Thinking Skills*) which includes sharp analytical power, synthesis skills, and critical evaluation. In an empirical comparison, students who integrate AI support into their learning process show significant advantages in critical and strategic thinking maturity compared to those who are still fixated on conventional learning methods. This phenomenon is clear evidence that AI plays a vital role in improving the quality of education, not only as a technical tool, but as a catalyst that strengthens the cognitive aspects of learning to be more profound and meaningful (Abdelmagid et al., 2025).

Complementing the empirical evidence landscape, Li et al.'s (2025) research in the realm of medical education provides a crucial perspective that integration *generative AI* into the model *Case-based learning* proven to be able to boost students' learning efficiency and academic results simultaneously. In this study, the group of students supported by AI technology showed real performance advantages, characterized by more accelerated task completion and higher score acquisition compared to the control group, in addition to AI was also considered to have the ability to provide reliable and objective assessments. Although this technological intervention raises concerns about the potential for a reduction in the intensity of direct interaction between lecturers and students, overall the presence of AI still makes a positive and constructive contribution to the quality of learning, especially in its function of strengthening the understanding of complex medical concepts and optimizing the effectiveness of the overall learning process (Li et al., 2025).

In a more macro perspective, various contemporary studies have further cemented the position of artificial intelligence as a vital pillar of strategic innovation in the education ecosystem, where this technology facilitates a paradigm transformation towards decision-making that is entirely based on precision data. AI capabilities don't just stop at its ability to comprehensively monitor student learning progress, but also include the predictive ability to detect potential learning barriers or difficulties early on. Through the implementation of intelligent analytics systems, educational institutions are now empowered to design much more accurate and targeted learning intervention schemes, which in turn escalates the overall quality of academic services. Thus, the impact of this AI integration goes beyond simply improving individual student learning outcomes; It also functions fundamentally in strengthening the architecture of the education system itself—both in terms of managerial efficiency and pedagogical effectiveness—in order to realize more responsive and adaptive educational governance.

Conclusion

Learning innovations driven by artificial intelligence (AI) advancements have had a significant transformative impact across different levels and disciplines of education, especially through its ability to realize personalized learning that allows each student to have an educational experience that is precisely aligned with their needs, capacities, and learning style preferences. The effectiveness of this technology is clearly illustrated through the implementation of various smart devices, such as SUNO. AI and English learning applications, which according to the findings of Hijriyah et al. (2025) and López-Minotta et al. (2025), have been shown to be effective in improving students' skills through curated practice mechanisms and the provision of instant feedback, a process that simultaneously succeeds in spurring learners' engagement and motivation. This reality is strong evidence that AI is able to deliver a much more dynamic, adaptive, and personalized learning experience, going beyond the rigid limitations that have been inherent in conventional learning methods.

While the transformative potential of AI is promising, we cannot ignore the reality of the implementation gap that is still a residue of serious problems, especially related to the disparity in technological accessibility that creates a digital divide. As underlined by Annuš (2024) and Ghnemat et al. (2022), infrastructure challenges and the lack of adequate availability of digital devices in developing countries are structural barriers that cause the distribution of the benefits of AI-based learning technologies to not be enjoyed equally by students in different regions. Furthermore, the urgency of addressing this issue is even more urgent when it is associated with the ethical dimension, data privacy protection, and the risk of algorithmic bias, all of which require serious attention and appropriate mitigation so that the integration of this advanced technology does not backfire on social stratification and widen the inequalities that have taken root in the global education ecosystem. (Gupta et al., 2025).

In addition to these technical achievements, we need to take a deep look at the fact that although AI interventions have succeeded in accelerating the improvement of competencies in the cognitive and psychomotor domains, a number of academic literature provides a critical note that this technology does not yet have the capacity to substitute the fundamental role of humans in the affective dimension and morality of education. This is specifically highlighted by Nirwana et al. (2025) in the context of Islamic education, which reveals the fact that although AI is able to effectively boost the mastery of knowledge and technical skills, it is still an entity that lacks ethical awareness and is unable to take over the functions of value-based learning and moral guidance that are the main foundation of student character development. This reality confirms a clear demarcation: that no matter how sophisticated AI is in facilitating the transfer of knowledge and skills, the presence of the teacher as a sovereign of noble values and a moral guide remains an irreplaceable element that guarantees the integrity of the essence of education itself.

From the perspective of teachers, the integration of artificial intelligence offers a value proposition that is no less strategic, especially in terms of operational efficiency and learning management. As elaborated by Annuš (2024), AI's ability to automate assessment mechanisms and handle routine administrative burdens provides valuable flexibility for educators to reallocate their time and energy to more creative, interactive, and substantive teaching dimensions. However,

the effectiveness of this digital transformation does not occur automatically, but depends on the level of readiness of the education ecosystem—both educators and institutions—to adopt this technology not only as a technical tool, but as an element that is pedagogically integrated and effective. Therefore, the urgency of providing adequate training programs and continuous competency development for educators is an absolute prerequisite, to ensure that the great potential of AI can be explored to the fullest and translated into quality teaching practices in the classroom.

In conclusion, AI in education has great potential to improve the quality of learning through personalization, engagement, and efficiency. However, challenges related to accessibility, ethics, data privacy, and educator readiness must be taken seriously in order for AI to be implemented effectively and inclusively. This technology should be seen as a tool that supports education, not a replacement for the role of humans in guiding and developing students' character. As technology develops, it is important to ensure that the application of AI in education is carried out with a holistic approach, taking into account broader social and pedagogical values.

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