Multi Layered Approach in AI based Educational Planning

Dr. Priya Deo[1], Dr. Amita Kumari[2], Dr Ram Kishan pal[3], Mrs. Vandana Jain[4], Dr Namrta Jain[5]

[1]*Assistant Professor Sri RamaKrishna Sarada Ashrama Teacher's Training College, Hazaribag, Jharkhand*
[2]*Assistant Professor Department of Education Vinoba Bhave University Jharkhand*
[3]*Assistant Professor Department of Education Khwaja Moinuddim Chishti Languag University Lucknow*
[4]*Department of psychology PMOCE Govt Mahakoushal Mahavidhyaly Jabalpur*
[5]*Assistant Professor College of law & Legal studies, Teerthanker Mahaveer University Moradabad*

Abstract
Educational planning is moving to a new generation with AI enabled resources in personalization, prediction and automation which will enhance the learning and resources. The combination of AI with education is not an accelerating factor, but a gradual switching point towards personalized, student-driven learning ecosystems. The present review discusses both these layers of AI in educational planning and how this is affecting personalized learning plans and predictive analytics in student performance and automation in administrative process. Given this emerging 'AI use within education' landscape, this paper seeks to help "center what we know so far and what remains to be known about AI interventions in education". Through a review of existing users, issues and trends, this paper seeks to give readers a fuller picture of the strategic ways in which AI may be deployed to achieve more effective, equitable and engaging educational systems.

Keywords: - Artificial Intelligence, Education, Multi-layer Approach, Decision-Making, Teaching, Learning,

1. Introduction

The development of AI within educational planning has about the potential to take us into a new era that can shape our future and future generation through a transformed learning experience, optimal resource utility, and evidence-based decision-making (Mah& Gross, 2024; Sposato, 2025). The promising impact of AI on education covers a range of applications, from the automation of organizational and administrative operations to the design of learning environments that respond to the particular needs of individual students (Sposato, 2025). AI's ability to process large amount of data and discover patterns has potential in the creation of predictive models, which can predict student performance, optimize curricula design and better allocate resources (Silva et al., 2024).Education organizations are looking to AI for ways to improve teaching and accommodate student differences (Dey, 2025; Mahmoud &Sørensen, 2024).It seeks to complement, not replace, the teacher through enlivening and expediting the learning process (Lampou, 2023). AI can help to personalise learning and enhance study effectively, reduce stress and increase performance in studying AI can bring a subsequent level in study effectiveness, which is another potential benefit of the technology (Ward et al., 2024).The fundamental goal of infusing AI into educational planning is to forge a more personalized, equitable and impactful-learning model that can support both educators and students.

1.1.   Background and Motivation

The burgeoning development of AI has attracted wide attention to apply these technologies in education, where personalized learning and learning performance could be enhanced(Dey, 2025). Conventional educational strategies typically find it difficult to accommodate varied student learning styles and paces, leading to poor learning experiences and learning deficits. AI has the potential to overcome these challenges by providing students with tools and techniques that respond to the individual requirement or preferences of the learner(Jian, 2023). AI can also promote equity in education by offering personalized learning experiences, resources, and environments that accommodate each student's individual needs and abilities in order to reduce gaps and promote inclusiveness (Roshanaei et al., 2023). The reason behind the investigation of AI in educational planning is to improve student participation, learning performance and the allocation of resources in today's complex and diversified education systems.

1.2.   Problem Statement

Despite its high potential for education, there are many challenges and ethical issues necessary to be overcome in order to apply it appropriately and with responsibility. The challenges of data privacy, algorithmic bias and the possibility of the deepening of the digital divide are some hurdles which must be looked at very carefully." Equitable access to AI-enabled educational tools and resources is instrumental in order to avoid exacerbating pre-existing inequalities. Furthermore, AI should be used as an aid rather than as a complete substitute for human teachers(Zaman, 2023). Furthermore, the absence of established normative frameworks for the ethical use of AI in education creates potential for unintended consequences. Iterative research and policy will be necessary to ensure that AI is used to be fair for all students and that fair access to a quality education continues with the adoption of AI.

1.3.   Objectives

Thepurpose of this review article is to conduct a deep analysis of the multi layered perspective adopted to outline AI based educational planning. It aims at investigating the "New Normal" situation of AI in the educational context, discussing potential impacts and challenges and giving indications about future trends and research directions. By revealing the opportunities, challenges, and obstacles, the present review is expected to assist in paving the way for the inclusive, creative, and sustainable education in which the AI will be practiced to its fullest (Saputra et al., 2023). The review is interested in understanding the impact of AI-based technologies on adaptive learning, student engagement and administrative efficiency(Merino-Campos, 2025). he end goal is to have a resource that is deployed by educators, policy-makers and researchers seeking to better understand the nuances of AI in education and interpret what AI does and why (Julien, 2024).

1.4.   Contribution

Thepurpose of this paper is to make a twofold contribution: a) a structuring of the Ai phenomenon in educational planning into a flexible framework to accommodate the multiple facets of its definitions; b) an analysis and classification of the existing research, which provides insights into the research gaps and challenges on Ai in educational planning and directions for future research. This article discusses ethical issues and practical obstacles as well as how we might generate solutions to help access parents that do not stigmatize individual candidates participating in the sharing process. This review paper seeks to inform

and direct educators, policy makers and researchers in the application of AI for the improvement of education, by offering a broad representation of the field (Ajani et al., 2024).

2. Literature Review
2.1. AI in Education

AI has been applied to numerous aspects of education, thus showing the diversity and transformative ability of traditional education and learning (Akinwalere& Ivanov, 2022). It is also oriented towards administrative tasks within educational institutions (Gouseti et al., 2024).Artificial intelligence-powered devices allow for personalized learning experiences by responding to the unique needs and learning styles of a pupil (Ayala-Pazmiño, 2023).Intelligent Tutoring Systems also provide personalized instruction and feedback, targeting learner gaps and self-pased learning (Kamalov et al., 2023).These systems assess student's answers, diagnose weaknesses, and present targeted support to improve learning and retention (Mahmoud &Sørensen, 2024).AI is heavily involved with testing and grading by helping in the automation of assignment grading and providing instant feedback for students (Almasri, 2024).

2.2. Educational Planning Models
The infusion of AI into academic planning requires that we build sophisticated models that can make sense of the complicated landscape of education. These transformations allow schools to better allocate resources, achieve better student outcomes and become more efficient. AI-enabled predictive analytics can enable academic institutions to predict enrollment trends, track at-risk students and allocate resources efficiently. AI Scenario A scenario planning tool that uses AI algorithms to simulate multiple scenarios, enabling decision-makers to be better prepared for uncertainties and consequences.

2.3. Multi-Layered Approaches
A multi-dimensional model of AI adoption in educational planning The ability to use AI for educational planning is dependent on an ecosystem of support, including infrastructure, motivation, and efforts to improve pedagogy, among others(Sposato, 2025). These layers interact with each other synergistically to form a comprehensive, adaptable environment for learning. The personalization layer is central to this approach, as it addresses the personalisation of learning experiences to the needs of individual students(Naseer et al., 2024). AI algorithms fuel adaptive learning platforms: they use student performance data to tailor the level, content, and speed of instructional activities. This is to ensure that each student receives the appropriate levels of challenge and support conducive to effective learning (Demartini et al., 2024)(Zou et al., 2025).

2.4. Gap Analysis
Several issues still remain to be addressed in AI-supported personalized education, although there have been significant developments (Maghsudi et al., 2021). It is paramount that fair and unbiased AI algorithms are guaranteed in education, especially in student evaluation and personalised learning (Tanjga, 2023). A complete program of teacher training, professional development and workshops is also necessary to support the use of AI tools by educators(Gligorea et al., 2023; Güneyli et al., 2024). Future investigations should contribute to creating a robust ethical framework and a set of guidelines that define how AI may be used in education by examining topics including data privacy, algorithmic bias, and transparency..

3. Theoretical Framework

3.1. Learning Theories

AI in education is based on well-established learning theories that highlight personalized, adaptive, and student-focused instruction. These theories allow AI-based teaching tools and strategies to be designed that are tailored to the individual student. Patterns of understanding and learning. One of these principles is constructivism, which maintains that rather than being passively received from a third party (be that the teacher, instruction book or TV programme) knowledge is actively built up by the learner through interaction with other people and the world. Constructivism accords well with AI's ability to learn from its experiences, enabling the development of custom learning environments in which learners can be encouraged to explore their world, discovering things about it for themselves. Cognitive Load Theory: The theory of cognitive load focuses on the need to manage the amount of information we present to learners to prevent cognitive overload, which can be tackled using AI tools by delivering complex material in bite-sized chunks, offering timely feedback, and tailoring the level of difficulty to where the individual student is at (Phua et al., 2025).

3.2. AI Principles

Ethical considerations should govern the use of AI in educational planning to ensure fairness, transparency, and accountability. These principles guide developers, educators, and policy-makers towards responsible and ethical AI use in education. Equality dictates that AI algorithm and systems are developed and employed such that there are no biases and that every student has equal opportunity irrespective of race, sex, or other equitably relevant demographic features. Transparency entails making the decision making process of AI algorithms understandable and explainable.

3.3. Planning Theories

Planning theories offer a rational means for educational planning, and so that schools can utilize AI to realize their long-term vision. The rational planning, characterized by data-informed and logical decision-makings, site AI in data-driven planning. Planning, especially if deep and pushing resources and actions toward hard objectives on the horizon, benefits from AI systems orchestrating forecasts, simulated scenarios, and allocations of resources.

4. Multi-Layered Approach

4.1. Layer 1: Data Collection and Preprocessing

Systematic data collection and pre-preprocessing The multi-layered approach proposed in this paper operates at three levels: a) systematic collection of data from diverse sources within the educational ecosystem. AI algorithms are trained on this data to identify patterns, predict outcomes, and personalize learning. Data sources are student demographics information, students' academic records, learning management system data, assessment score files and surveys of feedback. Data preprocessing means to scrub, transform and integrate data quality, consistency and the utility for the AI algorithms.

4.2. Layer 2: AI Model Development

AI systems are being constructed for education built with the aid of machine learning models and data mining pipelines using learning related data(Fenu et al., 2022). The second layer is AI models created for particular educational planning tasks. These are intended to cover a

number of problems including student performance prediction, personalized learning path planning, resource allocation optimization, and early warning systems development.

4.3. Layer 3: Implementation and Evaluation

Finally, the third layer concerns deploying AI-informed applications in authentic educational systems and measuring the impact on student performance and institution functions. This layer includes incorporating AI tools and software into the infrastructure of existing educational settings, training and maintaining support for teachers and staff, and evaluating the performance of AI systems(Owoc et al., 2021).

Use of artificial intelligence technologies is increasingly common in education, particularly in the non-public university environment that is dominated by strategic frameworks(Owoc et al., 2021).

4.4. Layer 4: Feedback and Refinement

The fourth layer emphasizes that continuous feedback and refinement are essential to AI-driven educational systems so that they continue to be effective and timely, able to reflect changing needs and priorities(Mallik&Gangopadhyay, 2023). This layer consists at least partially of acquiring feedback from students, teachers and administrators on their experiences with AI tools and platforms, analyzing that feedback to isolate improvement opportunities, and iteratively improving the AI models and algorithms for higher accuracy and efficacy.

AI solutions can be used to provide individual guidance and automatic feedback (Chetry, 2024).The AI incorporation in higher education has contributed to personalized learning experiences, adaptive assessments, data-based decision-making (Alotaibi, 2024).With the continued development and sophistication of AI, it is also important to examine how its implications could help to improve students' academic performance, thereby increasing its applicability in education (Phua et al., 2025).

5. Challenges and Limitations

5.1. Data Quality

The quality and availability of data is a key factor affecting the quality of AI-based educational planning. Data biases can cause unfair or discriminatory results and incomplete or incorrect data can undermine the confidence in AI models. These are because of data privacy and security issues, distrust, cost, and bias which must be resolved (Harry &Sayudin, 2023). Approach to challenges Sharing between parties of information and knowledge about how to handle the challenges to data quality will help to tackle the challenges. To address the challenge of data quality one must devise a plan to address data quality challenges. This plan should include the development and implementation of data validation measures, ensuring privacy and security of data, and increasing data literacy.

5.2. Bias in AI Models

"But AI models are only as good as the data they're trained on, and if that data has bias in it, the model is going to learn that, internalize it and amplify those biases. Bias in algorithms can have unfair or discriminatory consequences, specifically for students of color(Al-Zahrani, 2024). AI models that address bias must be designed and evaluated with care for data collection, model architecture, and evaluation metrics(Al-Zahrani, 2024; Roshanaei et al., 2023; Thelma et al., 2024).

AI in education should account for ethical factors and issues such as informed consent, data ownership, and algorithmic accountability should be thoroughly considered(Al-Zahrani, 2024).

## 6.	Future Directions
### 6.1.	Explainable AI
Explainable AI is a growing area of research to try to make decisions by AI explainable and understandable. In an educational planning context, explainable AI can provide valuable insight into the decision-making that underpins recommendations and predictions made by AI models.

AI curriculum can prepare these students to work with AI professionally(Chan, 2023). Educators need to build confidence in AI that can be accounted for; confidence in AI that is based on fundamentally secure and just practices.

The ethical implications of deploying AI in education — on issues of data privacy; automated discrimination; and the role of machine-driven instruction in an industry that is part of the service economy — are significant. The use of AI in education presents challenges such as the clarification of the teachers' roles, the reinforcement of the teacher training institutions and the establishment of capacity building programs (Gentile et al., 2023).

### 6.2.	Federated Learning
Federated learning is a type of distributed machine learning which can enable AI models to be training on decentralized data without data being transmitted to a central server. For education planning, federated learning would make it possible for schools to join forces on AI model development without compromising the privacy and security of their students' data.

### 6.3.	Integration with Emerging Technologies
As AI develops and matures, the interaction between AI and other rising technologies like blockchain, augmented reality and the Internet of Things deserves attention. Blockchain can offer secure and transparent data management, augmented reality can make learning experiences more interactive and engaging and Internet of Things can deliver real-time monitoring of student performance and engagement.

The embedding of AI in education requires a multi-stakeholder participation, including the cooperation among the researchers, teachers, federal representatives, and technology developers. Embracing new technologies and fostering cross-disciplinary collaboration, together we can unlock innovate and create a new future for education.

## 7.	Conclusion
Applications of AI in education must consider strategic steps to mitigate ethical challenges and advance fairness and transparency (KARAKUŞ et al., 2025).
The multi-tiered philosophy of artificial intelligence based educational planning is a holistic model for using AI to enhance student and institutional outcomes. Institutional commitment: Tackling data quality, bias and collaboration in order to make use of AI to build more personalized, equitable and effective learning experiences for every student, institutions must address challenges to data quality, mitigate bias and create a culture of collaboration. More evidence is required to assess the efficacy and effectiveness of various AI interventions and

to set benchmarks for AI to support educational planning (Adams et al., 2023; Chinta et al., 2024; Kooli, 2023; Ward et al., 2024).Longitudinal research is essential for understanding the long-term effects of AI on K-12 while demographic studies are critical for the design of inclusive and effective AI tools(Azzam& Charles, 2024). As AI further develops, it will be crucial to keep track of its implications for education and adjust accordingly. AI education policies can ensure AI is used equitably and ethically in the classroom. There is great potential for AI-powered personal learning to transform education ("Global Educational Studies Review," 2020).

AI presents tremendous promise for teaching and learning (AlTwijri&Alghizzi, 2024). AI may revolutionize planning for education by promoting individualized learning experience, the automation of administrative affairs, and the enhancement of decision-making (Ajani et al., 2024; Gudonienė et al., 2023; Zhai et al., 2021). AI can assist teachers in reducing workload burden, generate personalized learning experiences, and give feedback to students in an instructive manner (Lampou, 2023).

Actionable guidelines can enable successful integration of AI in education, centering on importance of ethical considerations, ongoing educator training and strong infrastructure) (Zhu, 2024).

References
1. Adams, C., Pente, P., Lemermeyer, G., & Rockwell, G. (2023). Ethical principles for artificial intelligence in K-12 education. Computers and Education Artificial Intelligence, 4, 100131. https://doi.org/10.1016/j.caeai.2023.100131
2. Ajani, O. A., Akintolu, M., &Afolabi, S. O. (2024). The emergence of artificial intelligence in the higher education. International Journal of Research in Business and Social Science (2147-4478), 13(8), 157. https://doi.org/10.20525/ijrbs.v13i8.3507
3. Akinwalere, S. N., & Ivanov, V. (2022). Artificial Intelligence in Higher Education: Challenges and Opportunities. BORDER CROSSING, 12(1), 1. https://doi.org/10.33182/bc.v12i1.2015
4. Almasri, F. (2024). Exploring the Impact of Artificial Intelligence in Teaching and Learning of Science: A Systematic Review of Empirical Research [Review of Exploring the Impact of Artificial Intelligence in Teaching and Learning of Science: A Systematic Review of Empirical Research]. Research in Science Education, 54(5), 977. Springer Science+Business Media. https://doi.org/10.1007/s11165-024-10176-3
5. Alotaibi, N. S. (2024). The Impact of AI and LMS Integration on the Future of Higher Education: Opportunities, Challenges, and Strategies for Transformation. Sustainability, 16(23), 10357. https://doi.org/10.3390/su162310357
6. AlTwijri, L., &Alghizzi, T. M. (2024). Investigating the integration of artificial intelligence in English as foreign language classes for enhancing learners' affective factors: A systematic review [Review of Investigating the integration of artificial intelligence in English as foreign language classes for enhancing learners' affective factors: A systematic review]. Heliyon, 10(10). Elsevier BV. https://doi.org/10.1016/j.heliyon.2024.e31053
7. Al-Zahrani, A. M. (2024). Unveiling the shadows: Beyond the hype of AI in education. Heliyon, 10(9). https://doi.org/10.1016/j.heliyon.2024.e30696

8. Ayala-Pazmiño, M. (2023). Artificial Intelligence in Education: Exploring the Potential Benefits and Risks. 593 Digital Publisher CEIT, 8(3), 892. https://doi.org/10.33386/593dp.2023.3.1827

9. Azzam, A., & Charles, T. (2024). A Review of Artificial Intelligence in K-12 Education [Review of A Review of Artificial Intelligence in K-12 Education]. Open Journal of Applied Sciences, 14(8), 2088. Scientific Research Publishing. https://doi.org/10.4236/ojapps.2024.148137

10. Chan, C. K. Y. (2023). A comprehensive AI policy education framework for university teaching and learning. International Journal of Educational Technology in Higher Education, 20(1). https://doi.org/10.1186/s41239-023-00408-3

11. Chetry, K. K. (2024). Transforming Education: How AI is Revolutionizing the Learning Experience. International Journal of Research Publication and Reviews, 5(5), 6352. https://doi.org/10.55248/gengpi.5.0524.1277

12. Chinta, S. V., Wang, Z., Yin, Z., Hoang, N., Gonzalez, M., Quy, T. L., & Zhang, W. (2024). FairAIED: Navigating Fairness, Bias, and Ethics in Educational AI Applications. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2407.18745

13. Demartini, C. G., Sciascia, L., Bosso, A., &Manuri, F. (2024). Artificial Intelligence Bringing Improvements to Adaptive Learning in Education: A Case Study. Sustainability, 16(3), 1347. https://doi.org/10.3390/su16031347

14. Dey, D. (2025). Enhancing Educational Tools Through Artificial Intelligence in Perspective of Need of AI. https://doi.org/10.2139/ssrn.5031275

15. Fenu, G., Galici, R., &Marras, M. (2022). Experts' View on Challenges and Needs for Fairness in Artificial Intelligence for Education. In Lecture notes in computer science (p. 243). Springer Science+Business Media. https://doi.org/10.1007/978-3-031-11644-5_20

16. Gentile, M., Città, G., Perna, S., & Allegra, M. (2023). Do we still need teachers? Navigating the paradigm shift of the teacher's role in the AI era. Frontiers in Education, 8. https://doi.org/10.3389/feduc.2023.1161777

17. Gligorea, I., Cioca, M., Oancea, R., Gorski, A.-T., Gorski, H., &Tudorache, P. (2023). Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review [Review of Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review]. Education Sciences, 13(12), 1216. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/educsci13121216

18. Global Educational Studies Review. (2020). In Global Educational Studies Review. https://doi.org/10.31703/gesr

19. Gouseti, A., James, F., Fallin, L., & Burden, K. (2024). The ethics of using AI in K-12 education: a systematic literature review. Technology Pedagogy and Education, 1. https://doi.org/10.1080/1475939x.2024.2428601

20. Gudonienė, D., Stanevičienė, E., Buksnaitis, V., & Daley, N. (2023). The Scenarios of Artificial Intelligence and Wireframes Implementation in Engineering Education. Sustainability, 15(8), 6850. https://doi.org/10.3390/su15086850

21. Güneyli, A., Burgul, N., Dericioğlu, S., Cenkova, N., Becan, S., Şimşek, Ş. E., &Güneralp, H. (2024). Exploring Teacher Awareness of Artificial Intelligence in Education: A Case Study from Northern Cyprus. European Journal of Investigation in Health Psychology and Education, 14(8), 2358. https://doi.org/10.3390/ejihpe14080156

22. Harry, A., &Sayudin, S. (2023). Role of AI in Education. Interdiciplinary Journal and Hummanity (INJURITY), 2(3), 260. https://doi.org/10.58631/injurity.v2i3.52

23. Jian, M. J. K. O. (2023). Personalized learning through AI. Advances in Engineering Innovation, 5(1), 16. https://doi.org/10.54254/2977-3903/5/2023039

24. Julien, G. (2024). How Artificial Intelligence (AI) impacts inclusive education. Educational Research and Reviews, 19(6), 95. https://doi.org/10.5897/err2024.4404

25. Kamalov, F., Calonge, D. S., &Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. Sustainability, 15(16), 12451. https://doi.org/10.3390/su151612451

26. KARAKUŞ, N., Gedik, K., &Kazazoğlu, S. (2025). Ethical Decision-Making in Education: A Comparative Study of Teachers and Artificial Intelligence in Ethical Dilemmas. Behavioral Sciences, 15(4), 469. https://doi.org/10.3390/bs15040469

27. Kooli, C. (2023). Chatbots in Education and Research: A Critical Examination of Ethical Implications and Solutions. Sustainability, 15(7), 5614. https://doi.org/10.3390/su15075614

28. Lampou, R. (2023). The Integration of Artificial Intelligence in Education: Opportunities and Challenges. Review of Artificial Intelligence in Education, 4. https://doi.org/10.37497/rev.artif.intell.educ.v4i00.15

29. Maghsudi, S., Lan, A., Xu, J., &Schaar, M. van der. (2021). Personalized Education in the Artificial Intelligence Era: What to Expect Next. IEEE Signal Processing Magazine, 38(3), 37. https://doi.org/10.1109/msp.2021.3055032

30. Mah, D.-K., & Gross, N. (2024). Artificial intelligence in higher education: exploring faculty use, self-efficacy, distinct profiles, and professional development needs. International Journal of Educational Technology in Higher Education, 21(1). https://doi.org/10.1186/s41239-024-00490-1

31. Mahmoud, C., &Sørensen, J. T. (2024). Artificial Intelligence in Personalized Learning with a Focus on Current Developments and Future Prospects. Research and Advances in Education, 3(8), 25. https://doi.org/10.56397/rae.2024.08.04

32. Mallik, S., &Gangopadhyay, A. (2023). Proactive and Reactive Engagement of Artificial Intelligence Methods for Education: A Review [Review of Proactive and Reactive Engagement of Artificial Intelligence Methods for Education: A Review]. arXiv (Cornell University). Cornell University. https://doi.org/10.48550/arxiv.2301.10231

33. Merino-Campos, C. (2025). The Impact of Artificial Intelligence on Personalized Learning in Higher Education: A Systematic Review [Review of The Impact of Artificial Intelligence on Personalized Learning in Higher Education: A Systematic Review]. Trends in Higher Education, 4(2), 17. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/higheredu4020017

34. Naseer, F., Khan, M. N., Tahir, M., Addas, A., &Aejaz, S. M. H. (2024). Integrating deep learning techniques for personalized learning pathways in higher education. Heliyon, 10(11). https://doi.org/10.1016/j.heliyon.2024.e32628

35. Owoc, M. L., Sawicka, A., &Weichbroth, P. (2021). Artificial Intelligence Technologies in Education: Benefits, Challenges and Strategies of Implementation. In IFIP advances in information and communication technology (p. 37). Springer Science+Business Media. https://doi.org/10.1007/978-3-030-85001-2_4

36. Phua, J. T. K., Neo, H. F., &Teo, C.-C. (2025). Evaluating the Impact of Artificial Intelligence Tools on Enhancing Student Academic Performance: Efficacy Amidst Security and Privacy Concerns. Big Data and Cognitive Computing, 9(5), 131. https://doi.org/10.3390/bdcc9050131

37. Roshanaei, M., Olivares, H., & Lopez, R. R. (2023). Harnessing AI to Foster Equity in Education: Opportunities, Challenges, and Emerging Strategies. Journal of Intelligent Learning Systems and Applications, 15(4), 123. https://doi.org/10.4236/jilsa.2023.154009

38. Saputra, I., Astuti, M., Sayuti, M., &Kusumastuti, D. (2023). Integration of Artificial Intelligence in Education: Opportunities, Challenges, Threats and Obstacles. A Literature Review. Indonesian Journal of Computer Science, 12(4). https://doi.org/10.33022/ijcs.v12i4.3266

39. Silva, R., Godwin, G., &Jayanagara, O. (2024). The Impact of AI on Personalized Learning and Educational Analytics. International Transactions on Education Technology (ITEE), 3(1), 36. https://doi.org/10.33050/itee.v3i1.669

40. Sposato, M. (2025). Artificial intelligence in educational leadership: a comprehensive taxonomy and future directions. International Journal of Educational Technology in Higher Education, 22(1). https://doi.org/10.1186/s41239-025-00517-1

41. Tanjga, M. (2023). E-learning and the Use of AI: A Review of Current Practices and Future Directions [Review of E-learning and the Use of AI: A Review of Current Practices and Future Directions]. https://doi.org/10.32388/ap0208

42. Thelma, C. C., Sain, Z. H., Shogbesan, Y. O., Phiri, E. V., &Akpan, W. M. (2024). Ethical Implications of AI and Machine Learning in Education: A Systematic Analysis. 3(1), 1. https://doi.org/10.33650/ijit.v3i1.9364

43. Ward, B., Bhati, D., Neha, F., & Guercio, A. (2024). Analyzing the Impact of AI Tools on Student Study Habits and Academic Performance. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2412.02166

44. Zaman, B. U. (2023). Transforming Education Through AI, Benefits, Risks, and Ethical Considerations. https://doi.org/10.36227/techrxiv.24231583

45. Zhai, X., Chu, X., Chai, C. S., Jong, M. S., Starčič, A. I., Spector, M., Liu, J., Jing, Y., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020 [Review of A Review of Artificial Intelligence (AI) in Education from 2010 to 2020]. Complexity, 2021(1). Hindawi Publishing Corporation. https://doi.org/10.1155/2021/8812542

46. Zhu, Y. (2024). The Impact of AI-Assisted Teaching on Students' Learning and Psychology. Journal of Education Humanities and Social Sciences, 38, 111. https://doi.org/10.54097/k7a37d11

47. Zou, Y. L., Kuek, F., Feng, W., & Cheng, X. (2025). Digital learning in the 21st century: trends, challenges, and innovations in technology integration. Frontiers in Education, 10. https://doi.org/10.3389/feduc.2025.1562391