



ARTIFICIAL INTELLIGENCE SUBJECT

QUIZ-2

LITERATURE REVIEW

Literature Review

A Review of AI Applications Shaping the Educational Landscape

Ayu Jovita Widyadhari²²⁴¹⁷²⁰²¹⁹, Lenka Melinda Florianka²²⁴¹⁷²⁰⁰⁷⁴, Sri Kresna Maha Dewa²²⁴¹⁷²⁰²⁴⁴, Virza Aulia Rachman²²⁴¹⁷²⁰⁰⁷⁸

State Polytechnic of Malang

ARTICLE INFO

Keywords :

Education
Artificial intelligence
Generative AI
ChatGPT
Large language models
Educative AI
Machine learning
Academics

ABSTRACT

This comprehensive literature review synthesizes insights from ten distinct studies on the dynamic interplay between artificial intelligence (AI) and education. It begins by proposing an AI Ecological Education Policy Framework, addressing multifaceted implications across pedagogical, governance, and operational dimensions. A horizon scan of the AI in Education (AIED) discourse reveals geopolitical, market-oriented, and narrative-focused dimensions. Delving into the reciprocal relationship between technical development and education since the 1950s, the third study illustrates how education has been mobilized as a tool for governance in computer policies. Investigating the impact of AI on higher education, the fourth study explores applications like personalized learning, adaptive testing, and predictive analytics, emphasizing both benefits and concerns. The transformative role of Generative AI is examined in the fifth study, utilizing critical analysis and paradox theory to reconcile its dual nature in education. The disruptive influence of Large Language Models on higher education pedagogy is explored in the sixth study. Students' perceptions of Generative AI technologies are investigated in the seventh study, revealing positive attitudes but acknowledging concerns about accuracy, privacy, and ethics. The eighth study offers a comprehensive overview of AI chatbots in higher education, comparing their performances and providing recommendations. Focusing specifically on ChatGPT, the ninth study discusses its transformative effects, capabilities, concerns, and challenges. The tenth study proposes the IDEE framework, exploring the benefits and challenges of using ChatGPT in education. Together, these studies offer a nuanced understanding of AI in education, encompassing policy development, student perceptions, disruptive technologies, and the potential of generative AI in shaping the future of education.

1. Introduction

The integration of artificial intelligence (AI) in education has emerged as a transformative force, influencing pedagogical practices, governance structures, and the overall educational landscape. This literature review seeks to explore and synthesize insights from ten seminal studies that delve into the multifaceted relationship between AI and education. The surge in AI applications, ranging from text generative technologies to chatbots, has raised both opportunities and concerns across various educational contexts globally. As the educational community grapples with the implications of AI, it becomes imperative to investigate the evolving policies, perceptions, and potentials associated with its integration.

The rapid development of AI technologies has prompted educators, policymakers, and researchers to assess their impact on higher education. The first study, focused on developing an AI education policy for higher education, underscores the need to address perceptions and implications of text generative AI technologies among students, teachers, and staff in Hong Kong universities. Additionally, the second study engages in a horizon scan of AI in education debates, shedding light on themes such as geopolitical dominance, market niches, and narrative management. Understanding the reciprocal relationship between technical development and education is crucial, as highlighted by the third study, which traces the historical mobilization of education in response to automation and AI since the 1950s.

International students, a distinct demographic in higher education, face unique challenges, leading to the exploration of AI applications in the fourth study. The study investigates how AI, including personalized learning experiences, adaptive testing, and chatbots, can enhance the academic experiences of international students, while acknowledging associated risks and limitations. The fifth study contributes to the discourse by offering a critical analysis of generative AI's paradoxes, recognizing it as both a 'friend' and 'foe,' 'capable' yet 'dependent,' 'accessible' yet 'restrictive,' and becoming 'popular' even when 'banned.'

Large Language Models (LLMs) and conversational-style generative AI take center stage in the sixth study, causing disruption in higher education pedagogy. The study explores AI's potential for creating supportive learning environments, emphasizing productive affordances and challenges associated with these technologies. The seventh study, based in Hong Kong, investigates university students' perceptions of generative AI technologies, providing insights into their attitudes, concerns, and the potential for personalized learning support.

Developments in the chatbot space, highlighted in the eighth study, have accelerated since late 2022, impacting millions of students and academics. This study systematically compares selected chatbots, emphasizing their performance and offering recommendations for key stakeholders in higher education. The ninth study specifically focuses on ChatGPT, discussing its transformative effects on modern education, capabilities, potential concerns, and challenges, including issues of accuracy, false data, and the generation of duplicate content.

Finally, the tenth study proposes a theoretical framework, IDEE, to explore the opportunities and challenges of using ChatGPT in education. This framework encompasses identifying desired outcomes, determining appropriate levels of automation, ensuring ethical considerations, and evaluating effectiveness.

2. Literature with benefits and limitation

The literature on the integration of artificial intelligence (AI) in education presents a nuanced landscape, highlighting both its potential benefits and associated limitations. This section synthesizes the key findings across the ten reviewed articles, providing insights into the multifaceted nature of AI in educational contexts.

2.1. Benefits of AI in Education

- **Enhanced Teaching and Learning Outcomes:** The first article proposes an AI Ecological Education Policy Framework, emphasizing AI's potential to enhance teaching and learning outcomes. The framework includes dimensions such as pedagogy, governance, and operations, showcasing the comprehensive ways in which AI can positively impact education.
- **Global Access and Economic Growth:** The second article explores the geopolitical dimension of AI in education, underscoring its potential to accelerate global education goals and contribute to economic growth. Partnerships between governments, private companies, and civil society are highlighted as means to improve access to education worldwide.
- **Adaptation to Changing Technological Landscapes:** Rahm's genealogical analysis reveals how education has historically adapted to technological advancements. Throughout different eras, education has played a crucial role in preparing individuals for the consequences of automation and AI, promoting computer literacy, and evaluating social impacts.
- **Personalized Learning and Administrative Support:** The fourth article on AI's impact on international students outlines potential applications such as personalized learning experiences, adaptive testing, predictive analytics, and administrative support. AI is seen as a tool to improve learning efficiency and provide customized educational support.
- **Transformative Resource in Education:** The fifth article examines generative AI's transformative potential in education. It identifies benefits such as timely feedback, enhanced knowledge acquisition, and improved assessment rigor. Generative AI is viewed as a valuable resource to support and transform educational activities.
- **Efficient and Customized Learning Experiences:** The sixth article focuses on AI-augmented teaching and learning, emphasizing the potential benefits of Large Language Models (LLMs) like ChatGPT. The document highlights AI's capacity to provide efficient and customized learning experiences, including personalized feedback and adaptive learning pathways.
- **Positive Student Perceptions:** The seventh article explores students' perceptions of generative AI technologies, revealing a generally positive attitude. Students recognize the potential for personalized learning support, writing assistance, and research aid. However, concerns about accuracy, privacy, and ethical issues are also expressed.
- **Personalized and Efficient Learning:** The eighth article discusses the benefits of using ChatGPT in education, such as providing personalized and efficient learning experiences. Virtual tutors, prompt-based learning, and faster feedback for teachers are highlighted as potential advantages.
- **Chatbot Development and Accessibility:** The ninth article provides insights into the rapid development of chatbots, their corporate backgrounds, and the need for a comparative

analysis. It emphasizes the importance of faculty and student awareness regarding chatbot limitations and advises institutions to stay informed about technological developments.

- Transformative Effects on Modern Education: The tenth article discusses the transformative effects of ChatGPT in modern education, showcasing its capabilities in creating instructional content and acting as an online educator. The integration with the Internet of Things (IoT) is highlighted as a potential enhancer of communication and collaboration in online education.

2.2. Limitations and Challenges of AI in Education

- Ethical Concerns and Academic Misconduct: The first article acknowledges the ethical concerns related to AI in education, including academic misconduct and dilemmas associated with text generative AI. The need for guidelines to detect and prevent misuse is emphasized, stressing the importance of transparency, data privacy, and addressing biases.
- Market Forces and Ethical Frameworks: The second article raises concerns about the dominance of market forces and the lack of consensus on ethical AI frameworks. The study highlights the challenges in managing narratives, norms, and perceptions, emphasizing the importance of inclusive and collaborative approaches to AI in education.
- Historical Context and Societal Impacts: Rahm's genealogical analysis reveals historical challenges in adapting education to technological changes. The article underscores the need to study educational policies in understanding technological anticipations and their broader societal impacts.
- Privacy Concerns and Cultural Differences: The fourth article identifies significant risks and limitations, including privacy concerns, cultural differences, language proficiency, and ethical implications related to AI in higher education. The study calls for careful consideration of AI implementation to address the unique needs and challenges of international students.
- Paradoxes and Ethical Use: The fifth article identifies four paradoxes related to generative AI in education, emphasizing concerns about plagiarism, distinguishing between novel and recycled knowledge, and ensuring ethical use. The study calls for guidelines, policies, and research to address the challenges of integrating generative AI.
- Caution in Integration and Transparent Communication: The sixth article on AI-augmented teaching stresses the need for a strategic approach to integration, gradual implementation, and transparent communication about data usage. It recognizes that AI is a tool to enhance, not replace, teaching and learning.
- Concerns about Accuracy and Holistic Competencies: The seventh article acknowledges concerns about the accuracy of generative AI technologies and their potential impact on holistic competencies and career prospects. The study advocates for AI literacy education, policy development, and a balanced approach to integration.
- Untested Effectiveness and Ethical Considerations: The eighth article highlights challenges such as the untested effectiveness of ChatGPT, limitations in data quality, and ethical and safety concerns. The authors emphasize the importance of further research, ethical considerations, and policies for responsible AI integration in education.
- Limitations in Intelligence and Potential Plagiarism: The ninth article discusses the limitations of chatbots in academic integrity and the lack of reliable results. It

recommends that faculty and students critically evaluate the use of chatbots and be aware of potential plagiarism concerns.

- **Accuracy and Ethical Considerations:** The tenth article addresses concerns about the accuracy of ChatGPT and the need for updated academic regulations. It emphasizes the importance of educating educators and students about ChatGPT's capabilities and limitations, advocating for responsible implementation and adaptation.

3. Result analysis

This chapter delves into a comprehensive analysis of the findings from the reviewed literature on the integration of artificial intelligence (AI) in education. The synthesis of these findings aims to provide a nuanced understanding of the current landscape, capturing both the positive trends and the challenges associated with the incorporation of AI in educational contexts. The integration of AI in education has garnered substantial attention in recent research, uncovering multifaceted insights into its potential benefits and limitations. The following sections encapsulate the key findings and trends identified throughout the literature review.

3.1 Findings and Trends

The literature review has unearthed several key findings and trends regarding the integration of artificial intelligence (AI) in education. These findings shed light on the multifaceted impact of AI on teaching, learning, and educational policies.

3.1.1 Comprehensive AI Education Policy Framework

Cecilia Ka Yuk Chan's study proposes a comprehensive AI Ecological Education Policy Framework, encompassing three dimensions: Pedagogical, Governance, and Operational. The findings underscore the significance of AI in enhancing teaching and learning outcomes, while also emphasizing the need for guidelines to address academic misconduct and ethical dilemmas. The study highlights a growing trend towards a holistic approach to AI implementation in higher education, considering both academic and ethical dimensions.

3.1.2 Geopolitical Dominance and Market Niches

The horizon scan of discourse on AI in education reveals a trend emphasizing geopolitical dominance and market niches. The discourse reflects a global interest in using AI to accelerate education goals and economic growth. This finding suggests a prevalent trend of international collaboration and partnerships between governments, private companies, and civil society in AI initiatives. However, challenges related to ethical frameworks and norm management underline the need for a more inclusive and collaborative approach.

3.1.3 Genealogy of Educational Imaginaries

Lina Rahm's genealogical approach identifies four educational imaginaries that have evolved over time. The findings indicate a historical shift from preparing individuals for an automated future to focusing on equal access to information and digital inclusion. This trend reflects an ongoing evolution in the perception of education's role in shaping the relationship between citizens and technology. The study underscores the dynamic nature of educational policies in response to technological advancements.

3.1.4 Impact on International Students

The exploration of AI's impact on international students in higher education reveals trends in personalized learning experiences and adaptive testing. The findings suggest a growing interest in using AI to cater to the diverse needs of international student populations. However, the study also highlights challenges related to privacy concerns, cultural differences, and ethical implications. This trend underscores the importance of careful consideration and cultural sensitivity in implementing AI technologies.

3.1.5 Paradoxes of Generative AI in Education

Critical analysis of generative AI in education uncovers four paradoxes that elucidate the complexity of its impact. While generative AI offers benefits such as personalized feedback and enhanced knowledge acquisition, challenges include concerns about plagiarism and the difficulty of distinguishing between novel and recycled knowledge. This trend emphasizes the need for clear guidelines and policies to navigate the ethical implications of generative AI in educational settings.

3.1.6 AI-Augmented Teaching and Learning

The study on AI-augmented teaching and learning reveals trends in leveraging Large Language Models (LLMs) like ChatGPT for personalized and efficient learning experiences. The findings suggest a gradual integration approach, emphasizing alignment with institutional values and the importance of faculty development programs. This trend signifies a strategic utilization of AI as a complement to traditional teaching methods.

3.1.7 Student Perceptions of Generative AI Technologies

Exploring student perceptions of generative AI technologies in higher education uncovers a generally positive attitude toward their use. Students recognize the potential for personalized learning support, writing assistance, and research aid. However, concerns about accuracy, privacy, and ethical issues highlight the need for a balanced approach to integration. This trend emphasizes the importance of understanding and addressing student perspectives in the implementation of AI technologies.

3.1.8 Theoretical Framework for ChatGPT in Education

The proposal of the "IDEE" framework for using ChatGPT in education signifies a trend toward theoretical frameworks guiding AI integration. The framework emphasizes the importance of identifying desired outcomes, determining the appropriate level of automation, ensuring ethical considerations, and evaluating effectiveness. This trend suggests a move toward a more structured and principled approach to incorporating AI tools in educational settings.

3.1.9 Development of Chatbots in Higher Education

The exploration of chatbots in higher education identifies a trend in their rapid development, with chatbots like ChatGPT, Bing Chat, Bard, and Ernie gaining prominence. However, the findings also highlight concerns about academic integrity and the limitations of chatbot intelligence. This trend underscores the need for a comparative analysis and continuous adaptation of educational policies to evolving technological landscapes.

3.1.10 Transformative Effects of ChatGPT in Education

The study on the transformative effects of ChatGPT in education showcases trends in using AI as an instructional resource and online educator. The findings suggest the potential of ChatGPT in creating engaging learning experiences. However, challenges related to accuracy and plagiarism underscore the need for updated academic regulations and awareness among educators and students. This trend emphasizes the importance of addressing risks while harnessing the benefits of AI in education.

3.2 Challenges and Gaps

While the literature review provides valuable insights, it is essential to acknowledge the inherent challenges and gaps in the studies reviewed. Identifying these limitations is crucial for developing a more nuanced understanding of the complexities surrounding AI integration in education.

3.2.1 Ethical Concerns and Lack of Consensus

A recurring challenge across multiple studies is the ethical dimension associated with AI in education. The lack of consensus on ethical frameworks and concerns about responsible AI use highlight a significant challenge. This gap calls for concerted efforts to establish universally accepted guidelines for ethical AI integration in educational settings.

3.2.2 Cultural Sensitivity and Internationalization

The impact of AI on international students underscores challenges related to cultural sensitivity and inclusivity. The literature identifies a gap in understanding and addressing the unique cultural differences and privacy concerns of international student populations. Bridging this gap requires a more culturally informed approach to AI implementation in higher education.

3.2.3 Accuracy and Reliability of AI Tools

Several studies highlight challenges related to the accuracy and reliability of AI tools, including generative AI models and chatbots. Concerns about plagiarism, the difficulty of distinguishing between novel and recycled knowledge, and untested effectiveness pose significant challenges. Addressing these gaps requires ongoing research and development to enhance the precision and dependability of AI technologies.

3.2.4 Need for Inclusive and Collaborative Approaches

The literature points to a gap in inclusive and collaborative approaches in the discourse around AI in education. The dominance of certain geopolitical interests and market forces raises concerns about inclusivity. Closing this gap necessitates fostering global collaboration and diverse stakeholder involvement in shaping the narrative and norms surrounding AI in education.

3.2.5 Lack of Consistent Evaluation Methods

A notable gap is the lack of consistent evaluation methods for AI tools in education. While studies discuss the potential benefits, there is a need for standardized metrics to assess the effectiveness and impact of AI on teaching and learning outcomes. Bridging this gap requires the development of robust evaluation frameworks to guide future research.

3.2.6 Limited Understanding of AI's Societal Impacts

The literature review reveals a gap in the limited understanding of AI's broader societal impacts on education. While studies focus on the immediate implications, there is a need for research that delves deeper into the long-term societal consequences, including the effects on employment, social dynamics, and accessibility. Addressing this gap contributes to a more comprehensive understanding of AI's role in shaping the educational landscape.

3.2.7 Unequal Access and Digital Inequality

The exploration of chatbots and AI tools highlights concerns about unequal access and digital inequality. The literature indicates that certain chatbots may be limited by paid subscription models, potentially widening socio-economic

4. Conclusion

The integration of artificial intelligence (AI) in education, as analyzed through a comprehensive review of key journals, reveals both promising trends and persistent challenges. Cecilia Ka Yuk Chan's groundbreaking AI Ecological Education Policy Framework suggests a strategic and holistic implementation of AI in academic settings. The discourse on AI in education reflects global collaboration and public-private partnerships, yet challenges related to ethical frameworks persist.

Lina Rahm's genealogical exploration underscores the dynamic nature of educational policies in response to technological advancements. Trends in personalized learning experiences for international students and the transformative potential of generative AI, represented by technologies like ChatGPT, highlight the evolving landscape.

However, challenges such as ethical concerns, cultural sensitivity, and the accuracy of AI tools persist. The synthesis emphasizes the transformative potential of AI in education, advocating for comprehensive policy frameworks, strategic implementations, and a commitment to ethical and inclusive practices. As we navigate this intersection, a thoughtful and balanced approach is crucial for harnessing benefits while addressing complexities and ensuring equitable access to innovative educational tools.

5. Future research direction

Future research in the realm of artificial intelligence (AI) in education should focus on establishing universally accepted ethical frameworks, addressing the current lack of consensus and navigating ethical complexities. A critical area for exploration is the internationalization of AI, specifically investigating cultural sensitivity and inclusivity to tailor AI tools to diverse global contexts. Additionally, there is a need for continued assessment of the accuracy and efficacy of AI tools, particularly in providing personalized learning experiences, along with longitudinal studies to track the sustained impact of AI integration in educational institutions. Further research should also delve into effective strategies for faculty development in AI literacy and explore how attitudes towards AI technologies evolve over time among students. Comparative analyses of different AI models and investigations into the real-world impact of AI policies will contribute to a more informed and nuanced understanding of the opportunities and challenges in the integration of AI in education, providing a solid foundation for future research endeavors.

6. References

- Wang, T. *et al.* (2023) 'Exploring the Potential Impact of Artificial Intelligence (AI) on International Students in Higher Education: Generative AI, Chatbots, Analytics, and International Student Success', *Applied Sciences*, 13(11), p. 6716. Available at: <https://doi.org/10.3390/app13116716>.
- Eager, B., & Brunton, R. (2023). Prompting Higher Education Towards AI-Augmented Teaching and Learning Practice. *Journal of University Teaching & Learning Practice*, 20(5). <https://doi.org/10.53761/1.20.5.02>
- Rudolph, J., Tan, S. and Tan, S. (2023). War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education. *Journal of applied learning and teaching*, 6(1). <https://doi.org/10.37074/jalt.2023.6.1.23>.
- Sukhpal Singh Gill, Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K., Fuller, S., Singh, M., Arora, P., Ajith Kumar Parlikad, Vlado Stankovski, Abraham, A., Ghosh, S.K., Hanan Lutfiyya, Kanhere, S.S., Rami Bahsoon, Rana, O., Schahram Dustdar, Sakellariou, R. and Uhlig, S. (2023). Transformative effects of ChatGPT on modern education: Emerging Era of AI Chatbots. *Transformative effects of ChatGPT on modern education: Emerging Era of AI Chatbots*, 4. <https://doi.org/10.1016/j.iotcps.2023.06.002>.
- Lim, W.M., Gunasekara, A., Pallant, J.L., Pallant, J.I. and Pechenkina, E. (2023). Generative AI and the Future of education: Ragnarök or reformation? a Paradoxical Perspective from Management Educators. *The International Journal of Management Education*, 21(2), p.100790. <https://doi.org/10.1016/j.ijme.2023.100790>.
- Nemorin, S., Vlachidis, A., Ayerakwa, H.M. and Andriotis, P. (2022). AI hyped? A horizon scan of discourse on artificial intelligence in education (AIED) and development. *Learning, Media and Technology*, pp.1–14. <https://doi.org/10.1080/17439884.2022.2095568>.
- Su (苏嘉红), J., & Yang (杨伟鹏), W. (2023). Unlocking the Power of ChatGPT: A Framework for Applying Generative AI in Education. *ECNU Review of Education*, 6(3), 355-366. <https://doi.org/10.1177/20965311231168423>
- Chan, C.K.Y., Hu, W. Students' voices on generative AI: perceptions, benefits, and challenges in higher education. *Int J Educ Technol High Educ* 20, 43 (2023). <https://doi.org/10.1186/s41239-023-00411-8>
- Rahm, L. (2021). Education, automation and AI: a genealogy of alternative futures. *Learning, Media and Technology*, pp.1–19. <https://doi.org/10.1080/17439884.2021.1977948>.

Chan, C.K.Y. A comprehensive AI policy education framework for university teaching and learning. *Int J Educ Technol High Educ* 20, 38 (2023).
<https://doi.org/10.1186/s41239-023-00408-3>