Check for updates

Commentary: Generative artificial intelligence empowers educational reform: current status, issues, and prospects

Yujin Han*

Rossier School of Education, University of Southern California, Los Angeles, CA, United States

A Commentary on
Generative artificial intelligence empowers educational reform: current status, issues, and prospects

by Yu, H., and Guo, Y. (2023). *Front. Educ.* 8:1183162. doi: 10.3389/feduc.2023.1183162

The article by Yu and Guo (2023) provides a comprehensive overview of the current state and potential future of generative AI in education. With the advent of GPT-4o (OpenAI, 2024), an enhanced generative AI model, there are new opportunities and challenges for educational reform. This commentary explores the implications of GPT-4o in the context of the developments and issues highlighted by Yu and Guo, while offering insights into how these advancements can reshape the educational landscape.

GPT-4o's advanced functionalities can significantly improve intelligent teaching systems, homework grading, tutoring systems, and speech interaction systems. The model's ability to handle voice interactions and provide real-time feedback enhances the personalization and responsiveness of educational tools, addressing some limitations of previous AI systems. For instance, GPT-4o can generate personalized course content and teaching plans tailored to individual learning styles and progress, creating a more engaging and effective learning environment. Automated grading systems can provide accurate and timely feedback, helping students understand their mistakes and learn more effectively, thus saving time for educators and ensuring consistent, objective assessments. By analyzing student performance and learning behaviors, GPT-4o can offer personalized tutoring sessions that adapt to the student's pace and understanding. Its voice interaction capabilities allow for more natural and interactive learning experiences, with students engaging in spoken dialogue with the AI, receiving immediate feedback and support, particularly beneficial for language learning and developing communication skills.

Despite the promising advancements, several issues remain pertinent with the generative AI (Kim and Kong, 2023). Its sophisticated algorithms may exacerbate the issue of opacity, necessitating the development of more transparent and interpretable AI systems. Enhancements in explainable AI (XAI) techniques could help mitigate these concerns by making the decision-making processes of GPT-4o more understandable to educators and students. The complexity of AI models like GPT-4o makes it difficult for users to understand how certain outputs are generated, potentially hindering trust and acceptance. Therefore, it is crucial to develop tools that can provide clear explanations for

AI-generated decisions and recommendations, integrated into educational platforms to help users understand the rationale behind AI suggestions and actions.

The vast data requirements for training GPT-4o pose significant privacy and security risks (Wang et al., 2023, 2024). Robust encryption and data anonymization techniques are still critical. GPT-4o's deployment in educational settings must be accompanied by stringent data protection measures to safeguard sensitive information. The increasing use of AI in education involves collecting and analyzing large amounts of personal data, including sensitive information such as student identities, academic records, and behavioral patterns. Ensuring the privacy and security of this data is paramount, requiring strong encryption methods, secure data storage solutions, and strict access control policies to protect against data breaches and unauthorized access.

While GPT-4o offers enhanced personalization capabilities, it also raises concerns about fairness. The potential for bias in AI-driven personalized learning tools must be carefully managed. Developing fair algorithms and ensuring diverse and representative training datasets are essential to mitigate bias and ensure equitable educational outcomes. Personalization in education can lead to unequal learning opportunities if not carefully managed. AI systems trained on biased data may reinforce existing inequalities, providing advantages to some students while disadvantaging others. Continuous monitoring and evaluation of AI systems can help identify and mitigate biases, ensuring that all students benefit equally from personalized learning tools.

The reliability of AI applications in education depends heavily on the quality of training data. GPT-4o's advanced capabilities require extensive, high-quality datasets, to ensure that applications in education are both effective and dependable. This means having comprehensive datasets that include diverse student interactions, performance metrics, and learning behaviors. Ensuring the accuracy and reliability of these datasets through rigorous data collection and validation processes is critical. Additionally, ongoing updates and improvements to the AI models are necessary to maintain their effectiveness and relevance in dynamic educational environments.

The future development of generative AI in education is promising. GPT-4o's capabilities can drive the next generation of personalized education, providing tailored assessments, learning content, and teaching routes. By leveraging its advanced natural language processing and emotional recognition features, GPT-4o can create more engaging and effective personalized learning experiences. AI can enhance various aspects of teaching, from course design and assessment to interaction and monitoring. GPT-4o's ability to generate and adapt educational content dynamically can help educators create more responsive and interactive learning environments. Real-time monitoring and feedback capabilities enable teachers to better understand student needs and adjust their teaching strategies accordingly.

Generative AI can facilitate collaborative education, such as interdisciplinary teaching, cross-school collaboration, and cross-cultural education (Ahn et al., 2024). GPT-4o can help create virtual classrooms and laboratories, enabling students from different regions and backgrounds to collaborate and learn together. This can promote a more inclusive and diverse educational experience, breaking down geographical, and cultural barriers. The creation of virtual classrooms and laboratories, along with gamified learning experiences, can provide engaging and effective educational environments. GPT-4o's integration with virtual and augmented reality technologies can enhance immersive learning experiences, allowing students to explore complex concepts in a more interactive and intuitive manner.

GPT-4o's introduction marks a significant step forward in the application of generative AI in education. As mentioned in Aguilar et al. (2024), generative AI has to potential to enhance communication skills and learning. Its advanced features have the potential to revolutionize personalized learning, intelligent tutoring, and educational content generation. However, the issues of opacity, data privacy, fairness, and reliability remain pertinent. Addressing these challenges through transparent AI design, robust data protection, fair algorithm development, and high-quality datasets is crucial for realizing the full potential of GPT-4o in educational reform. In conclusion, while GPT-4o offers promising advancements for educational applications, careful consideration and proactive management of its associated challenges are essential. By building on the insights, educators and policymakers can harness the transformative power of GPT-4o to enhance educational outcomes while mitigating potential risks. The future of education with GPT-4o looks promising, but it requires a balanced approach that considers both the opportunities and the challenges associated with advanced AI technologies (Grammer and Ahmed, 2023).

Author contributions

YH: Writing – original draft, Writing – review & editing.

Funding

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Aguilar, S. J., Swartout, W., Nye, B., Sinatra, G. M., Wang, C., and Bui, E. (2024). *Critical Thinking and Ethics in the Age of Generative AI in Education.* USC Center for Generative AI and Society, Los Angeles, CA. doi: 10.35542/osf.io/7dr9j

Ahn, J., Gomez, K., Lee, U. S., and Wegemer, C. M. (2024). Embedding racialized selves into the creation of research-practice partnerships. *Peabody J. Educ.* 1–19. doi: 10.1080/0161956X.2024.2357031

Grammer, J. K., and Ahmed, S. F. (2023). Informing the development of school-based strategies to promote children's executive function skills: considerations, challenges, and future directions. *Mind Brain Educ.* 17, 383–390. doi: 10.1111/mbe.12368

Kim, D., and Kong, J. (2023). Front-end AI vs. Back-end AI: new framework for securing truth in communication during the generative AI era. *Front. Commun.* 8:1243474. doi: 10.3389/fcomm.2023.1243474

OpenAI (2024). *Hello GPT-4o.* Available online at: https://openai.com/index/hello-gpt-4o/ (accessed June 1, 2024).

Wang, Z., Kim, D., and Zhu, J. (2024). To live or not to live with it? examining the cultivation effect of state media on support for the zero-COVID policy. *Int. J. Public Opin. Res.* 36:edae031. doi: 10.1093/ijpor/edae031

Wang, Z., Zhu, J., Xu, Y., Kim, D., and Williams, D. (2023). Cross-platform information flow and multilingual text analysis: a comparative study of Weibo and Twitter through deep learning. *Comput. Commun. Res.* 5. doi: 10.5117/CCR2023.1.8.WANG

Yu, H., and Guo, Y. (2023). Generative artificial intelligence empowers educational reform: current status, issues, and prospects. *Front. Educ.* 8:1183162. doi: 10.3389/feduc.2023.1183162