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Is AI a Challenge or an Opportunity for Education?

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Abstract

Generative artificial intelligence (GAI), represented by ChatGPT, is profoundly reshaping production patterns and learning forms in human society. As the traditional standardized model of talent cultivation can no longer meet the urgent demand for innovative talents in the AI era, the in-depth integration of education with artificial intelligence (AI) has emerged as a core driver of educational transformation. Based on a review of its development history, the current application of AI in education is analyzed in this paper across three dimensions: classroom teaching, school administration, and out-of-school education. Moreover, it also explores the development opportunities, including personalized learning support, workload reduction, and efficiency enhancement for teachers, and precision-oriented education delivery, while dissecting such practical challenges as privacy leakage, ethical risks, and the diminishing role of teachers. Finally, the corresponding coping strategies are further proposed with regard to the cultivation of digital literacy, professional development of teachers, and the construction of a sound intelligent education ecosystem.

Keywords

Artificial intelligence; educational transformation; intelligent education; opportunities; challenges

1. Introduction

In March 2024, the Report on Work of Government released by the State Council incorporated the "AI+" initiative for the first time, charting a new path for cultivating new productive forces. Against the backdrop of the AI age, the integrated innovation of education and AI has emerged as a burgeoning trend across the education sector. This trajectory of integrated innovation begins with the "application of AI in education", progresses through a phase of "coordinated and integrated development", and ultimately strives toward the goal of "holistic innovation in education" (Cao, 2020). At present, the ongoing advancement and large-scale adoption of GAI technologies, exemplified by tools such as ChatGPT and Sora, have substantially propelled the integrated innovation of AI and education, and have become a core driver accelerating the digital transformation and upgrading of the education system.

2. Overview of Artificial Intelligence

Nearly three-quarters of a century have passed since AI emerged in the 1950s. In the summer of 1956, researchers, including John McCarthy and Marvin Minsky, held a research conference at Dartmouth College in the United States, where the term "Artificial Intelligence" was coined and adopted for the first time, which was widely acknowledged as the formal establishment of AI as an international academic discipline (Cai, 2016). In the early 1990s, Deep Blue,

developed by IBM, defeated a reigning world chess champion, marking a critical inflection point in computational intelligence. In 2016, AlphaGo beat Lee Sedol, the world Go champion, demonstrating that AI systems can address the most challenging problems in highly complex fields. In November 2022, OpenAI released ChatGPT 3.5, whose robust capabilities in text generation, code writing, and bug fixing delivered a remarkable advance to the public. In the education sector, the majority of educators are optimistic about ChatGPT's potential to facilitate learning (Lu et al., 2023). In September 2024, OpenAI rolled out the o1-preview and o1-mini models, whose enhanced reasoning capacity for complex tasks has reshaped how AI processes intricate assignments and exerted a far-reaching impact on industries including education and healthcare.

3. Applications of Artificial Intelligence in Education

The application of AI in education is mainly reflected in two core domains: classroom teaching and school administration. In terms of classroom teaching, teachers leverage intelligent tools such as Seewo Whiteboard, Rain Classroom and Super Star Learning Platform to integrate teaching resources and conduct statistical data analysis (Wu et al., 2017). In addition, intelligent grading systems, like www.pigai.org, are widely deployed to assist teachers with homework correction and feedback. For school administration, AI is primarily applied in campus access control. Facial recognition technology is used to verify the identities of students, faculty, and staff, serving as a safeguard for campus security. As for out-of-school educational applications, AI mainly supports parents in homework checking and tutoring, while students carry out independent learning in smartphone-based educational apps and educational robots.

4. Opportunities Brought by Artificial Intelligence to Education

With the continuous advancement of online self-learning platforms, automated assessment tools, and intelligent educational management systems, the education sector is rapidly moving toward a stage of smart transformation. The proliferation of intelligent teaching-support tools has significantly alleviated teachers' workload of repetitive routine tasks. Meanwhile, AI has also accelerated the development of personalized learning for students, enabling precise customization of educational content.

GAI, represented by ChatGPT, has demonstrated enormous application potential in education. Systems, like ChatGPT, are equipped with four core capabilities, including generation of heuristic content, comprehension of conversational context, execution of sequential tasks, and parsing of programming language, which can deliver effective support in four domains: instructional delivery, learning processes, educational assessment, and academic tutoring. Depending on its outstanding computational capacity, AI injects strong momentum into the shift toward precision-oriented education. From the perspective of new quality productive forces, some scholars point out that the digital-intelligent era urgently calls for cultivating new-quality talents with creative-transformative thinking, integrative thinking, and technical thinking, and that the deep integration of AI across the entire talent cultivation chain serves as the key pathway to this goal.

5. Challenges Posed by Artificial Intelligence to Education

Nevertheless, as the in-depth integration of AI technology and education enters a more complex deepening phase, a series of challenges have gradually come to the fore. With its robust data collection capabilities and sophisticated algorithms, AI enables detailed and dynamic analysis of student behaviors. Yet these very advanced technologies may give rise to ethical dilemmas in higher education practice, including privacy leakage, the information cocoon effect, over-reliance on intelligent systems, and assessment bias. To achieve the goal of precision-oriented education, it is necessary to collect the personal data of students extensively. The application of technologies such as facial recognition and fingerprint capturing, in particular, has drastically increased the risk of personal privacy leakage, which may, in turn, trigger broader adverse consequences.

The core mission of higher education is to foster sound values, worldviews, and outlooks on life among students and support their healthy development. If future evaluation criteria for teachers place excessive emphasis on technical competence, teachers may be trapped in a technocratic mode of work, neglecting personalized instruction, their educational responsibilities, and their own professional identity. Zhang and Zhang (2017) warn that AI technology is not a neutral technical tool. In the process of human-computer interaction, it may lead to immoral, unethical, or even illegal outcomes, making it necessary to draw clear boundaries for its application and define explicit no-go areas.

Furthermore, GAI systems, such as ChatGPT, still struggle to fully grasp the inherent logical relationships within information. They are prone to generating unreasonable content or factual errors, which can mislead learners without relevant expertise and result in learning disorientation and cognitive barriers. Yuan (2023) further points out that digital transformation in education has not achieved the same remarkable success as it has in sectors such as industry, finance, and logistics. The fundamental reason lies in the fact that educational activities are not connections between objects, but interactions between people. Centered on human development, educational digitalization is implemented through people, by people, and for people.

6. Coping Strategies

At present, China is deepening the digital transformation of its education sector, striving to build a new educational ecosystem centered on student growth and defined by connectivity, openness, sharing, and personalization. In response to the future evolution of AI technologies, we should uphold the principles of rational scrutiny and targeted application, leverage their strengths while mitigating associated risks, and stay committed to the fundamental educational mission of fostering virtue through education. This approach will drive comprehensive innovation across the education system and restructure the talent cultivation framework (Zhu et al., 2024).

To refine the cultivation framework for students' digital literacy and skills, schools can embed the development of digital literacy into the daily instruction of all academic subjects. It is also a core priority to encourage teachers to actively explore and effectively apply AI technologies. Educational institutions should roll out in-service training programs for teachers to strengthen their professional competence in human-computer collaborative teaching environments. Specifically, teachers should gain proficiency in technology-enabled instructional methods, keep abreast of cutting-edge disciplinary advances via intelligent platforms, and effectively acquire and integrate teaching resources. Besides, they also need the capacity to facilitate learning progress and carry out innovative practices across diverse teaching scenarios (Yu & Wang, 2019).

Against the backdrop of the AI era, the development of education environments in schools should focus on seamless data integration, close home-school collaboration, and pervasive intelligent connectivity. The application of AI technologies accelerates the intelligent upgrading of campus settings, enables full interconnection and interoperability of on-campus data, and closely links campus facilities, physical environments, and individual users, so as to build a green, open, and intelligently interconnected learning space. Looking forward, the core mission of education in the digital-intelligent era lies in cultivating new-quality talents endowed with a growth mindset, human-AI symbiotic thinking, a pioneering spirit, and creative capacity.

7. Conclusion

In this paper, by examining the conceptual connotations and developmental characteristics of AI, I systematically analyze the opportunities and challenges confronting education in the AI era, and put forward a set of feasible countermeasures for the identified issues. It is found that the application of AI in education is evolving from the initial stage of empowering education to the intermediate stage of innovating education, and will ultimately advance toward the advanced stage of reshaping education. Throughout this process, AI not only presents unprecedented opportunities for personalized learning, precision-oriented instruction, and workload reduction with efficiency gains for teachers, but also poses severe challenges in terms of privacy security, ethical risks, the diminishing role of teachers, and educational equity. In response to these challenges, our concerted efforts should be made across multiple dimensions, including nurturing digital literacy, advancing teachers' professional development, building an intelligent education ecosystem, and improving the ethical regulatory system. By capitalizing on benefits while mitigating risks and upholding the fundamental educational mission of fostering virtue through education, we can achieve the in-depth integration and sustainable development of AI and education.

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