

# ChatGPT and AI: The Game Changer for Education

By Xiaoming Zhai\*, *AI4STEM Education Center, University of Georgia*

(Manuscript received March 14 2023)

## ABSTRACT

This paper explores the impact of artificial intelligence (AI) on education, particularly the role of ChatGPT, a pre-trained natural language model developed by OpenAI. The article outlines five transformations that will shape the future of education, including the impact of AI on the educational goals, educational procedures, learning materials and methods, assessment and evaluation, and learning outcomes. The authors argue that the integration of AI and ChatGPT in education has the potential to enhance students' learning effectiveness, advance the distribution of educational resources, and improve the oversight of educational quality. The paper suggests that education must prioritize the cultivation of students' creativity and critical thinking skills to adeptly tackle and solve diverse problems in the environment, resources, economy, politics, and other areas of future life. The application of AI technologies, particularly ChatGPT, has brought new opportunities and vitality to traditional teaching processes and methods, transforming the learning process to become more student-centered. Overall, the authors contend that ChatGPT has the potential to be a key developmental avenue for future education and an influential catalyst for education reforms.

*Keywords: ChatGPT, Artificial Intelligence (AI), Pre-trained natural language model, Education, Game Changer.*

## 1. Introduction

The landscape of education is experiencing a profound transformation instigated by the advent of artificial intelligence (AI). This transformation is expected to affect the educational objectives, processes, learning materials and methods, assessment and evaluation, and learning outcomes in a systematic manner. Technology in the education sector has historically and primarily manifested in the form of learning management systems, electronic textbooks, etc., mainly serving to manage student learning progress and provide learning resources (Linn et al., 2014; Pellegrino & Quellmalz, 2010). However, such technology has typically offered limited support to address relatively simplistic educational issues, thus failing to comprehensively cater to the personalized and diverse learning needs of students (Linn et al., 2023; Zhai, 2021). AI, which has the ability to construct an understanding of human language and images, presents an opportunity for significant development and utilization in education, potentially revolutionizing the pattern of modern education (Zhai et al., 2020a).

This article aims to explicate five transformations that will shape the future of education, along with the impact of AI on education, based on the generative natural language model—ChatGPT. ChatGPT is a sophisticated pre-trained natural language model launched by OpenAI, a US-based company, on Novem-

ber 30, 2022 (Assaraf, 2022). It can grasp the semantics and syntax of natural language, generate natural language text, answer questions, and participate in dialogues based on specific conversation contexts. Some scholars have already tested its application in academic writing, generating tests, and completing professional tests (Kung et al., 2023; Zhai, 2023). The potent functions of interaction, reasoning, questioning, and feedback showcased by ChatGPT offer novel opportunities for educational transformation. Its advent can not only enhance students' learning effectiveness and quality but also advance the distribution of educational resources and the oversight of educational quality. It is a key developmental avenue for future education and an influential catalyst for education reforms.

## 2. Educational Goals

In modern society, education serves to cultivate citizens who are equipped to adapt to future development, shaping their future lives, careers, thinking, and emotions. Educational goals are established based on social needs, and they must anticipate and prepare for future citizen (Zhai & Pellegrino, 2023). With the advent of AI technology and applications such as ChatGPT, intelligent technology is increasingly integrated into all facets of society. Thus, the cultivation of future citizens who are capable of adapting to future social development and are proficient in understanding and utilizing AI technology has become a pressing issue that education must address and solve.

Traditionally, education places emphasis on imparting

---

\* Corresponding author.  
e-mail: xiaoming.zhai@uga.edu

knowledge, skills, and methods to students. However, future society requires students to possess creativity and critical thinking skills. With the rise of AI technology, knowledge learning and basic skills that were once central to traditional education, such as writing, are being gradually supplanted by intelligent machines. Computers can execute high-quality writing, respond to technical queries, write programs, and so on, within a short span of time. Owing to the increasing potency of computer AI functions, educational goals are undergoing fundamental transformations to better adapt to social development needs. Research has revealed that although AI technology can partially supplant human labor, enhancing work and learning efficiency, it cannot fully substitute for human creative thinking skills (Zhai, 2022). Moreover, AI technology finds it challenging to replace complex human decision-making, especially in situations that require the integration of emotions, experience, and scientific knowledge. Education should prioritize the cultivation of students' creativity and critical thinking skills so that they can adeptly tackle and solve diverse problems in the environment, resources, economy, politics, and other areas of future life.

### 3. Educational Procedures

The integration of AI technologies, particularly ChatGPT, has brought new opportunities and vitality to traditional teaching processes and methods. As a natural language processing tool, ChatGPT's ability to understand and generate natural language, coupled with its strong conversational interaction capabilities, has resulted in the creation of personalized and high-quality learning content and services for students. This has greatly transformed the learning processes and activities.

For instance, through the analysis of students' language input and behavior, ChatGPT can generate teaching resources and strategies that fit students' personalized learning styles and interests (Zhai, 2023), effectively transforming the learning process to become more student-centered. In doing so, ChatGPT has successfully broken away from the rigid and uniform teaching methods that are often found in traditional teaching models, which typically lead to the neglect of students' personalized needs.

The application of AI technologies, including ChatGPT, enables teachers to customize personalized learning plans that suit students' learning styles and ability levels. This, in turn, aids in better knowledge acquisition by the students. Moreover, ChatGPT can automate certain teaching tasks, including grading assignments and answering student questions, reducing the burden on teachers and increasing teaching efficiency. By intelligently adjusting teaching content and methods based on students' learning performance and feedback, ChatGPT can significantly improve teaching quality. Additionally, AI technologies like ChatGPT can assist teachers in student management and learning analysis (Gobert et al., 2023), enabling them to concentrate more on teaching.

ChatGPT, functioning as an intelligent learning assistant, is useful for promoting task-driven project-based learning, which transforms traditional passive learning. The traditional teaching model often follows a "one-size-fits-all" approach, where teachers provide knowledge while students passively receive it, thereby neglecting students' interests and needs. However, future education should focus more on the application of knowledge and skills for creation, generation, and interpretation, with the best learning method being project-based task-driven learning. In this regard, ChatGPT can assist project learners in quickly retrieving and organizing relevant knowledge points. By inputting keywords or questions, ChatGPT can intelligently search for relevant literature and materials and summarize the content, providing learners with references and learning bases. ChatGPT can also serve as a learning aid tool, providing learners with answers and problem-solving services through interaction, thereby enhancing learning efficiency and quality.

### 4. Learning Materials and Tasks

In traditional teaching models, students mainly acquire knowledge through textbooks and teacher lectures. With the advent of AI technologies like ChatGPT, learners can access more diverse knowledge sources, such as online videos, games, and virtual reality, which can enhance their interest and motivation in learning. ChatGPT can intelligently recommend learning content and generate innovative teaching resources to cater to each student's personalized learning needs, thereby expanding their horizons and promoting creative thinking and abilities. Moreover, students can explore real-life phenomena, apply scientific knowledge, and develop critical thinking skills through intelligent technologies.

Despite the advantages of AI, educators must design learning tasks that cultivate unique skills in students beyond the capabilities of machines. Integrating AI into domain learning tasks is essential as it reflects how humans solve practical problems. ChatGPT represents the latest developments in artificial general intelligence and provides educators with the opportunity to design learning tasks involving AI to attract student participation. ChatGPT's powerful language and visual processing functions also offer new types of learning materials, such as cross-linguistic communication and promoting cross-cultural communication and understanding, helping students complete more personalized learning tasks.

In conclusion, AI technologies like ChatGPT provide diverse learning resources and personalized learning experiences, but educators must design learning tasks that cultivate unique human skills that go beyond the capabilities of machines. This paper suggests that integrating AI into domain learning tasks and utilizing its language and visual processing functions can enhance students' learning experiences and prepare them for the challenges of the future.

## 5. Assessment and Evaluation

The integration of AI technology has the potential to transform assessment and evaluation practices in education. Traditional evaluation methods mainly rely on exams and teacher observations, which often neglect students' individual learning needs and actual performance. In contrast, future education assessment will be more diversified and objective, facilitated by AI technologies such as ChatGPT (Zhai & Pellegrino, 2023). Through these tools, students can receive comprehensive and personalized evaluations and feedback, enabling them to identify areas for improvement and enhance their learning experience. Furthermore, ChatGPT can serve as an automatic evaluation tool by analyzing student data, including homework, questions, and answers, to help teachers identify mistakes and improve the quality of teaching (Zhai et al., 2020b).

However, the development of AI technology also raises concerns about the outsourcing of writing and other evaluation tasks. ChatGPT can easily complete writing and open-ended questions, which may lead to students relying on these tools to complete assignments (Stokel-Walker, 2022). To address this issue, educators must innovate their evaluation activities and focus on skills that cannot be outsourced. General writing skills may no longer be considered essential career skills, and thus the evaluation focus should shift toward critical thinking and creativity. To meet societal demands and evolving educational objectives, educators must consider innovative assessment tasks and evaluation forms that assess and improve these skills.

In conclusion, the integration of AI technology in assessment and evaluation provides a promising opportunity for comprehensive and personalized assessments. However, educators must adapt their assessment and evaluation practices to focus on skills that cannot be easily outsourced, reflecting changing societal demands and educational objectives.

## 6. Educational Outcomes

AI and ChatGPT are driving forces in the contemporary education revolution, with far-reaching implications for talent development and national competitiveness. These technologies have the potential to fundamentally transform education and cultivate future citizens, scientists, engineers, and other professionals who are better suited to meet society's needs. ChatGPT's ability to provide personalized educational resources and teaching methods enables students to acquire the necessary skills and knowledge to adapt to the demands of future society, fostering critical thinking, innovation, and collaboration among future citizens. The integration of AI and subject learning allows students to utilize AI and ChatGPT for data collection, analysis, and simulated experiments, leading to improved research efficiency, accuracy, and driving technological innovation and scientific development. Additionally, ChatGPT can provide personalized learning resources and teaching methods to cultivate students' professional skills and practical abilities, preparing

them for future engineering demands and driving technological innovation.

Leveraging AI technologies like ChatGPT can make education more intelligent, personalized, and international, enabling students to learn, communicate, and develop more efficiently and effectively while promoting cultural integration. With the help of AI and ChatGPT, remote learning can be achieved, further advancing the internationalization and openness of the education field and allowing students to access teaching resources from different countries and cultural backgrounds. ChatGPT can also assist teachers in better understanding students' learning situations, providing targeted guidance according to their needs, and improving teaching quality. Therefore, the application of AI and ChatGPT in education will be an important trend and direction in the future.

## References

- Assaraf, N. (2022). Chatgpt: Optimizing language models for dialogue. <https://blog.cloudhq.net/openai-chatgpt-optimizing-language-models-for-dialogue/>
- Gobert, J. D., Sao Pedro, M. A., Li, H., & Lott, C. (2023). Intelligent tutoring systems: a history and an example of an ITS for science.
- Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., Madriaga, M., Aggabao, R., Diaz-Candido, G., & Maningo, J. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLOS Digital Health*, 2(2), e0000198.
- Linn, M. C., Donnelly-Hermosillo, D., & Gerard, L. (2023). Synergies Between Learning Technologies and Learning Sciences: Promoting Equitable Secondary School Teaching. In *Handbook of research on science education* (pp. 447-498). Routledge.
- Linn, M. C., Gerard, L., Ryoo, K., McElhane, K., Liu, O. L., & Rafferty, A. N. (2014). Computer-guided inquiry to improve science learning. *Science*, 344(6180), 155-156.
- Pellegrino, J. W., & Quellmalz, E. S. (2010). Perspectives on the integration of technology and assessment. *Journal of Research on Technology in Education*, 43(2), 119-134.
- Stokel-Walker, C. (2022). AI bot ChatGPT writes smart essays-should academics worry? *Nature*.
- Zhai, X. (2021). Advancing automatic guidance in virtual science inquiry: From ease of use to personalization. *Educational Technology Research and Development*, 69(1), 255-258.
- Zhai, X. (2022). ChatGPT user experience: Implications for education. Available at SSRN 4312418.
- Zhai, X. (2023). ChatGPT for Next Generation Science Learning. Available at SSRN 4331313.
- Zhai, X., Haudek, K. C., Shi, L., Nehm, R., & Urban-Lurain, M. (2020a). From substitution to redefinition: A framework of machine learning-based science assessment. *Journal of Research in Science Teaching*, 57(9), 1430-1459.
- Zhai, X., & Pellegrino, J. (2023). Large-Scale Assessment in

Science Education. In N. G. Lederman, D. L. Zeidler, & J. S. Lederman (Eds.), *Handbook of research on science education* (Vol. III, pp. 1045-1098). Foutledge.

Zhai, X., Yin, Y., Pellegrino, J. W., Haudek, K. C., & Shi, L. (2020b). Applying machine learning in science assessment: a systematic review. *Studies in Science Education*, 56(1), 111-151.