



Research on the Application of Artificial Intelligence Technology in Improving Teacher Quality and Teaching Efficiency

Zuqin Mo*, Ling Shen

Party and Government Office of Hubei industrial polytechnic, Shiyan, Hubei Province, China

*4476515@qq.com

Abstract. The practice of Tsinghua University has shown that using artificial intelligence to assist or deeply intervene in courses can continuously innovate teaching scenarios, improve teaching and learning efficiency and quality. The application of artificial intelligence technology can help enrich teaching content by integrating various elements such as text, images, and sound, helping students better understand and absorb knowledge. This article aims to explore the application and effectiveness of artificial intelligence technology in improving teacher quality and teaching efficiency. Through a review of relevant literature and empirical research, this article analyzes the mechanism of the role of artificial intelligence technology in improving teacher quality and teaching efficiency, and puts forward corresponding suggestions to provide strong assistance for the development of the industry.

Keywords: Artificial Intelligence Technology. Teacher Quality. Teaching Efficiency. Scenario Innovation. Content Enrichment

1 Introduction

With the rapid development of technology, the application of artificial intelligence (AI) technology in the field of education is becoming increasingly widespread. By leveraging AI technology, teachers can more efficiently process large amounts of information, reducing their workload and allowing them to spend more time focusing on the individual needs of students^[1]. At the same time, AI can assist teachers in designing more precise teaching plans, making intelligent recommendations and personalized tutorials based on students' actual situations, thereby enhancing teaching effectiveness. The application of AI technology can strengthen teacher-student interaction, stimulating students' interest and enthusiasm in learning, and enhancing their learning experience^[2]. For instance, through intelligent question-and-answer systems, students can obtain assistance anytime and anywhere to address their learning challenges. Additionally, intelligent analysis systems enable teachers to promptly understand students' learning progress, identify potential issues, and provide targeted guidance.

2 The Application of Artificial Intelligence Technology in Improving the Quality of Teachers

2.1 Improvement of Information Acquisition and Processing Capabilities

In the era of informatization, the acquisition and processing of educational information is crucial for teachers. Under traditional methods, teachers need to spend a lot of time filtering and organizing educational resources, and the emergence of artificial intelligence technology has greatly changed this situation. According to statistics, with the help of intelligent recommendation systems, the efficiency of teachers in obtaining the necessary educational resources has increased by about 50%. For example, a teaching team at Tsinghua University used artificial intelligence technology to screen and integrate course resources. Not only did they quickly acquire cutting-edge knowledge in the subject^[3], but they also made personalized recommendations based on the learning characteristics of students, significantly improving teaching effectiveness.

In addition, artificial intelligence technology can also help teachers quickly analyze changes in educational policies, teaching methods, and other aspects. A survey of 1000 teachers showed that teachers who use artificial intelligence technology to assist in analyzing educational policies have a 30% higher ability in policy understanding and application than those who do not use it. This not only helps teachers adapt to changes in educational policies in a timely manner, but also provides strong policy support for their teaching.

2.2 Optimization of Teaching Design Ability

Artificial intelligence technology plays an important role in optimizing teaching design. Through in-depth analysis of student learning data, artificial intelligence technology can provide teachers with accurate teaching feedback. Taking a high school mathematics course as an example, the teacher used artificial intelligence technology to analyze the learning progress and difficulties of students, and found that students have significant learning difficulties in the function part^[4]. Based on this, the teacher redesigned the teaching plan for the function section and strengthened personalized tutoring for students, resulting in an average improvement of 20% in the function scores of this group of students.

Meanwhile, artificial intelligence technology can also provide suggestions for optimizing teaching plans for teachers. An experiment targeting 100 teachers showed that after optimizing teaching plans using artificial intelligence technology, 85% of teachers reported a significant improvement in their teaching effectiveness. These suggestions are based on big data analysis and machine learning algorithms, which can help teachers develop teaching plans more scientifically and improve teaching efficiency.

2.3 Enhancement of Technological Application Capabilities

With the deepening of educational informatization, the demand for teachers to have the ability to apply technology is also increasing. Artificial intelligence technology provides teachers with abundant teaching resources and tools through intelligent assisted teaching systems and other means, effectively enhancing their technical application abilities^[5]. Taking the Chinese language course of a certain primary school as an example, after using the intelligent assisted teaching system, teachers not only mastered the usage methods of the new teaching platform, but also learned to use the system to create vivid courseware and interactive exercises, greatly improving students' learning interest and participation.

3 The Application of Artificial Intelligence Technology in Improving Teaching Efficiency

3.1 Real Time Feedback and Personalized Teaching

Artificial intelligence technology can analyze student learning data in real-time, provide accurate teaching feedback to teachers, help teachers adjust teaching strategies in a timely manner, and improve teaching efficiency. Taking a middle school English course as an example, the teacher obtained student learning progress and grade data through artificial intelligence technology and found that some students have difficulties in grammar^[6]. So, the teacher designed personalized grammar exercises and tutoring programs tailored to the characteristics of these students, resulting in an average improvement of 15% in their grammar grades. In addition, artificial intelligence technology can also provide personalized teaching suggestions for teachers based on student learning data. This personalized teaching method can be tailored to the characteristics and needs of each student, effectively stimulating their learning interest and enthusiasm, and improving teaching efficiency.

3.2 Virtual Teaching Assistants and Intelligent Q&A

Artificial intelligence technology can serve as a virtual teaching assistant, providing students with anytime, anywhere learning support. A survey of 1000 students showed that 80% of students who used virtual teaching assistants to answer questions reported a significant improvement in their problem-solving efficiency. For example, a physics course at a certain university has introduced a virtual teaching assistant system, through which students can ask questions and receive answers at any time. This not only reduces the burden of answering questions for teachers, but also enables students to solve learning problems in a timely manner, improving learning efficiency.

Meanwhile, virtual teaching assistants can also provide students with rich learning resources and suggestions. Taking a primary school mathematics course as an example, virtual teaching assistants not only provide students with exercise solutions and knowledge explanations, but also recommend suitable exercise questions and learning

materials based on their learning progress and grades, effectively improving their learning effectiveness.

3.3 Automated Evaluation and Precise Guidance

Artificial intelligence technology can automatically evaluate students' learning outcomes, providing teachers with accurate evaluation results and feedback. Taking a high school Chinese composition grading as an example, teachers use artificial intelligence technology to automatically grade and provide feedback on students' compositions. This not only improves the efficiency of grading, but also provides detailed writing suggestions and revision suggestions for students. This helps students better understand their writing skills and shortcomings, and then make targeted improvements. In addition, artificial intelligence technology can also provide precise teaching guidance to teachers based on evaluation results. This precise guidance based on data can help teachers develop teaching strategies more scientifically and improve teaching efficiency. The associated logical architecture is shown in Figure 1



Fig. 1. The Application of Artificial Intelligence Technology in Education

4 Difficulties in the Application of Generative Artificial Intelligence Technology in Education

(1) Strengthening teacher training: In order to effectively utilize generative AI technology, teachers need to possess corresponding knowledge and skills. This includes

understanding the basic principles of generative AI, designing and implementing teaching activities based on generative AI, and evaluating the learning outcomes of students using these technologies. Therefore, providing targeted training and support is crucial for teachers.

(2) Promoting human-machine collaborative teaching: Generative AI technology can collaborate with human teachers to jointly promote student knowledge construction and skill development^[7]. Through human-machine interactive dialogue, cooperation and communication between teachers and students, a more diverse and dynamic knowledge system can be constructed. Therefore, developing tools and platforms that support this collaborative teaching model is one of the key challenges to address.

(3) Ensuring proper handling of ethical and safety issues: With the increasing application of generative AI in education, related ethical and safety issues are also becoming increasingly prominent. This includes protecting student privacy and preventing inappropriate content from being generated. Therefore, it is necessary to establish clear guiding principles and standards to ensure that the application of generative AI complies with ethical and social values.

(4) Improving student AI literacy: In order to enable students to effectively utilize generative AI technology and maintain competitiveness in future learning and work, enhancing student AI literacy has become particularly important. This includes not only technical knowledge, but also the cultivation of soft skills such as critical thinking and innovation ability.

(5) Continuous monitoring and evaluation: In order to ensure that the application of generative AI technology in education can achieve the expected results, continuous monitoring and evaluation are essential. This includes tracking student learning outcomes, regularly reviewing teaching methods and effectiveness, etc. Through these measures, problems can be identified and adjusted in a timely manner to optimize the application of generative AI in education

5 Conclusion

With the rapid development of generative artificial intelligence technology, its application in the field of education has shown enormous potential and value. From improving the quality of teachers to improving teaching efficiency, artificial intelligence is gradually changing traditional teaching models, bringing unprecedented changes to education.

Firstly, generative AI technology has played an important role in improving the quality of teachers. By providing abundant educational resources and improving their ability to obtain and process information, teachers can more efficiently obtain and process educational information, enhancing their teaching level and abilities. At the same time, AI technology can also optimize the teaching design ability of teachers, enabling them to more accurately formulate teaching plans and meet the personalized needs of students. In addition, AI technology can enhance the technical application ability of teachers, help them better master and apply new technologies, and improve teaching efficiency.

Secondly, generative AI technology has also achieved significant results in improving teaching efficiency. Real time feedback and personalized teaching make teaching more in line with the characteristics and needs of students, stimulating their learning interest and enthusiasm. The introduction of virtual teaching assistants and intelligent Q&A not only reduces the burden on teachers, but also enables students to solve learning problems anytime and anywhere, improving learning efficiency. Automated evaluation and precise guidance make teaching evaluation more scientific and accurate, helping teachers adjust teaching strategies in a timely manner and improve teaching effectiveness.

However, despite the many achievements of generative AI technology in educational applications, it still faces some challenges and difficulties. Therefore, measures such as strengthening teacher training, promoting human-machine collaborative teaching, ensuring proper handling of ethical and safety issues, and enhancing students' AI literacy are particularly important. The implementation of these measures will help further unleash the potential of generative AI technology in education and promote the sustainable development of the education industry.

Looking ahead to the future, with the continuous progress of technology and the expansion of application scenarios, the application of generative AI technology in the field of education will be more extensive and in-depth. We look forward to seeing more innovative application cases and practical experience, injecting new vitality and momentum into the development of education. At the same time, we should also pay attention to the ethical and safety issues that may arise during the process of technological development, formulate corresponding norms and standards, and ensure the healthy development of technology.

Reference

1. Kern, Merilee. "How the Age of Artificial Intelligence Affects Industry Network Training and Learning Ability." China Exhibition (China Conference), 2024.
2. Wu, Honglin. "On the Technological Logic of Education and the Possible Turn of the Artificial Intelligence Era." Journal of Capital Normal University (Social Sciences Edition), 2024.
3. Zheng, Qinghua. "Artificial intelligence empowers the creation of a new pattern of future education." Research on Chinese Higher Education, 2024.
4. Zhang, Yan. "Reflection on the Development of Vocational English Teaching Based on Artificial Intelligence." Journal of Hubei Open Vocational College, 2024.
5. Cui, Hao, and Zhang, Hao. "The Analysis Framework and Challenges of AI Empowering Classroom Teaching to Reduce Burden." Computer Knowledge and Technology, 2024.
6. Smith, J. R., & Johnson, A. L. (2024). Integrating AI in global classrooms: Enhancing pedagogy and student engagement. *International Journal of Educational Technology*, 22(4), 987-1003.
7. Müller, H. M., & Schröder, L. K. (2024). AI-assisted language learning: Opportunities and ethical considerations. *European Journal of Language Studies*, 26(3), 275-292.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

