

The Impact of Teachers' Artificial Intelligence Literacy on Teaching Effectiveness

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ABSTRACT

Focusing on the development of teachers' artificial intelligence literacy in the context of the rapid development of artificial intelligence, this paper expounds the significance of enhancing teachers' artificial intelligence literacy in achieving the degree of teaching personalization, promoting the innovation of teaching models, and strengthening the scientific nature of teaching decisions. And analyze the relevant literature on artificial intelligence and education at home and abroad, and conduct bibliometric analysis. On this basis, the current practical predicaments faced by teachers in terms of knowledge system, application ability and ethical awareness are explored, and targeted countermeasures are proposed to provide useful references for the optimization of teaching practice in the era of artificial intelligence.

KEYWORDS

Teachers' artificial intelligence literacy education; Teaching innovation

1 Introduction

Empowered by artificial intelligence technology, the entire teaching process is undergoing a comprehensive revolution, and the role of teachers and the interaction mode between teachers and students are also changing accordingly. Teachers' artificial intelligence literacy is the foundation for effectively using intelligent tools to perform their duties, promoting the implementation of personalized teaching, driving the innovation of teaching models, and enhancing the scientific nature of teaching decisions. Therefore, delving deeply into the impact of teachers' artificial intelligence literacy on teaching effectiveness holds significant theoretical and practical significance for breaking through the bottlenecks of traditional teaching and promoting high-quality educational development.

2 Relevant Research and Bibliometric Analysis at Home and Abroad

2.1 Relevant Research at Home and Abroad

Liu Dawei (2025)^[1] holds that the application of artificial intelligence tools by teachers to assist teaching has become a future trend in educational development. He proposes that teachers should learn to select and use artificial intelligence tools, and be clear about the auxiliary role of artificial intelligence tools in teaching to safeguard the dominant position of educators. Tadimalla Y S and Maher L M (2025)^[2] hold that artificial intelligence literacy is a core component of artificial intelligence-enabled education. The framework of the artificial intelligence literacy course is constructed based on four dimensions: understanding the scope and technical dimensions of artificial intelligence technology, learning how to interact with artificial intelligence technology, grasping the principles of artificial intelligence usage, and analyzing the impact of artificial intelligence on society, providing effective suggestions for teachers to enhance their artificial intelligence literacy. Arkorful V et al. (2025)^[3] adopted a cross-sectional survey design and used an adapted artificial intelligence literacy scale to assess the artificial intelligence literacy of 319 teachers. It was found that, on the whole, the artificial intelligence literacy of teachers was at a medium level and still needed to be further improved. In this context, teachers should enhance their digital intelligence literacy and make rational use of artificial intelligence tools. Some scholars have also conducted research on teachers' willingness to embrace artificial intelligence technology. Fei Jianxiang et al. (2025)^[4] analyzed 256 college teachers' willingness to adopt artificial intelligence technology in teaching and found that teachers' willingness to adopt artificial intelligence technology in teaching was good, but there was still some room for improvement. Fang Xu et al. (2025)^[5] analyzed 733 valid questionnaires and found that teachers generally hold a positive attitude towards artificial intelligence technology-assisted teaching, but their application ability of artificial intelligence technology needs to be further improved.

2.2 Bibliometric Analysis

The change in the number of academic papers published is usually regarded as an important reference for measuring the development trend of a certain research field. In the initial stage of the research field, due to the fact that the theoretical system is not yet complete and empirical exploration is relatively limited, the number of related papers produced is often not large, and the growth rate is relatively slow. As academic research in this field deepens gradually, the theoretical foundation is continuously consolidated, and more researchers are attracted to engage in it. As a result,

the number of published papers will enter a period of relatively rapid growth. When the research field develops to a relatively mature stage, the number of published papers will gradually stabilize. The number of journal articles related to artificial intelligence and teachers in both Chinese and English included in CNKI is shown in Table 1. The annual distribution of Chinese journal papers related to artificial intelligence and teachers included in CNKI is shown in Figures 1 and 2. In terms of the annual publication situation with the keywords "artificial intelligence" and "teachers" (the data for 2025 is not yet complete and is only for reference), it can be found from the chart that the number of papers published with the keywords "artificial intelligence" and "teachers" has generally shown a significant upward development trend since 2020.

Table 1 Shows the number of Chinese and English journal articles related to artificial intelligence and teachers included in CNKI

Year	The number of Chinese characters included	The number of English characters included
2020 年	2451	45
2021 年	2803	70
2022 年	3028	125
2023 年	4218	158
2024 年	6918	458

The annual distribution of Chinese journal articles related to artificial intelligence and teachers included in CNKI

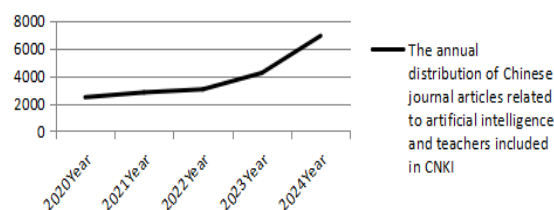


Figure 1 Annual Distribution of Chinese journal papers related to artificial intelligence and teachers included in CNKI (2020-2024)

The annual distribution of English journal articles related to artificial intelligence and teachers included in CNKI

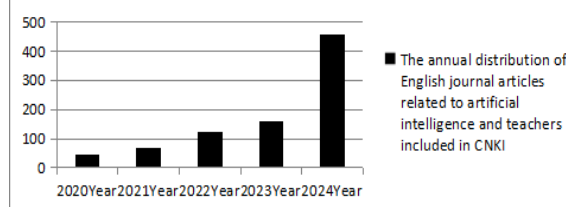


Figure 2 Annual Distribution of English journal papers related to artificial intelligence and teachers included in CNKI (2020-2024)

3 The Practical Predicaments Faced by Teachers' Artificial Intelligence Literacy

3.1 Knowledge System Discontinuity

At present, there is a significant gap between the knowledge system of teachers and the application demands of artificial intelligence in education. Although teachers are aware of the basic functions of intelligent teaching tools, they do not understand their operational logic. When faced with tool malfunctions or abnormal data, they are unable to troubleshoot and solve problems from the principle level. If the intelligent assessment system leads to incorrect results due to data collection deviations, teachers, lacking knowledge of data cleaning and algorithm verification, can only rely on technical personnel, which restricts the in-depth innovation of teaching.

3.2 Weak Application Ability

There exists a problem of "disconnection between learning and application" among teachers in the application of artificial intelligence tools. Some teachers, due to the lack of practical guidance and application scenarios, have insufficient ability to apply the advanced functions of intelligent tools and thus find it difficult to delve into the teaching

practice process. Although the intelligent writing assistance system can provide process-based guidance, teachers still use the traditional "final draft correction" mode because they do not know how to connect the writing teaching links. The application of technology remains superficial and fails to enhance teaching efficiency.

3.3 Lack of Ethical Awareness

There is a "blind spot" in ethical awareness among teachers in the application of artificial intelligence. In the data collection and usage process, some teachers excessively collect students' behavioral data and fail to strictly follow the data desensitization and authorization procedures, posing a risk of privacy leakage. In the application of algorithms, some teachers overly rely on the grade predictions generated by intelligent evaluation tools without verifying the algorithms' biases against special groups of students, which may lead to unfair evaluations.

4 Effective Countermeasures for Enhancing Teachers' Artificial Intelligence Literacy

4.1 Build a Knowledge Supply System

The education department needs to take the lead in designing a stratified and classified training course system, develop general education courses on "Artificial Intelligence + Education" for all teachers, and invite experts and senior researchers in the field of educational artificial intelligence to collaborate in teaching. They should teach the basic algorithm principles within artificial intelligence, data thinking, and the technical application logic in educational scenarios. By analyzing the operation cases of tools such as intelligent lesson preparation systems and learning analysis platforms, it helps teachers understand the underlying logic of technology. For teachers of different subjects, the education department needs to collaborate with subject teaching experts and technology enterprises to develop special courses on "subject + intelligent tools". For instance, it can offer specialized courses on intelligent text analysis tools to assist in composition teaching for Chinese language teachers, and design application training for intelligent problem-solving diagnosis systems for mathematics teachers, thereby strengthening the connection between knowledge and teaching scenarios.

4.2 Promote Technical Application Training

Schools should take the lead in conducting "teaching-technology" integrated training activities, driven by real teaching tasks, and organize teachers to participate in the training in groups. For instance, they can focus on specific tasks such as "Designing interdisciplinary project-based learning using intelligent tools" and "Optimizing classroom interaction with the aid of intelligent feedback systems". Enable teachers to apply the intelligent design platform in practice to plan courses, create teaching resources and simulate teaching processes. Meanwhile, the school needs to invite engineers from technology enterprises and outstanding subject teachers to serve as mentors. They should track the teachers' practical process throughout, promptly solve problems in tool operation and bottlenecks in teaching integration, and establish a closed-loop mechanism of "application - reflection - iteration". Teachers are required to write application reflection reports after each practice and adjust and optimize them in accordance with the suggestions of the mentors. Promote the transformation of teachers from "being able to operate tools" to "making good use of tools to empower teaching".

4.3 Formulate Technical Operation Norms

The education department, in collaboration with the market supervision department and educational technology enterprises, jointly establishes the selection standards and operation norms for intelligent teaching tools. The education department should organize experts to evaluate the transparency of the algorithm logic, the security of data processing, and the matching degree of functions with educational goals of common intelligent lesson preparation systems, learning analysis platforms, and intelligent assessment tools in the market. The education department should compile operation manuals for intelligent teaching tools for teachers, detailing the applicable teaching scenarios of different tools, specific operation steps, and risk prevention measures, to ensure that the application of technology is carried out in an orderly manner and to avoid ethical risks and teaching errors from the source.

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