

Literature Review on AI Literacy Research for Primary and Secondary School English Teachers in China

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Abstract:

Based on existing research, this paper analyzes the current state of AI literacy framework studies. It is found that AI literacy framework research has diversified, encompassing both general AI literacy frameworks and differentiated ones. Studies on teachers' AI literacy include framework development and training pathways, reflecting a trend toward specialization. Some scholars have adopted a comparative perspective, drawing on international AI literacy frameworks to explore localized practices. In terms of empirical research on AI literacy, numerous findings and insights have emerged, though limitations in research subjects have been identified—particularly the gap in studies on AI literacy among primary and secondary school English teachers. Therefore, future research directions are proposed, including the development of discipline-specific AI literacy frameworks, empirical investigations, exploration of effective training pathways, and enhanced international comparative studies. The aim is to provide theoretical references and practical guidance for integrating AI into China's basic English education.

Keywords:

Primary and Secondary School English Teachers, AI Literacy Framework, International Comparison and Localization, Empirical Research, Necessity, Future Research Directions

1. Introduction

With the rapid advancement of artificial intelligence technology and its deep integration into the field of education, AI literacy has become a focus of global educational reform. As a key factor in the digital transformation of education, the AI literacy level of primary and secondary school English teachers directly impacts the effectiveness of integrating AI technologies into English language instruction. Based on existing international sources and domestic research, this paper analyzes the current state of AI literacy framework studies, highlights gaps in research on AI literacy among English teachers in primary and secondary schools, and proposes

future research suggestions, aiming to provide theoretical insights and practical guidance for leveraging AI to enhance foundational English education in China.

2. The Diversified Research on the Development of AI Literacy Framework

Existing literature has focused on the study of AI literacy frameworks, revealing a trend of diversified development.

2.1. Research on General AI Literacy Frameworks

As a core research area in this field, AI literacy frameworks provide a theoretical foundation and practical guidance for enhancing one's literacy. In recent years, scholars have constructed diverse AI literacy framework from various dimensions. Based on the STEM education, Yang Hongwu et al. [1] developed a literacy framework consisting of four dimensions: core concepts, technical practice, interdisciplinary thinking, and ethical attitudes. This framework emphasizes the importance of interdisciplinary integration in AI literacy cultivation, offering a significant reference for subsequent research. By means of international comparative studies, Huang Ruhua et al. [2] proposed an educational content framework encompassing four elements, namely AI cognition, skills, application, and ethics, highlighting the practicality and ethical considerations of AI literacy. Yu Weijie et al. [3] systematically analyzed 40 representative frameworks and distilled a five-dimensional model, that is, cognition, skills, application, innovation, and ethics, further enriching the connotation of AI literacy. These general framework studies reveal the multidimensionality and complexity of AI literacy, laying a theoretical foundation for literacy cultivation across different educational fields and groups.

2.2. Research on Differentiated AI Literacy Frameworks

To address the characteristics of different educational stages and groups, researchers have developed differentiated AI literacy frameworks. In the field of basic education, Hou Hezhong et al. [4] constructed a framework for K-12 students' intelligent literacy, comprising seven dimensions such as awareness, attitude, and knowledge, providing systematic guidance for AI education at the K-12 level. Qiao Xuefeng et al. [5] proposed a three-dimensional framework—intelligent cognition, integrated application, and intelligent innovation—by establishing progressive learning paths to meet the needs of students at different school levels. In vocational education, Li Haisheng et al. [6] focused on the characteristics of higher vocational education and developed a professional talent cultivation framework that equally emphasizes knowledge, skills, and ethics, reflecting the practice-oriented nature of vocational education. These differentiated framework studies demonstrate the fundamental principle that AI literacy cultivation requires tailored approaches based on individual and group characteristics.

3. The Professional Trend in Research on Teachers' AI Literacy

Research on AI literacy among teachers covers frameworks and cultivation pathways, demonstrating a trend toward professionalization.

3.1. Research on AI Literacy Frameworks for Teachers

As key implementers of educational digital transformation, teachers' AI literacy levels directly impact the effectiveness of technology-enabled education. In teacher training, Wang Pengjiao [7] proposed an AI literacy framework for pre-service teachers, while Huang Lei [8] explored a competency framework for university students, providing a theoretical basis for pre-service teacher development. Ding Shiqiang et al. [9] developed a three-dimensional professional competency framework for primary and secondary school teachers, and Wang Xia et al. [10] constructed a digital literacy framework for postgraduate supervisors. These studies collectively advance the professionalization of AI literacy research for teachers. Notably, UNESCO [11] released the Artificial Intelligence Competency Framework for Teachers, establishing a global standard with six key competencies, serving as an important reference for teachers' AI professional development worldwide. On April 10, 2025, Guangdong Province officially launched the “2+1” plan to promote AI education in primary and secondary schools. The “2” refers to “two literacy frameworks”—Guangdong Primary and Secondary School Teachers' AI Literacy Framework (Trial) and Guangdong Primary and Secondary School Students' AI Literacy Framework (Trial)—while the “1” represents Guangdong Primary and Secondary School AI Curriculum Guide (Trial). This provides theoretical guidance and practical pathways for enhancing AI literacy among English teachers in primary and secondary schools.

3.2. Research on Cultivation Pathways for Teachers' AI Literacy

Regarding specific pathways for improving teachers' AI literacy, researchers have proposed diverse implementation strategies. Wang Dan [12] suggested that teachers' professional competencies in the AI era manifest in three progressive levels: technological tool application, intelligent pathway implementation, and smart talent cultivation. Liu Bangqi et al. [13] proposed a practical strategy for enhancing teachers' digital literacy based on “demand orientation, standard guidance, scenario implementation, and evaluation feedback”. These studies emphasize that AI literacy cultivation for teachers should integrate theory with practice and blend technology with pedagogy as fundamental principles.

4. Comparison Between International and Domestic Research

Many scholars have conducted research on AI literacy from a comparative perspective, examining both domestic and international contexts.

4.1. Global Benchmarking of AI Literacy Frameworks

Learning from international experience is of great significance to the development of AI literacy education in China. Scholars such as Chen Shanshan [14] systematically analyzed the AI literacy education framework in UK universities, summarizing it into four dimensions: cognition, application, thinking, and ethics. Wei Yue [15] compared the Global Framework for Digital Literacy with UNESCO's AI Competency Framework for Students, dissecting the structural elements of students' AI competencies. Lan Guoshuai [16] examined the U.S. AI Literacy Framework, extracting key components such as six types of educational practices and two core principles. These cross-national comparative studies provide an international perspective for the localized development of AI literacy education in China.

4.2. Exploration of Localized Practices

Building on international insights, Chinese scholars have actively engaged in localized practical explorations of AI literacy. Based on UNESCO's AI Competency Framework for Students, Miao Fengchun [17] emphasized that AI curricula for primary and secondary school serve as the main channel for cultivating citizens' literacy in an intelligent society. Lin Ronghui [18] explored the implementation pathways of school-based AI projects through a coordinated approach of macro-level school-based design and micro-level project-based execution. These localized studies reflect the distinctive path of AI literacy education in China.

5. Empirical Research on AI Literacy

In recent years, empirical research on AI literacy has been booming, with not only diversified research topics but also the revelation of numerous existing issues.

5.1. Main Research Themes

Current empirical studies on AI literacy primarily focus on investigating literacy status, analyzing application scenarios, exploring cultivation pathways, constructing evaluation systems, and anticipating ethical education. Yang Bo et al. [19] examined the AI literacy education practices at the University of Arizona Library using case analysis. Zai Bingxin et al. [20] constructed a content framework for AI literacy education from five dimensions: knowledge system, application ability, information norms, thinking cultivation, and ethical cognition. These empirical studies provide data support for the practical implementation of AI literacy education.

5.2. Research Findings and Implications

Multiple empirical studies have revealed key factors and obstacles in AI literacy development. Li Hongchen et al. [21] found that intellectual humility has a dual effect in moderating AI anxiety and usage intention. Duan Yushan et al. [22] conducted a specialized assessment of pre-service teachers, revealing significant gaps in their knowledge and skills. Li Yan et al. [23] discovered that disciplinary background and AI literacy levels jointly influence the choice of GenAI application scenarios. These findings provide a scientific basis for formulating targeted improvement strategies.

5.3 Limitations in Research Subjects

Although existing studies have covered several important groups, there are notable limitations. Shi Yu et al. [24] found through a systematic literature review that research subjects are mainly concentrated among students. In studies on teachers, the focus has largely been on university faculty or pre-service teachers, with a severe lack of specialized research on K-12 subject teachers. In particular, research on AI literacy among English teachers in primary and secondary schools remains entirely absent, which stands in sharp contrast to the significant role of English in basic education.

6. The Necessity of Research on AI Literacy for Primary and Secondary School English Teachers

From the above literature review, it can be seen that enhancing the AI literacy of primary and secondary school English teachers and promoting deep integration of AI with English education are urgent demands in the era of Artificial Intelligence.

6.1. The Distinctiveness of the English Discipline

The AI literacy framework for English teachers should reflect disciplinary characteristics. As a language subject, English possesses unique features distinct from STEM disciplines. The application scenarios of AI technology in language learning (e.g., intelligent speech evaluation, AI writing assistance, machine translation, etc.) have their particularities. This requires English teachers to possess the ability to evaluate, select, and apply AI tools to support personalized learning and instructional decision-making. In their research on the application of generative AI in writing feedback, Pan Haiying et al. [25] demonstrated that the use of AI technology in English teaching requires specialized literacy support.

6.2. The Demand for Digital Transformation in Basic Education

Globally, digital education strategies (such as China's *Education Informatization 2.0 Action Plan* and the *Digital Education Action Plan 2021-2027* by European Union) emphasize the integration of AI technology in education. With the deepening of digital transformation in education, primary and secondary school English teachers face an urgent need to effectively incorporate AI technology into teaching. However, existing research on teachers' AI literacy fails to fully consider the characteristics of the English discipline, lacking targeted literacy frameworks and pathways for improvement. This research gap leaves English teachers without systematic guidance in technological application, hindering the effectiveness of AI-enabled English instruction.

6.3. Global Trends in Language Education

From a global perspective, the integration of AI and language education has become an irreversible trend. Constructing an AI literacy framework for primary and secondary school English teachers will not only improve the quality of basic English education in China but also strengthen the nation's voice in the global language education landscape. International experience shows that discipline-oriented AI literacy training for teachers is key to the success of digital transformation in education (UNESCO, 2023).

It is evident that research on AI literacy for primary and secondary school teachers is not merely a matter of technological application but a fundamental issue concerning the essence of education and the future societal landscape. Such research can provide a theoretical foundation for educational governance in the intelligent era.

7. Suggestions for Future Research

Based on the relevant literature review, future research could focus on the construction of a disciplinary AI literacy framework, empirical investigations, effective cultivation pathways, and international comparative studies.

7.1. Constructing a Disciplinary AI Literacy Framework

Future research should prioritize the development of an AI literacy framework tailored for primary and secondary school English teachers. This framework should fully consider the characteristics of English as a discipline and the needs of basic education, potentially encompassing dimensions such as AI technology awareness, pedagogical application in English teaching, innovative practices, and ethical safety. The construction process may draw upon Wu Dan's [26] five-level competency model

and Cai Yingchun's [27] comprehensive framework but must undergo disciplinary adaptation.

7.2. Conducting Empirical Investigations

Large-scale questionnaire surveys and in-depth interviews should be employed to reveal the current state of AI literacy among primary and secondary school English teachers and its influencing factors as well. Research may draw reference from Zhou Qiong's [28] scale development method and Su Wencheng's [29] Analytic Hierarchy Process (AHP) evaluation system but should be adjusted to fit the characteristics of English teachers.

7.3. Exploring Effective Cultivation Pathways

Based on empirical findings, strategies for enhancing AI literacy among English teachers should be explored. Insights may be drawn from Liu Bangqi's [13] empowerment strategies and Lin Ronghui's [18] school-based implementation pathways, but innovations should align with the disciplinary and pedagogical features of English teaching.

7.4. Strengthening International Comparative Studies

Future research should enhance the study of AI literacy frameworks for language teachers in English-speaking countries, such as the relevant standards by the American TESOL Association and the European Framework for Digital Competence of Language Educators. Through international comparisons, an AI literacy system for Chinese primary and secondary school English teachers can be developed—one that aligns with China's national context while maintaining global relevance.

8. Conclusions

In conclusion, research on AI literacy frameworks exhibits trends toward diversification, specialization, and internationalization. However, studies of AI literacy targeting primary and secondary school English teachers as a specific group remain a gap. Future research should focus on constructing a discipline-oriented AI literacy framework, conducting systematic empirical investigations, and exploring effective cultivation pathways to provide theoretical support and practical guidance for AI-enabled basic English education in China. Research on AI literacy among primary and secondary school English teachers will not only help fill an academic void but also offer professional support for China's educational digital transformation, carrying significant theoretical value and practical implications.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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