Teacher Development in the "AI + Education" Ecosystem: Application Ability of Artificial Intelligence for Primary School English Teachers and Construction of Training System

Chunli Li*

Tianjin University of Science and Technology, Tianjin, China

*Author to whom correspondence should be addressed.

Abstract: In the current era of digitalization sweeping the education field, primary school English education is facing new challenges and opportunities of deep integration with artificial intelligence. This study focuses on primary school English teachers and uses various methods such as questionnaire surveys, visits, and interviews to conduct an in-depth exploration of their artificial intelligence literacy. After data analysis, optimization strategies are proposed to further improve the artificial intelligence literacy of primary school English teachers and promote the development of educational soft power.

Keywords: Primary school English teacher; Artificial intelligence literacy; Teacher Artificial Intelligence Capability Framework; Enhancement strategy

1. Introduction

1.1. Research background and objective

In today's digital age, the application of artificial intelligence technology is constantly expanding and profoundly affecting various aspects of human life, and the education sector is also deeply influenced by it. The "Outline of the Plan for Building an Educationally Strong Country (2024–2035)" issued by the Central Committee of the Communist Party of China and the State Council clearly proposes to open up new development tracks and shape new development advantages through the digitization of education. The Ministry of Education has issued a notice on strengthening artificial intelligence education in primary and secondary schools, aiming to achieve basic popularization of artificial intelligence education in primary and secondary schools by 2030. The "Teacher AI Competency Framework" released by UNESCO defines the knowledge that teachers must master in the era of artificial intelligence.

At present, the artificial intelligence literacy of primary school English teachers varies greatly, and there

are many problems [1]. Therefore, this study aims to gain a deeper understanding of the current status of artificial intelligence literacy among primary school English teachers through a questionnaire survey, analyze the existing problems and their causes, and propose practical and feasible improvement strategies to provide strong support for promoting innovative development in primary school English teaching.

1.2. Research significance

The digital literacy of primary and secondary school teachers in our country is generally at a medium level [2]. At the theoretical level, in-depth research on the artificial intelligence literacy of primary school English teachers can help enrich and improve the theoretical system of teacher professional development. With the advancement of digital transformation in education, artificial intelligence literacy has become an important component of teachers' ability structure. In-depth research on teachers' artificial intelligence abilities and literacy can deepen our understanding of the connotation and extension of teachers' professional development, and promote the construction of a more comprehensive and adaptable theoretical framework for teachers' professional development that meets the needs of the times.

At the practical level, enhancing the artificial intelligence literacy of primary school English teachers is of great significance. On the one hand, it can help teachers better utilize artificial intelligence technology to optimize the teaching process, provide precise teaching based on individual differences of students, improve teaching quality and efficiency, and promote the improvement of students' language abilities. On the other hand, it can provide a reference for relevant departments to formulate scientific and reasonable teacher training policies and educational development plans, promote high-quality education, and advance the overall development of primary school English education in China.

2. Research method

2.1. Investigation implementation

In this survey, a questionnaire was distributed to primary school English teachers in various regions. To overcome the limitations of time and space during the survey process, this study adopted the Wenjuanxing network questionnaire survey method, effectively utilizing media platforms such as WeChat groups and community forums to distribute questionnaires for primary school English teachers. The survey questionnaire involves primary school English teachers from 6 grades, covering 28 provinces. Finally, a total of 402 questionnaires were collected, of which 398 were valid questionnaires and 4 were invalid questionnaires, with an effective rate of 99%. The collected data was comprehensively summarized and organized in the later stage, meeting the requirements of data statistics and serving as a basis for analyzing the survey results.

2.2. Data analysis methods

In order to ensure the scientific validity of the survey questionnaire and the reliability of the data, this study used reliability and validity analysis methods to evaluate the collected data.

This study conducted a detailed analysis of the collected data using SPSS.

2.2.1. Questionnaire reliability analysis

Reliability indicates the consistency or stability of a scale. Cronbach's alpha reliability coefficient was used as the reference standard for reliability evaluation in the study. The following is the reliability analysis of the scale section in the questionnaire, as shown in **Table 1**.

Table 1. Cronbach's reliability analysis (simplified format)

Number of items	Sample size	Cronbach's alpha coefficient
17	337	0.717

2.2.2. Questionnaire validity analysis

Validity is an important indicator for measuring the effectiveness of a questionnaire survey. In this study, KMO and Bartlett's tests were used as reference standards for validity evaluation. The following is the validity analysis of the scale section in the questionnaire, as shown in **Table 2**.

Table 2. KMO and Bartlett's test

KMO value		0.833
Bartlett sphericity test	Approximate chi-square	1364.571
	df	136.000
	P-value	0.000

3. Current status of artificial intelligence literacy among primary school English teachers

3.1. Research on teachers' participation in artificial intelligence literacy training

This survey is based on the "Artificial Intelligence Fundamentals and Application Skills" in the UNESCO Teacher Artificial Intelligence Competency Framework, and investigates whether schools provide training to teachers on the principles, application foundations, and application skills of artificial intelligence.

The survey shows that in the past two years, primary school English teachers have participated in training sessions related to artificial intelligence technology (**Figure 1**). About 44% of teachers participated in 3–4 training sessions within two years, and about 30% of teachers participated in 1–2 training sessions within two years. But this is the number of training sessions that teachers have participated in within two years, with the highest proportion being 3–4 times. Relatively speaking, the average time teachers receive relevant training per semester is very little. The application of artificial intelligence technology requires in-depth learning and practice based on the characteristics of the discipline, and the current training frequency clearly cannot meet this demand. The lack of attention from local education departments or schools and the absence of corresponding artificial intelligence training have resulted in teachers being unable to receive sufficient support and opportunities to enhance their technical application abilities. The country and schools need to take stronger measures to promote the improvement of teachers' artificial intelligence literacy.
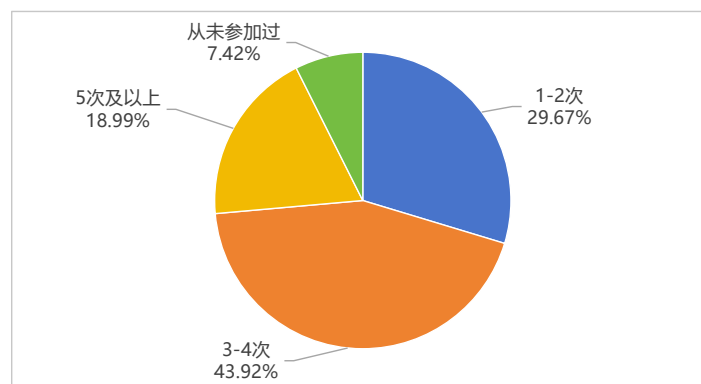
Figure 1. Survey and analysis of teachers' participation in artificial intelligence literacy training

3.2. Research on problems in artificial intelligence literacy training

This survey is based on the theory of "integration of artificial intelligence and teaching methods" in the UNESCO Teacher Artificial Intelligence Competency Framework. It investigates the training issues related to AI-assisted teaching and the integration of AI and teaching, and continues the previous survey to ensure its coherence.

In response to the national government report, some regions have organized training on artificial intelligence literacy for primary school teachers. Survey data (**Figure 2**) shows that there are still deficiencies in the current artificial intelligence literacy training, mainly including too few training opportunities, strong theoretical training, a lack of practical guidance, and insufficient training duration. These issues seriously affect the effectiveness of training and limit the improvement of teachers' artificial intelligence literacy. It is urgent to improve the design and implementation of training to enhance its practicality and effectiveness. Only by helping teachers truly master artificial intelligence technology can they fully unleash its potential in teaching and promote the development of educational informatization and modernization.
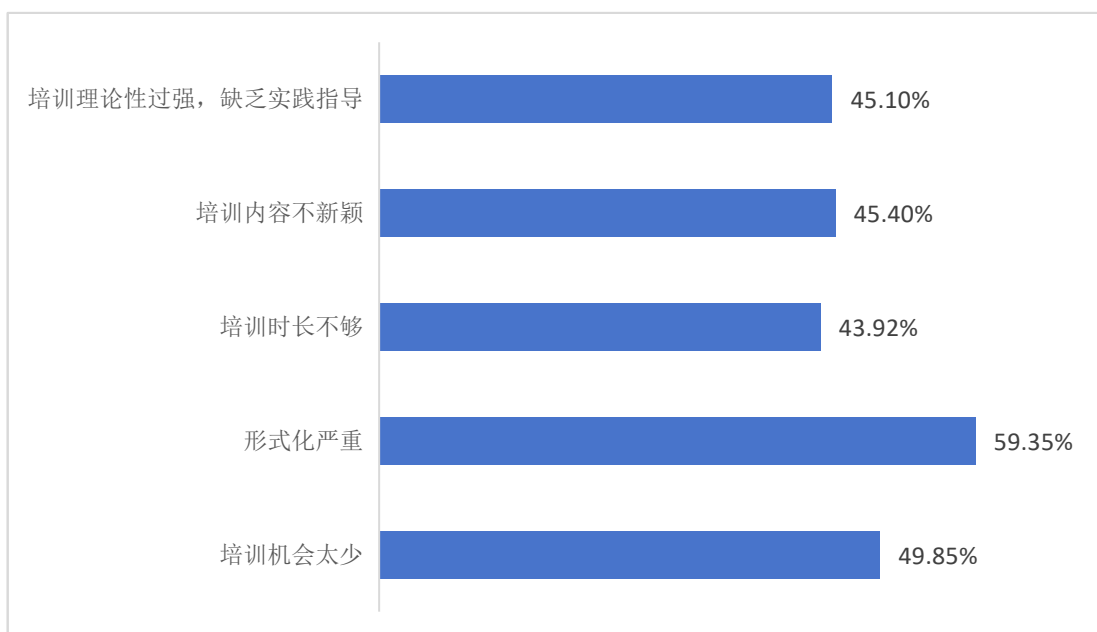

Figure 2. Survey and analysis of problems in artificial intelligence literacy training

3.3. Research on the impact of artificial intelligence-assisted teaching on students

This survey is based on the theory of "integration of artificial intelligence and teaching methods" in the UNESCO Teacher Artificial Intelligence Competency Framework, and investigates the support of artificial intelligence in teaching methods.

The survey report shows that artificial intelligence-assisted teaching not only plays a significant role in teachers' own literacy but also has many positive impacts on students (**Figure 3**). Teachers believe that after using artificial intelligence to assist teaching, students' classroom participation has significantly increased, their learning autonomy has improved, their learning enthusiasm has been enhanced, and their English listening, speaking, reading, and writing abilities have been strengthened. Therefore, in the future, it is necessary to further strengthen teacher training, optimize technological design, increase investment in educational informatization, fully tap into the potential of artificial intelligence-assisted teaching, and provide better support for students' learning and growth.
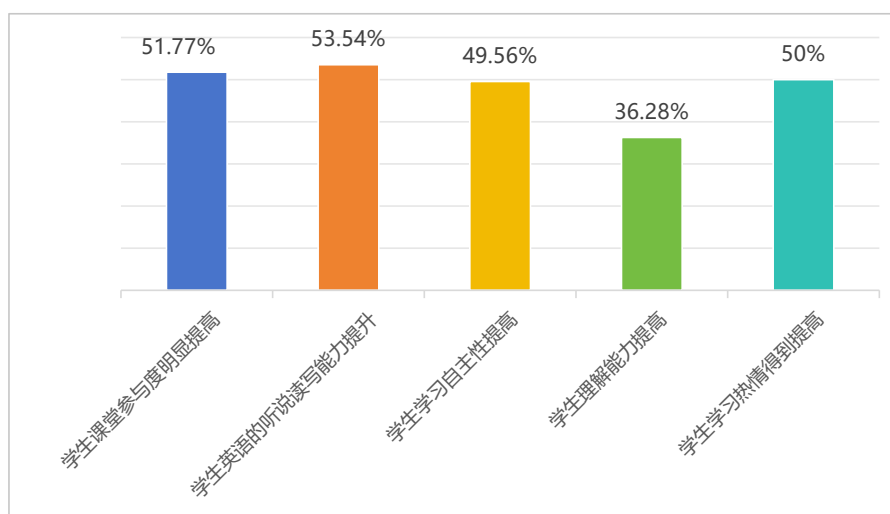
Figure 3. Survey and analysis of the influence of AI-assisted teaching on students

3.4. Reasons for the current situation caused by artificial intelligence-assisted teaching

At the teacher level, some teachers' understanding of artificial intelligence remains superficial, lacking an understanding of its potential in education, resulting in a lack of enthusiasm for AI-assisted teaching, and some teachers even have resistance. Secondly, teachers themselves have limited opportunities to receive artificial intelligence literacy training, and the training content is often too theoretical and lacks practical guidance, making it difficult for teachers to apply the knowledge they have learned to actual teaching and effectively improve their application abilities.

At the school level, there is a lack of a comprehensive AI literacy training system for teachers, and the training content, format, and frequency cannot meet the needs of teachers, resulting in poor training effectiveness. Secondly, the school did not develop personalized training and development plans based on individual differences of teachers, resulting in a lack of targeted training and ineffective improvement of teachers' artificial intelligence literacy.

At the social level, the cooperation between the education and business sectors is not close enough, resulting in a lack of sufficient funding and technical support for the application of artificial intelligence technology in the education field, and prone to technological homogenization, that is, the application of artificial intelligence technology in the education field lacks innovation and practicality. In addition, society's understanding of artificial intelligence is not comprehensive enough, which can easily lead to exclusion from parents and students. These factors have all led to the insufficient status quo of teachers in AI-assisted teaching.

4. Optimization path of artificial intelligence literacy for primary school English teachers

4.1. Teacher's autonomous development

4.1.1. Establishing the concept of lifelong learning and enhancing the understanding of artificial intelligence

In the rapidly changing present, artificial intelligence is advancing day by day, and new data models are constantly emerging. From the perspective of factors affecting the artificial intelligence literacy of primary school English teachers, improving subjective factors is more convenient. Primary school English teachers should keep up with the development of the times, constantly update their knowledge structure, and establish the concept of

lifelong learning.

Primary school English teachers need to intensify their understanding of relevant artificial intelligence books and literature. Primary school English teachers should actively understand the basic concepts, development history, application areas, and future trends of artificial intelligence. There are a large number of literature on the integration of artificial intelligence in early foreign education, and the exploration of artificial intelligence and education in China is still continuing. Primary school English teachers stay up-to-date with the latest research achievements and application cases in the field of artificial intelligence by browsing professional websites, subscribing to industry journals, and following experts and scholars.

These books and literature describe the methods, far-reaching impacts, and optimization paths of using artificial intelligence to empower primary school English education, providing effective references for the integration of artificial intelligence in education in the new era and offering optimal solutions for current primary school English teachers' classroom practices.

Primary school English teachers should actively participate in training and lectures organized by schools and education departments. According to public survey data, some teachers refuse to participate in training and lectures related to the integration of artificial intelligence education, citing reasons such as being too old to use artificial intelligence and having limited classroom time. Often, these trainings and lectures grasp the cutting-edge ideas of integrating artificial intelligence into education, enabling systematic learning of the application of artificial intelligence technology in education.

4.1.2. Actively participating in practical exploration and enhancing the application capability of artificial intelligence

Teachers should be problem-oriented and break down the barriers to traditional solutions [3]. Practical exploration can help teachers transform artificial intelligence technology into practical teaching abilities. Primary school English teachers can try using various artificial intelligence teaching tools. Currently, every artificial intelligence software on the market has its specific advantages. Primary school English teachers can classify and apply artificial intelligence teaching software based on classroom teaching objectives to achieve optimal teaching effectiveness. Primary school English teachers can actively try using tools such as artificial intelligence speech recognition, machine translation, and intelligent grading to assist in dictation, listening, and reading classes in English teaching, improving teaching efficiency.

Primary school English teachers can actively participate in research projects on the integration of artificial intelligence and English teaching, explore the application models of artificial intelligence technology in different teaching stages, and summarize experiences and lessons learned. Through systematic research, primary school English teachers can deeply accumulate experience in human-computer collaborative teaching, collect corresponding data, establish a teaching case library, and provide practical basis for building an intelligent English teaching model. Primary school English teachers can enter the research library of teaching software, put forward their own opinions, and provide timely summary of successful experiences and failed lessons to R&D personnel, promote the development of intelligent teaching software, and ultimately achieve the dual goals of improving teaching efficiency and promoting the development of domestic teaching facilities.

4.2. Schools promote development
4.2.1. Improving the teacher training system

At present, most schools have conducted training on artificial intelligence-assisted teaching, and teachers have a certain level of artificial intelligence literacy, but the quality of training needs to be improved. Therefore, it is

necessary for schools to improve their artificial intelligence teaching and training system. Schools should organize regular artificial intelligence literacy training to enhance the artificial intelligence literacy of new and old teachers. Schools can combine local characteristics with school-based curriculum to provide unique training, making the training more specific and distinctive. Schools cannot be limited to just holding group meetings, but can also build platforms such as flipped classrooms, workshops, and laboratories. The school's training system can combine practical cases from various grades, integrate theory with practice, and enable teachers to apply it flexibly. Encourage teachers to actively participate and select teachers with high artificial intelligence literacy for specialized training. These teachers can impart operational skills of artificial intelligence-assisted teaching to other teachers and form their own unique experiences. Schools can increase the reward for teachers using artificial intelligence to assist teaching, and combine it with teacher assessment work to promote learning, application, and excellence through evaluation. Targeted training on high-quality teachers' artificial intelligence literacy can be conducted to fully promote the trend of teachers attaching importance to artificial intelligence-assisted teaching.

4.2.2. Customized personalized teacher development path

Different teachers have different ages, teaching styles, and basic knowledge. Schools can evaluate teachers' artificial intelligence literacy and customize personalized development paths for them based on the evaluation results. There are significant differences in the level of technology acceptance and learning styles among teachers of different age groups. Young teachers may be more accustomed to diverse teaching, while experienced teachers may be more inclined to rely on their own experience in teaching. Therefore, schools should consider these differences and provide suitable learning methods and resources for teachers of different age groups. Each teacher has their own teaching style, and without special instructions, artificial intelligence carries neutral emotions and generates content that does not fit the teacher's personal style. Based on the teaching style of the teacher, instructions can be given to the artificial intelligence to generate corresponding styles. Therefore, schools should also provide different technical training and application guidance for different teachers.

4.3. National empowerment for development
4.3.1. Promoting cooperation between the education and business sectors

The learning content of students not only exists in the classroom, but also students' horizons are particularly important. Teachers need to make use of some conditions and resources to improve students' listening and speaking abilities as well as their comprehensive qualities. Therefore, the continuous follow-up of AI technology is needed [4]. The country attaches great importance to the development of education, and the integration of artificial intelligence into education is a great opportunity and a major driving force for business. Education is the great plan of the country, and commerce is the engine of national economic growth. The two are coordinated by the state, which can produce a synergistic effect and inject a continuous stream of power into the future development of the country. Collaboration between the education sector and the artificial intelligence industry has the potential to break through many limitations of traditional education. The artificial intelligence industry can master more practical teaching cases, improve the actuarial degree and analytical ability of data. A large number of cases are analyzed by artificial intelligence and stored in databases to accurately understand the characteristics of each type of student. Artificial intelligence customizes better personalized learning plans, improving the work efficiency of teachers and the learning efficiency of students.

The investment in education in the artificial intelligence industry can create vast opportunities for

development. If DeepSeek collaborates with the government, it can create artificial intelligence specifically designed to serve government systems, greatly improving work efficiency. If artificial intelligence collaborates with the education sector, various types of artificial intelligence software and machines can be derived to meet the learning needs of different age groups and requirements. Meanwhile, the collaboration between artificial intelligence and the education sector can drive the development of other industries and boost employment.

4.3.2. Vigorously promoting the importance of artificial intelligence literacy

Although artificial intelligence involves various aspects of life, there are still some groups that have not fully recognized the importance of teachers' artificial intelligence literacy. There are also significant differences in artificial intelligence literacy among regions, with poor teaching facilities and lack of advanced artificial intelligence equipment for teaching in remote areas. Some schools also do not attach importance to teachers' artificial intelligence literacy. The country should use various media channels to strengthen public promotion of artificial intelligence literacy. For remote areas, the country should strengthen offline publicity efforts. Organize a team of experts to go deep into schools and carry out activities to popularize artificial intelligence literacy. Carefully design artificial intelligence literacy training courses, set up practical sessions, and enable teachers to have a comprehensive and clear understanding of artificial intelligence.

5. Conclusion

This study conducted a questionnaire survey and field research to sort out the levels of artificial intelligence literacy among primary school English teachers based on the United Nations' "Teacher Artificial Intelligence Competency Framework." It deeply analyzed the current situation of artificial intelligence literacy among primary school English teachers, revealed the existing problems and their causes, and proposed targeted optimization paths.

Research has found that although the application of artificial intelligence technology in the field of education is gradually becoming popular, there is still significant room for improvement in the artificial intelligence literacy of primary school English teachers. Some teachers have a relatively shallow understanding of artificial intelligence and lack systematic training and practical opportunities, which makes it difficult for them to effectively apply artificial intelligence technology in teaching. In addition, insufficient support from schools and society also hinders the improvement of teachers' artificial intelligence literacy.

Based on the research results, this study proposes specific optimization strategies from three levels: teacher self-development, school promotion of development, and national empowerment of development. Firstly, teachers should establish the concept of lifelong learning, actively participate in training and practice related to artificial intelligence, and enhance their technical application abilities. Secondly, schools should improve their teacher training system, develop personalized training plans, and help teachers better integrate artificial intelligence technology into teaching practice. Finally, the country should strengthen cooperation between the education and business sectors, promote innovative applications of artificial intelligence technology in the field of education, and publicize the importance of artificial intelligence literacy through various channels to enhance the overall society's awareness of artificial intelligence education.

Disclosure statement

The author declares no conflict of interest.

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