

# Beyond Technological Competence: Examining Digital Literacy and AI Integration in Language Teaching

Xi Liu

The Open University of China (Qingdao), Qingdao, Shandong, China

## 1. Introduction

In the rapidly evolving educational landscape, the integration of digital technologies and artificial intelligence (AI) has moved beyond a focus on basic technological skills. Instead, the emphasis has shifted towards fostering a more comprehensive digital literacy, particularly among language educators. This shift is critical as digital literacy encompasses not only the ability to use technology but also the understanding of how to leverage it to enhance teaching practices and improve learning outcomes. As AI tools increasingly become a part of language teaching, educators need to develop both their digital competence and pedagogical strategies to effectively integrate these innovations. This paper explores the intersection of digital literacy and AI in language education, addressing how teachers can go beyond technical proficiency to create transformative learning experiences.

## 2. Literature Review

### 2.1 International Frameworks for Teacher Digital Literacy

In recent years, the global educational landscape has increasingly emphasized the importance of teacher digital literacy. A variety of frameworks have been developed to guide educators in integrating digital skills into their professional practice. From 2011 to 2022, key frameworks were introduced by organizations such as UNESCO and the European Union, each outlining essential competencies for educators in the digital age. These frameworks underscore that digital literacy goes beyond mere technical skills; it includes the ability to apply digital tools effectively in teaching, facilitating richer learning environments.

The ISTE Standards for Educators (2017) in the United States and the European Digital Competence Framework for Educators (2017) both highlight the need for teachers to cultivate digital knowledge and skills. Other frameworks, such as the Digital Teaching Professional Framework (2019) in the United Kingdom and the Cambridge Life Competencies Framework (2022), further elaborate on these competencies, placing a strong emphasis on teacher adaptability to evolving digital tools and the capacity to nurture digital awareness among students. These frameworks collectively reflect a growing consensus that digital competence is critical to successful teaching in today's interconnected world.

### 2.2 Chinese Standards and Teacher Evaluation Systems

In China, the Ministry of Education has also acknowledged the importance of teacher digital literacy, issuing national standards in 2022. These standards are designed to guide educators on how to incorporate digital competencies into their teaching practices. By 2024, teacher evaluation systems will integrate these standards, assessing teachers' digital literacy as a fundamental requirement for career advancement. Municipal education commissions in Beijing and Shanghai have already started embedding these requirements into local teacher evaluation frameworks, demonstrating China's commitment to fostering digitally competent educators.

### 2.3 The Intrinsic Relationship Between Language Teaching and Technology

First, Language is served as a carrier and component of information. Language is not just a medium of communication but also a structured system for conveying and interpreting information. Theoretical models (Hu & Chen, 2013) frame language as both a carrier and a component of information, which means that language teaching inherently involves information processing. Therefore, the integration of information technology into language education becomes not only desirable but essential, enabling learners to engage with the language in dynamic, real-world contexts.

Second, technology integration is vital for authentic language Learning. As Chun (2016) asserts, technology integration is crucial for creating authentic language learning environments. Without technology, it is difficult to replicate the diversity of linguistic contexts that learners encounter in real-life situations. The digital age demands that learners are equipped to interact with language across various media and platforms, highlighting the necessity of technology in modern language pedagogy.

Third, the TPACK (Technological Pedagogical Content Knowledge) framework offers a model for exploring how teachers integrate technology into their content-specific teaching practices (Chen & Li, 2020). In the context of language teaching, TPACK focuses on how technology can enhance the transmission of linguistic components such as grammar, vocabulary, and syntax, while also enriching the learning environment with digital tools that provide students with a more interactive experience. Diagrams of TPACK systems reveal the potential for technology to mediate teacher-student interactions and scaffold language learning in ways that were previously unachievable.

In summary, the literature reflects a strong and growing relationship between language teaching and information

technology, reinforcing the idea that digital literacy is essential for modern educators, particularly those teaching languages. Through frameworks like TPACK, we can better understand how technology and pedagogy intersect to foster effective, authentic, and engaging learning experiences.

### 2.4 OUC Context: AI-Powered Personalized English Teaching Practice at Scale

This study is situated within the broader context of AI-powered personalized learning in higher education, with a particular focus on English language teaching. Drawing on the Technology Acceptance Model, this study aims to understand how teachers at Open University of China (OUC) have adopted AI-powered tools in their English language courses. While previous research has explored the potential of AI in education, few studies have examined its implementation in the context of large-scale, open university settings. By addressing this research gap, this study seeks to answer the following questions: How does AI facilitate large-scale personalized English teaching at OUC? What are the challenges and opportunities of implementing AI in English language teaching?

## 3. Methodology

This research employed a quantitative research design to investigate the digital literacy perceptions of English teachers at Qingdao Open University. A structured questionnaire, aligned with the Teacher Digital Frameworks (JY/T 0646-2022), was developed to assess the teachers' self-reported digital skills and their perceptions of their digital literacy. The questionnaire comprised five dimensions: digital awareness, digital knowledge and skills, digital application, digital social responsibility, and professional development.

This study adopted a mixed-methods research design, combining quantitative and qualitative approaches to comprehensively investigate the digital literacy of English teachers at Qingdao Open University. A case study approach was employed to delve into the specific context and experiences of these teachers.

### 3.1 Quantitative Research

A structured questionnaire was administered to all English teachers at the university to gather quantitative data on their digital literacy levels. The questionnaire was aligned with the Teacher Digital Frameworks (JY/T 0646-2022), covering dimensions such as digital awareness, knowledge and skills, application, social responsibility, and professional development.

Descriptive statistics were used to analyze the questionnaire data, providing insights into the overall levels of digital literacy among the teachers. Additionally, inferential statistics were employed to identify significant differences in digital literacy perceptions based on demographic variables like age, gender, and teaching experience.

### 3.2 Qualitative Research

To complement the quantitative data, semi-structured

interviews were conducted with a selected group of teachers. These interviews aimed to explore their experiences, perspectives, and challenges related to digital literacy in depth. The interview data was transcribed and analyzed using thematic analysis to identify key themes and patterns.

### 3.3 Data Collection and Analysis

The data collection process involved multiple phases:

- 1) Questionnaire Distribution: The questionnaire was distributed electronically to all English teachers at Qingdao Open University.
- 2) Data Cleaning and Analysis: The collected questionnaire data was cleaned, coded, and analyzed using statistical software.
- 3) Interview Scheduling and Conducting: Semi-structured interviews were scheduled with selected teachers, covering topics such as their digital literacy experiences, challenges, and professional development needs.
- 4) Transcription and Analysis: The interview recordings were transcribed, and the transcripts were analyzed using thematic analysis to identify recurring themes and patterns.

### 3.4 Triangulation

To enhance the validity and reliability of the findings, triangulation was employed. This involved comparing and contrasting the quantitative and qualitative data to identify converging and diverging patterns. By combining different data sources and methodologies, the study aimed to provide a more comprehensive and nuanced understanding of the English teachers' digital literacy.

## 4. Results and Analysis

The demographic analysis revealed that the majority of participants were female (94.12%) and aged between 30 and 49 (76.47%). Most participants primarily engaged in English teaching (70.59%), followed by cross-disciplinary teaching (23.53%).

**Table 1: Demographic Analysis Table**

Demographic	Frequency	Percentage
<b>Gender</b>		
Male	1	5.88%
Female	16	94.12%
<b>Age Group</b>		
30-34	3	17.65%
35-39	3	17.65%
40-44	4	23.53%
45-49	3	17.65%
50-54	4	23.53%
<b>Job Title</b>		
Lecturer	10	58.82%
Associate Professor	5	29.41%
Other	1	5.88%
<b>Primary Teaching Task</b>		
English Teaching	12	70.59%
Cross-disciplinary Teaching	4	23.53%
Other	1	5.88%

The questionnaire demonstrated high internal consistency, with an overall Cronbach's alpha of 0.983. Analysis of individual dimensions revealed that participants exhibited strong levels of digital knowledge and skills, application, and attitudes towards LLMs. However, there was room for improvement in digital awareness and social responsibility.

Overall, the results suggest that the English teachers at Qingdao Open University possess a solid foundation in digital literacy, with particular strengths in using digital tools and resources in their teaching practice. However, there is a need to enhance their awareness of digital citizenship and ethical considerations in their use of technology.

**Table 2:** Cronbach's Alpha Values for Each Dimension

Dimension	Number of Items	Cronbach's Alpha
Digital Awareness	7	0.873
Digital Knowledge & Skills	5	0.952
Digital Application	9	0.962
Digital Social Responsibility	4	0.914
Professional Development	7	.0915
Attitudes	7	0.939
Overall Questionnaire	36	0.983

Descriptive analysis of the questionnaire data revealed that participants demonstrated a high level of digital awareness (average score 4.26), strong digital knowledge and skills (average score 3.90), and high levels of digital application (average score 3.89). Additionally, participants exhibited moderate levels of digital social responsibility (average score 4.08) and professional development (average score 3.97). Positive attitudes towards LLMs were also evident, with an average score of 3.90.

These findings suggest that the English teachers at Qingdao Open University possess a solid foundation in digital literacy, with particular strengths in using digital tools and resources in their teaching practice. However, there is room for improvement in certain areas, such as digital awareness and social responsibility.

Overall, the results indicate that the teachers are generally well-equipped to leverage digital technologies in their teaching, but further efforts are needed to promote ethical and responsible use of technology and to provide ongoing professional development opportunities in digital literacy.

**Table 3:** Descriptive Analysis

	Sample size	Minimum value	Maximum value	Age range value	Standard deviation	Median
Digital Awareness	17	2	5	4.26	0.941	4.5
Digital Technology Knowledge and Skills	17	1	5	3.90	0.967	4
Digital Application	17	2	5	3.89	0.984	4
Digital Social Responsibility	17	2	5	4.08	0.977	4
Professional Development	17	1	5	3.97	0.967	4
Attitudes	17	2	5	3.90	0.967	4

Correlational analysis revealed significant positive relationships between all dimensions of digital literacy. This

suggests that possessing strong digital awareness, knowledge and skills, application, social responsibility, and professional development is associated with positive attitudes towards LLMs.

Among the individual dimensions, digital technology knowledge and skills demonstrated the strongest correlations with other dimensions, indicating its central role in overall digital literacy. Additionally, attitudes towards LLMs were found to be significantly correlated with all other dimensions, highlighting the importance of positive attitudes in fostering digital literacy.

Overall, the results suggest that a holistic approach to digital literacy development is crucial, as improvements in one dimension can positively impact other areas. This emphasizes the need for comprehensive professional development programs that address all aspects of digital literacy.

**Table 4:** Correlations

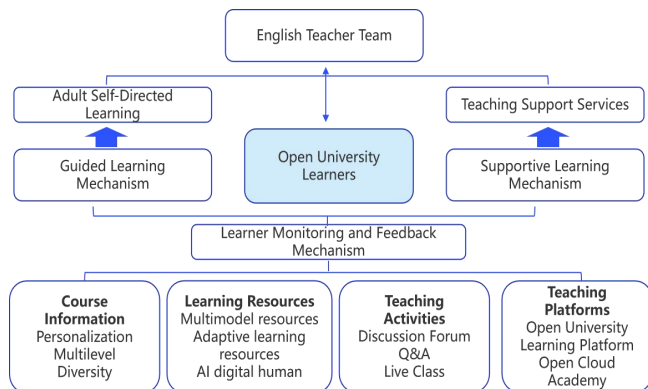
	Digital Awareness	Digital Technology Knowledge and Skills	Digital Application	Digital Social Responsibility	Professional Development	Attitudes
Digital Awareness	1	0.741	0.723	0.682	0.639	0.605
Digital Technology Knowledge and Skills	0.741	1	0.805	0.744	0.685	0.642
Digital Application	0.723	0.805	1	0.79	0.727	0.684
Digital Social Responsibility	0.682	0.744	0.79	1	0.785	0.741
Professional Development	0.639	0.685	0.727	0.785	1	0.822
Attitudes	0.605	0.642	0.684	0.741	0.822	1

### 5. Discussion

The study revealed that teachers hold high expectations for LLMs to transform education, but their actual usage varies. While some teachers extensively utilize AI tools, others are more cautious. Technical challenges, such as generating accurate instructions, need to be addressed.

However, the study also highlights the positive impact of AI on teaching and learning. Students demonstrated significant improvement after using AI tools, and teachers reported increased efficiency over time.

To fully leverage the potential of AI, schools need to establish clear guidelines for AI usage and provide adequate training and support to teachers. Additionally, a shift in mindset is necessary to embrace AI as an essential tool for educators. By addressing these factors, AI can be effectively integrated into teaching and learning to enhance student outcomes.



**Figure 1:** Application and Enhancement of Digital Literacy for English Teachers

The findings of this study highlight the importance of ecological application scenarios in fostering English teachers' digital literacy in the AI era. The centralized learning and application model, which provides teachers with adaptive learning software and centralized training, plays a crucial role in supporting their professional development.

The study also emphasizes the significance of self-initiated learning and usage. English teachers should actively explore and utilize various AI tools, such as ChatGPT, to enhance their teaching practices. By tailoring the use of these tools to their specific needs and teaching contexts, teachers can effectively leverage AI to personalize instruction and improve student outcomes.

Furthermore, the study underscores the importance of supportive learning mechanisms, including learner monitoring and feedback, course information personalization, and multilevel learning resources. These mechanisms contribute to a supportive and effective learning environment for both teachers and learners.

In conclusion, this study demonstrates that a holistic approach to digital literacy development is essential for English teachers in the AI era. By combining centralized learning and application with self-initiated learning and usage, teachers can effectively enhance their digital skills and apply AI technologies to improve their teaching practices.

## 6. Conclusion

The study findings highlight the significant potential of LLMs to transform English language teaching. Teachers perceive LLMs as valuable tools for achieving personalized and high-quality education at scale. By generating engaging learning materials tailored to individual student needs, LLMs can enhance student learning outcomes.

While the study identified challenges in generating accurate instructions for LLMs, it also demonstrated the positive impact of AI on teaching effectiveness. Students showed significant improvement in vocabulary retention after using AI tools, and teachers reported increased efficiency over time.

However, the successful integration of LLMs into teaching practice requires careful consideration of human-machine collaboration. Teachers should play a central role in leading instruction and leveraging AI as a supportive tool.

Additionally, schools need to establish clear guidelines for AI usage and provide adequate training and support to teachers.

In conclusion, this study suggests that LLMs have the potential to revolutionize English language teaching by providing personalized and effective learning experiences. By addressing the identified challenges and fostering a supportive environment for AI adoption, schools can harness the power of LLMs to enhance student outcomes and improve teaching practices.

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