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Digital Literacy and AI Tool Application Among University Foreign Language Teachers: A Survey Study

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Abstract: *As digital technologies and artificial intelligence (AI) become integrated into higher education, strengthening the digital literacy of university foreign language teachers has become an important part of foreign language teaching reform. Drawing on Digital Literacy of Teachers, issued by the Ministry of Education of the People's Republic of China, this study surveyed in-service foreign language teachers at universities in Huai'an, Jiangsu Province. It examined overall digital literacy, AI tool use, and differences across teacher groups. Based on 91 valid responses, the overall digital literacy score was M = 4.09. Digital awareness was the highest-scoring dimension, whereas digital application was the lowest (M = 3.96). Machine translation and generative AI were the most frequently used tools; corpus tools were used least often, and only 37.4% of respondents reported that they could independently conduct corpus retrieval and analysis. No significant differences in digital literacy were found across teaching-experience or professional-title groups. The most frequently reported difficulty was concern about students' over-reliance on AI (73.6%), and hands-on AI tool training was the most commonly requested form of support (73.6%). These findings support practical training in AI tools, corpus-based and data-driven teaching, and clearer institutional guidance on students' AI use.*

Keywords: digital literacy; university foreign language teachers; artificial intelligence; AI tool application

INTRODUCTION

Digital technologies, particularly artificial intelligence (AI), are changing how higher education is delivered. The report to the 20th National Congress of the Communist Party of China incorporated "educational digitalization" into national strategy for the first time. In 2022, the Ministry of Education of China issued the education industry standard *Digital Literacy of Teachers* (JY/T 0646—2022), providing a common framework for developing and assessing teachers' digital literacy in China (Ministry of

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Education, 2022). For foreign language teachers, digital literacy involves more than basic technical proficiency. It also includes the ability to integrate intelligent language learning platforms, speech recognition, machine translation, and generative AI into teaching in ways that support learning and students' learning experiences.

AI has direct implications for language teaching. Generative AI tools such as ChatGPT combine information retrieval, machine translation, and dialogue generation, creating new possibilities for instructional design and classroom interaction (Li, 2024). Teachers' ability to use these tools appropriately may therefore affect teaching quality (Wang, 2024). However, existing research has largely focused on introducing digital literacy frameworks and discussing general improvement strategies. Regional assessment of foreign language teachers based on *Digital Literacy of Teachers* remain limited, as does evidence on how often teachers use AI tools, the tasks for which they use them, and the difficulties they encounter (Xiao et al., 2024; Zhang & Yu, 2025).

Using *Digital Literacy of Teachers* as its framework, this study surveyed foreign language teachers at universities in Huai'an, Jiangsu Province. It addresses three research questions: (1) What is the overall level of university foreign language teachers' digital literacy, and what structural characteristics emerge across its dimensions? (2) How frequently do foreign language teachers use AI tools, in what scenarios, and with what practical difficulties? (3) Do teachers with different teaching experience and professional titles differ significantly in digital literacy, and what training support do they need? The study aims to provide empirical evidence for improving the digital literacy of foreign language teachers in regional universities and to inform the future development of a digital literacy evaluation system for foreign language teachers.

LITERATURE REVIEW

The Conceptual Evolution and Evaluation Frameworks of Digital Literacy

The concept of "digital literacy" was first proposed by the Israeli scholar Eshet-Alkalai in 1994, initially covering computer literacy, network literacy, information literacy, and media literacy (Wan et al., 2026). As digital technologies have become deeply integrated into education and teaching, the connotation of digital literacy has continuously expanded, and framework construction has generally evolved from a "technical tool orientation" toward a "comprehensive competence orientation" (Wan et al., 2026). Internationally, the European Framework for the Digital Competence of Educators (DigCompEdu), released by the European Union in 2017, delineates 22 digital competences across six areas: professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital competence (Redecker, 2017). It has become an important reference for national standards of teachers' digital literacy. Around this framework, extensive empirical research has been conducted internationally. For example, Cabero-Almenara et al. (2021) surveyed 2,180 university teachers in Andalusia, Spain, based on DigCompEdu and found that their digital competence was at a moderate level overall, with significant differences across fields of knowledge and age ranges. Alarcón et al. (2020) developed and validated DIGIGLO, a tool for assessing educators' digital competence, providing an instrumental model for the quantitative assessment of digital literacy. In China, the Ministry of Education

issued the education industry standard entitled *Digital Literacy of Teachers* (JY/T 0646—2022) in November 2022, establishing five first-level dimensions: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development (Ministry of Education, 2022), thereby providing an authoritative basis for localized assessment. Xu (2021) reviewed the evolutionary logic of Chinese policies on teachers' ICT based teaching competence, noting an internal evolution from developing Technological Pedagogical Content Knowledge (TPACK) to cultivating computational thinking, with a future trend toward interdisciplinary teaching. The present study constructs its survey instrument on the basis of the five dimensions of the standard of *Digital Literacy of Teachers*.

Research on University Foreign Language Teachers' Digital Literacy

Since the release of *Digital Literacy of Teachers*, domestic research on university foreign language teachers' digital literacy has gradually increased and can be roughly divided into three categories. The first is diagnostic and evaluative research. Xiao et al. (2024) developed a questionnaire based on the standard to diagnose university foreign language teachers' digital literacy, verified the path relationships among teaching experience, professional title, and digital literacy, and constructed a relational model of evaluation indicators. The second concerns improvement pathways and influencing factors. Drawing on the TPACK framework, Zhang and Yu (2025) pointed out that Chinese university foreign language teachers currently exhibit evident weaknesses in technology integration, digital instructional design, and multimodal expression, and proposed countermeasures such as improving the mechanism of digital competence development and optimizing the technology integration system. Using a sample of 753 university teachers, Song et al. (2026) employed fuzzy-set qualitative comparative analysis (fsQCA) to examine the influencing factors of teachers' digital competence and found that behavioral agent characteristics, the digital learning ecology, organizational management mechanisms, the digital innovation culture, and digital transformational leadership operate jointly in configurational ways. The third category involves instrument development. Referring to the industry standard, Liu et al. (2025) developed a digital literacy scale for university teachers and administered it to 218 in-service teachers, verifying its satisfactory reliability and validity (the overall Cronbach's α coefficient of the scale was 0.978) and demonstrating the feasibility of developing discipline-specific, school-based assessment instruments modeled on the standard. Overall, research on foreign language teachers' digital literacy is moving from conceptual elaboration to empirical diagnosis, with increasing disciplinary specificity.

Research Progress on AI-Empowered Foreign Language Teaching

Generative AI tools such as ChatGPT have created new opportunities for transformation in foreign language teaching. Li (2024) examined their applications and potential risks, arguing that, in an era of human-machine symbiosis, foreign language teachers should adapt their teaching practices, develop AI literacy, and attend to ethical issues. In a "General Academic English Writing" course, Wang (2024) examined AI-supported reform of the syllabus, teaching content, instructional modes, and assessment. Han (2025) considered human-AI collaboration and its implications for teachers' roles and responsibilities. Together, these studies suggest that the educational value of AI depends not only on access to tools but also on teachers' ability to use them effectively and responsibly.

REVIEW OF THE LITERATURE

In summary, existing studies provide a solid foundation for the present research, but three gaps remain. First, previous studies have emphasized frameworks, conceptual pathways, or macro-level policy analysis (Wan et al., 2026; Zhang & Yu, 2025; Xu, 2021). Empirical assessments of foreign language teachers in specific regions or institutions using *Digital Literacy of Teachers* remain limited, and localized samples constrain the generalizability of existing findings (Xiao et al., 2024; Liu et al., 2025). Second, digital literacy is often examined as a single construct, with less attention to teachers' actual AI use, the contexts in which it occurs, and the difficulties involved. These issues are relevant to the standard's "digital application" dimension (Wang, 2024; Li, 2024). Third, although existing research has attended to variables such as teaching experience and professional title (Cabero-Almenara et al., 2021; Xiao et al., 2024; Song et al., 2026), evidence from foreign language teachers at local universities remains scarce. This study therefore uses *Digital Literacy of Teachers* to examine the digital literacy and AI tool application of university foreign language teachers, aiming to provide empirical evidence for regional improvement efforts.

RESEARCH METHODS

Participants

In 2026, the questionnaire was distributed through Wenjuanxing, a Chinese online survey platform, to in-service foreign language teachers, primarily at universities in Huai'an, Jiangsu Province. Of 100 submitted questionnaires, nine were removed because they had been completed in under 90 seconds and showed straight-line response patterns on the scaled items. The final sample comprised 91 valid responses, giving a valid response rate of 91.0%. As shown in Table 1, female teachers accounted for 78.0% of the sample, and 73.6% had 11 or more years of teaching experience. Lecturers (51.6%) and associate professors (33.0%) constituted the largest professional-title groups, and most participants held a master's (54.9%) or doctoral (33.0%) degree.

Table 1. Sample Profile (N=91)

Variable	Category	N	%
Gender	Male	20	22.0
	Female	71	78.0
Teaching experience	5 years or less	17	18.7
	6–10 years	7	7.7
	11–20 years	26	28.6
	21 years or more	41	45.1
Professional title	Teaching assistant	8	8.8
	Lecturer	47	51.6
	Associate professor	30	33.0
	Professor	6	6.6
Highest degree	Bachelor's	11	12.1
	Master's	50	54.9
	Doctorate	30	33.0

Instrument

The questionnaire was developed for this study on the basis of the education industry standard of *Digital Literacy of Teachers* (JY/T 0646—2022), issued by the Ministry of Education. It comprised four parts. The first part collected demographic information, including gender, teaching experience, professional title, highest degree, course types taught, and weekly teaching load. The second part was a 25-item digital literacy self-assessment scale covering the standard's five first-level dimensions: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development. Each dimension contained five items rated on a five-point Likert scale (1 = not at all true of me, 5 = completely true of me). The third part addressed AI tool use, including the frequency of use of six tool categories, application scenarios, self-reported completion of three typical practical tasks, difficulties, and training needs. The fourth part consisted of an open-ended question inviting suggestions for instructional support for the digital transformation of foreign language teaching. Before formal administration, peer teachers were invited to pilot the questionnaire, and their feedback was used to revise item wording and question formats.

Reliability and Factorability

Analyses were conducted on the 91 valid questionnaires. The overall Cronbach's α was 0.969, and the five sub-scales ranged from 0.898 to 0.957, exceeding the conventional threshold of 0.80 and indicating high internal consistency. The KMO value was 0.915, and Bartlett's test of sphericity was significant, $\chi^2(300) = 2481.7$, $p < 0.001$, indicating that the correlation matrix was suitable for factor analysis. Because the sub-scales were taken directly from the theoretical framework of *Digital Literacy of Teachers*, subsequent analyses followed the theoretical structure and no further exploratory factor analysis was conducted.

Data Analysis

The data were processed and analyzed using Python 3. After invalid responses were removed on the basis of completion time and response patterns, descriptive statistics (means, standard deviations, and frequencies), reliability analyses, the Kaiser–Meyer–Olkin (KMO) measure, Bartlett's test of sphericity, independent-samples *t*-tests, and one-way ANOVA were conducted. These analyses examined overall digital literacy, group differences, and AI tool use among university foreign language teachers.

RESULTS

Overall Level of Digital Literacy

As shown in Table 2, the overall mean of the participating teachers' digital literacy was 4.09 (SD = 0.72), corresponding to "mostly true of me". The five dimensions exhibited clear structural differences (Figure 1): digital awareness scored the highest (M = 4.30, SD = 0.96), followed by digital social responsibility (M = 4.20, SD = 0.83); digital technology knowledge and skills (M = 4.01) and professional development (M = 3.97) fell in the middle; and digital application scored the lowest (M = 3.96, SD = 0.80). Thus, participants reported strong awareness of digital technologies and their responsible use but relatively weaker integration of these technologies into instructional design, implementation, and evaluation.

Table 2. Scores and Reliability Across the Five Dimensions (N=91)

Dimension	M	SD	Cronbach's α
Digital awareness	4.30	0.96	0.957
Digital technology knowledge and skills	4.01	0.79	0.910
Digital application	3.96	0.80	0.926
Digital social responsibility	4.20	0.83	0.941
Professional development	3.97	0.82	0.898
Overall	4.09	0.72	0.969

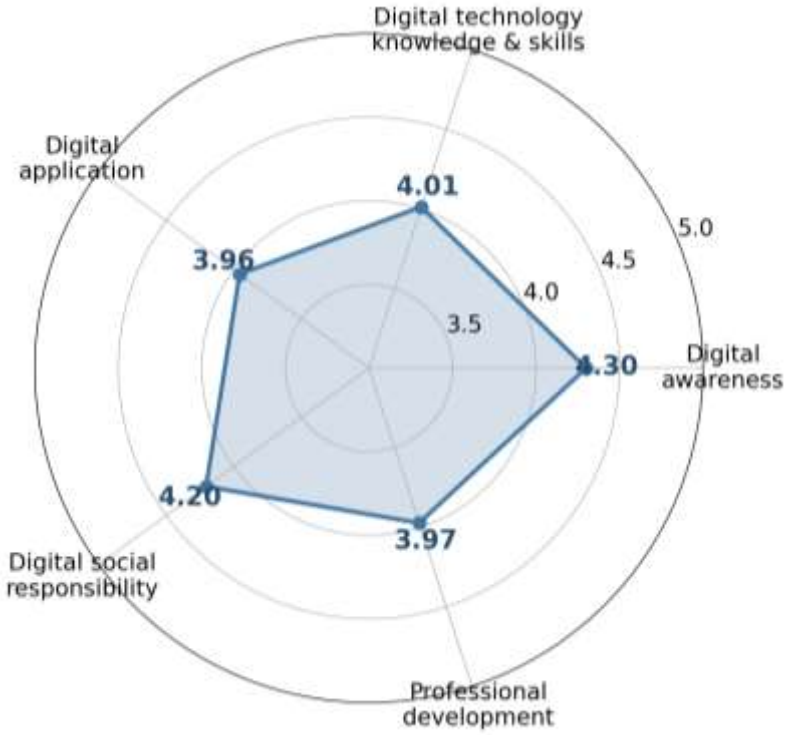


Figure 1. Digital Literacy Scores Across Five Dimensions (N=91)

At the item level, "I actively embrace new technologies" and "I am aware of the new requirements that digital transformation places on the professional development of foreign language teachers" tied for the highest mean (both M = 4.37), followed by "I recognize the value of digital technology in improving foreign language teaching" (M = 4.30). All three belonged to digital awareness. The lowest mean was for "I follow policies and standards concerning digital literacy and the educational application of AI" (M = 3.78), followed by "I have basic troubleshooting skills" (M = 3.87). "I use digital tools to conduct classroom interaction" and "I exchange digital teaching experiences with colleagues through online

communities or platforms" tied at M = 3.90. These item-level results point to relative weaknesses in policy awareness, troubleshooting, and applied practice.

Self-Assessment Versus Practical Competence

To complement the digital literacy scale, participants reported whether they could complete three practical tasks (Figure 2). Most reported that they could independently use generative AI to generate and revise teaching materials (76.9%), and 61.5% reported that they could diagnose class learning conditions using teaching platform data. By contrast, 37.4% reported independent competence in corpus retrieval and analysis, with "cannot" and "uncertain" responses together accounting for 62.6%. The mean for "I can use at least one technological tool to collect and analyze students' learning data" was 3.97, compared with the 61.5% independent-completion rate for platform data diagnosis. The lower corpus-task rate identifies a specific area for further development. Because both measures were self-reported, however, they should not be interpreted as objective performance assessments.

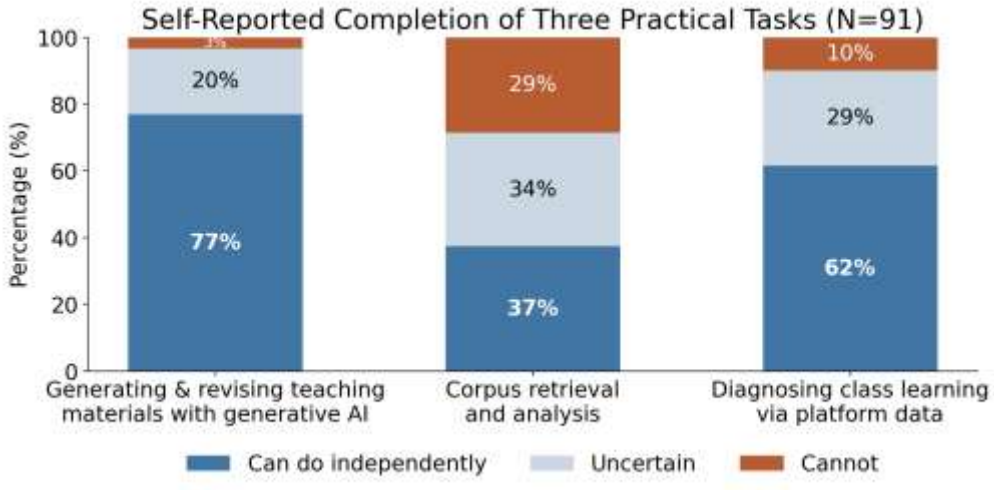


Figure 2. Self-Reported Completion of Three Practical Tasks (N=91)

Usage Frequency and Application Scenarios of AI Tools

As shown in Figure 3, the usage frequency of the six categories of tools displays a clear tiered distribution. Machine translation (M = 4.24) and generative AI (M = 4.16) were used most frequently, followed by intelligent language learning platforms (M = 3.95). Automated grading/writing evaluation (M = 3.66) and speech recognition/oral assessment (M = 3.38) were used less often, and corpus tools had the lowest mean frequency (M = 2.77), consistent with the low independent-completion rate for corpus tasks.

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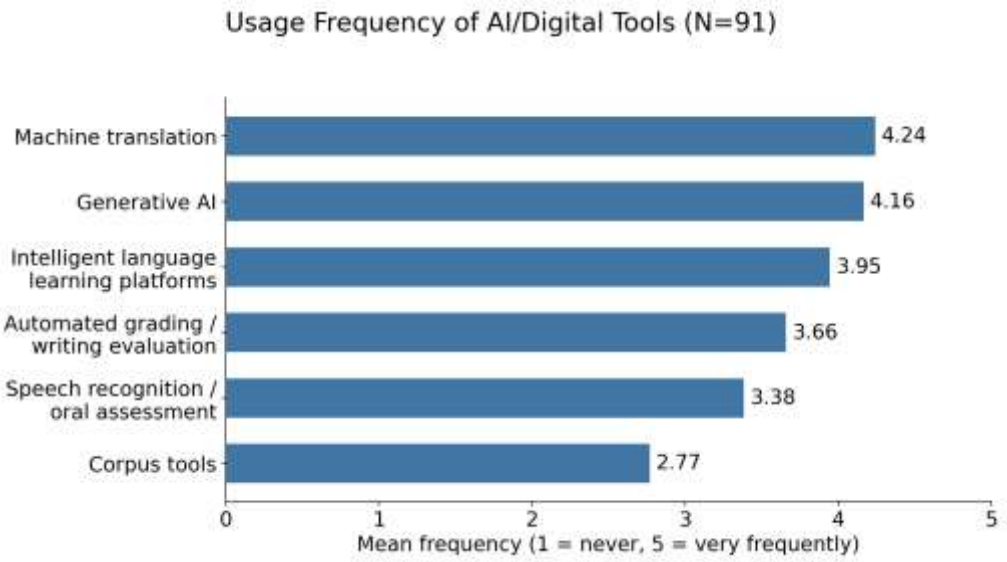


Figure 3. Usage Frequency Ranking of AI/Digital Tools (N=91)

For application scenarios (multiple choice, up to three options), lesson preparation was most frequently selected (89.0%), followed by classroom teaching (74.7%) and assignment grading and feedback (63.7%). Just under half of the participants reported using AI tools for research (48.4%), and none selected "basically never use." AI use therefore extended across several teaching activities, although lesson preparation remained the most common context.

Group Differences

For the teaching-experience comparison, participants were divided into groups with 10 years or less (n = 24) and 11 years or more (n = 67). Independent-samples t-tests showed no statistically significant differences between these groups on any dimension or on the overall score (all $p > 0.05$; Table 3). One-way ANOVAs likewise found no significant differences by professional title (all $p > 0.05$). Descriptively, lecturers had the lowest means among title groups for digital technology knowledge and skills (M = 3.89), digital application (M = 3.89), and professional development (M = 3.79); these patterns were not statistically significant.

Table 3. Group Difference Tests by Teaching Experience and Professional Title

Dimension	≤10 yrs	≥11 yrs	t	p	Title F	p
Digital awareness	4.21	4.33	-0.55	0.583	1.46	0.232
Digital technology knowledge and skills	4.08	3.99	0.44	0.658	1.64	0.187
Digital application	3.89	3.98	-0.46	0.649	1.19	0.318
Digital social responsibility	4.19	4.21	-0.09	0.930	1.41	0.246
Professional development	3.89	4.00	-0.57	0.571	1.88	0.139

Overall	4.05	4.10	-0.30	0.766	1.87	0.140

Main Difficulties and Training Needs

The most frequently reported difficulty was "concern about students' over-reliance on AI and its negative effect on learning" (73.6%; Figure 4), suggesting that participants were particularly attentive to possible effects on learning habits and academic integrity. "Lack of targeted training and guidance" (42.9%) and "basic use only, but difficult to integrate into teaching design" (39.6%) ranked second and third, respectively. "Data security and privacy concerns" were reported by 36.3% of participants.

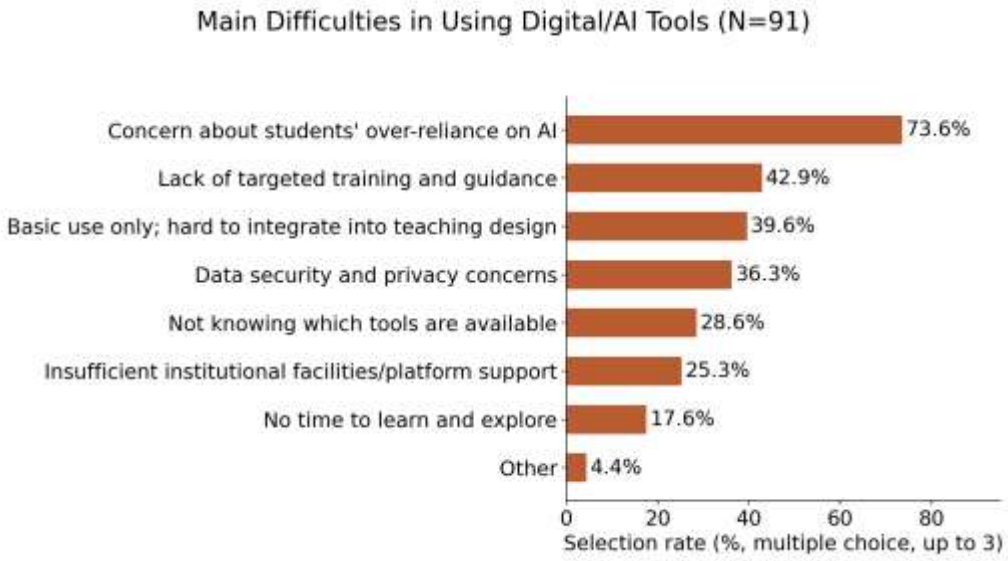


Figure 4. Main Difficulties in Using Digital/AI Tools (N=91)

Hands-on AI tool training was the most frequently requested form of support (73.6%; Figure 5), followed by workshops on digital instructional design (53.8%) and training on corpora and data-driven teaching (47.3%). Fewer participants selected guidance on digital ethics and AI-use norms (24.2%) or digital literacy assessment with personalized development advice (19.8%). Open-ended responses were consistent with these priorities: one participant requested "more hands-on training to help teachers improve their teaching," while another proposed an annual institutional allowance for AI memberships or usage credits.

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Figure 5. Training and Support Desired by Teachers (N=91)

DISCUSSION

The Awareness–Application Gap as the Defining Feature

The pattern of higher digital awareness (M = 4.30) and digital social responsibility (M = 4.20) alongside lower digital application (M = 3.96) is consistent with Zhang and Yu's (2025) account of weaknesses in technology integration and digital instructional design. It also aligns with Song et al.'s (2026) emphasis on teachers' self-motivation: positive attitudes do not necessarily translate into changes in teaching practice. The 39.6% of participants who reported difficulty moving beyond basic functions to instructional integration illustrate this gap.

Shallow AI Application and the Corpus Weakness

Although no participant selected "basically never use," AI tool use was concentrated in lesson preparation and classroom activities. Machine translation and generative AI were used most frequently, whereas corpus tools had the lowest usage frequency (M = 2.77), and only 37.4% of participants reported that they could independently conduct corpus retrieval and analysis. This contrast suggests that familiarity with general-purpose tools may not extend to discipline-specific applications. The findings therefore qualify arguments for deep AI integration in foreign language teaching (Li, 2024; Wang, 2024): among these participants, retrieval, translation, and content generation were more established than corpus-informed instructional design.

Explaining the Non-Significant Group Variations

Unlike Xiao et al. (2024), who identified path relationships among teaching experience, professional title, and digital literacy, this study found no significant differences across teaching-experience or professional-title groups. Two explanations are possible. First, participants worked at local universities in the same

region and may have had access to similar digital teaching environments and training resources, potentially limiting between-group variations. Second, Cabero-Almenara et al. (2021) examined a much larger sample of Spanish university teachers spanning more disciplines; the present sample may have been too small to detect small-to-medium group effects. These findings suggest that group differences should be interpreted in context and that regional policies should not rely uncritically on national-level conclusions.

Recommendations

Four recommendations follow from these findings. First, training should prioritize hands-on work with authentic teaching tasks, reflecting the 73.6% of participants who requested hands-on AI tool training. Workshops and lesson-study activities should address integration into instructional design rather than focus solely on demonstrations of tool functions. Second, corpus retrieval and data-driven teaching warrant dedicated training, given that only 37.4% of participants reported independent competence in corpus tasks. Third, universities should provide guidance on students' AI use and academic integrity in response to the 73.6% who expressed concern about over-reliance on AI. Fourth, institutions should address the funding and hardware needs mentioned in open-ended responses and connect digital literacy assessment with personalized development advice, creating a coherent cycle of assessment, training, and feedback.

CONCLUSION

Using *Digital Literacy of Teachers* as its framework, this study investigated digital literacy and AI tool use among 91 foreign language teachers at universities in Huai'an, Jiangsu Province. Overall digital literacy was relatively high, but digital application was the lowest-scoring dimension. Machine translation and generative AI were the most frequently used tools, whereas corpus tools were used less often and corpus-related competence was limited. No statistically significant differences were found across teaching-experience or professional-title groups. Participants most frequently reported concern about students' reliance on AI, and hands-on AI tool training was the most commonly requested support.

This study has several limitations. First, the sample was confined to one region, limiting the generalizability of the findings. Second, the data were based on teacher self-assessment and self-report. Although task-specific questions provided additional detail, they did not constitute independent performance measures, and social desirability bias may remain. Third, the cross-sectional design cannot capture changes in digital literacy over time. Future research should include broader samples, longitudinal designs, and performance-based assessments. It could also develop an evaluation system for university foreign language teachers by translating the weaknesses and needs identified here into operational indicators for teacher training and professional development.

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