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Educational Technology in EFL Teaching and Learning in China: Types, Effectiveness, Determinants, and Challenges

Chunwen Yang, Jing Chen, Shuai Hou

Abstract: With the rapid advancement of digital technologies and artificial intelligence (AI), the integration of educational technology in English as a Foreign Language (EFL) teaching has become increasingly prominent in higher education worldwide. However, there remains limited empirical understanding of the types, effectiveness, and challenges of these technologies from the perspective of EFL teachers in China. This study aims to investigate the adoption, perceived usefulness, influencing factors, and concerns related to educational technology use among Chinese higher education EFL teachers. A mixed-methods approach was employed, utilizing an electronic survey distributed to EFL teachers (N = 139) across Chinese universities, followed by post-survey group discussions with 15 selected participants to gain deeper qualitative insights. The findings reveal widespread use of a diverse range of digital tools, with teachers reporting significant benefits in learner engagement, personalization, and teaching management. Importantly, the study identifies policy, technological, and individual factors as key determinants influencing the adoption and integration of educational technology, while also highlighting challenges related to infrastructure, digital literacy, and ethical data concerns. These results underscore the importance of coordinated institutional policy, robust technological support, and ongoing professional development to ensure the effective, equitable, and ethical integration of educational technology in EFL higher education contexts, thereby contributing to the achievement of sustainable development goal (SDG) – quality education.

Keywords: artificial intelligence (AI), EFL teaching, educational technology, digital tools, higher education, education policy, quality education, sustainability, technology integration, teacher perception.

Highlights

What is already known about this topic:

- Digital technologies are increasingly used in higher education EFL teaching worldwide.
- Technology can enhance language learning engagement, personalization, and collaboration.

What this paper contributes:

- Identifies the specific types, benefits, and challenges of technology use among EFL teachers in China.
- Reveals policy, technological, and individual factors influencing effective technology integration.

Implications for theory, practice and/or policy:

- Calls for coordinated institutional policy and robust professional development for EFL technology use.
- Highlights the need for equitable access, data privacy, and ethical standards in digital language education.

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Introduction

In recent years, language learning and teaching have undergone significant transformation, particularly within English as a Foreign Language (EFL) educational settings (Nunan, 2022). With globalization accelerating the demand for English proficiency, EFL institutions are continually exploring innovative methods to enhance language acquisition and learner engagement (Li et al., 2025). Traditional classroom-based approaches are increasingly being complemented, and replaced by more interactive, learner-centered models that leverage both digital and blended learning environments. This shift reflects a broader trend in education toward personalization, flexibility, and the integration of authentic communicative practices, all aimed at better meeting the needs of diverse student populations.

Educational technology, broadly defined as the use of digital tools, platforms, and applications to facilitate teaching and learning, has become a cornerstone of these evolving pedagogical practices (Haleem et al., 2022). The rise of technology-assisted, computer-assisted, and more recently, AI-assisted language learning solutions has been particularly pronounced in EFL contexts (Feng, 2025). Tools such as Learning Management Systems (LMS), mobile learning applications, virtual classrooms, and AI-driven platforms (e.g., ChatGPT, automated essay scoring, adaptive grammar exercises) are now widely adopted to provide more personalized feedback, enable real-time interaction, and offer access to a wealth of multimedia resources (Zhang & Liu, 2025). These technologies not only expand the boundaries of the classroom but also cater to the increasingly digital literacy of both teachers and learners, making language learning more accessible and engaging.

Against this backdrop, the global desire for achieving sustainable development goals (SDG), including quality education (SDG 4), further underscores the importance of leveraging educational technology to promote inclusive, equitable, and effective learning opportunities for all. Emphasizing the transformative potential of technology in education, this goal calls for innovations that ensure lifelong learning and reduce disparities in educational access and outcomes (Bhaduri et al., 2024). In EFL educational settings, the integration of digital technologies aligns closely with this vision, providing new pathways for high-quality language education and supporting the broader goals of educational equity and sustainability.

Previous Studies

TAM in Language Learning and Teaching

Technology Acceptance Model (TAM) is a widely used framework that explains users' acceptance of technology based on key components: perceived usefulness, perceived ease of use, attitudes, and behavioral intention. TAM has proven instrumental in examining how language learners and teachers adopt digital tools, consistently showing that perceived usefulness and ease of use strongly predict attitudes and actual technology use (Alfadda & Mahdi, 2021; Liu & Ma, 2023). However, recent research exposes the limitations of traditional TAM, as extensions incorporating psychological, motivational, and social factors such as intrinsic motivation, trust, and subjective norms. These factors offer much greater explanatory power for technology adoption and sustained engagement in language learning and teaching (Hsu & Lin, 2022; Fan, 2023; Ma, 2025). Crucially, studies also highlight ongoing gaps in digital literacy and the need for institutional support and professional development, especially in EFL contexts where technology integration is still uneven (Moradi, 2025). Together, these insights suggest that while TAM remains a valuable lens, a more holistic, context-sensitive approach is essential for understanding and advancing technology use in language education.

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Perceived Usefulness of Educational Technology in Language Education

A substantial body of research demonstrates the multifaceted benefits of integrating educational technology in language education. Studies have consistently shown that digital tools including mobile-assisted language learning (MALL), virtual reality (VR), and learning management systems, enhance learner engagement, motivation, and academic performance (Zhang & Zou, 2022; Togaibayeva et al., 2022). For example, MALL allows for ubiquitous, personalized, and interactive learning experiences, supporting learners' autonomy and enabling language practice beyond classroom constraints (Ebadi & Raygan, 2023; Togaibayeva et al., 2022). Chen (2022) also finds that the immediacy and adaptability of technologies such as AI-powered feedback and VR simulations could reduce language anxiety especially public speaking anxiety by offering more accessible and authentic learning environments. Besides, technology facilitates increased collaboration and interaction among students and between students and teachers, while also providing access to a wide array of official and unofficial resources that support diverse learning needs (Cohen et al., 2022). These advantages suggest that educational technology improve language proficiency and learner satisfaction and at the same time, contribute to the personalization and sustainability of quality language education in higher education settings.

Factors Affecting the Use of Educational Technology in Language Education

Although studies have highlighted the significant benefits of integrating educational technology in EFL classrooms, a range of individual, institutional, and technological factors continue to hinder its effective implementation. For example, Raygan and Moradkhani (2020) have found that EFL teachers' attitudes, their level of technological pedagogical content knowledge (TPACK), and the broader educational climate significantly predict successful technology integration in the classroom, with school climate exerting both direct and indirect effects through its influence on teacher attitudes and professional knowledge. In the context of AI-based applications, factors such as teachers' perceived usefulness, perceived ease of use, self-efficacy, and anxiety play pivotal roles while positive attitudes toward AI, high self-efficacy, and reduced anxiety are particularly important for fostering teachers' intention to adopt and continue using new technologies in higher education (Wang et al., 2021). Furthermore, a recent study on ChatGPT-assisted language learning further extends these models, identifying system quality, hedonic motivation, and behavioral intention as key predictors of learner attitudes and use, emphasizing the need to consider both personal and environmental factors for effective technology integration in higher education language contexts (Cai et al., 2023).

Challenges in the Use of Educational Technology in Language Education

Even when educational technology is integrated into real-world language education, a growing body of research highlights several persistent challenges. In one hand, technological limitations such as system robustness, accuracy, and user interface issues continue to affect the effectiveness of tools like chatbots and AI-powered platforms. In this case, students may encounter irrelevant responses, limited conversational abilities, and difficulties with understanding user input, especially with lower-level learners (Huang et al., 2022). In the other hand, the "novelty effect" has also been observed, where initial enthusiasm for new technology quickly fades, resulting in only short-term engagement and limited sustained improvement. Moreover, in collaborative and technology-assisted reading and writing environments, learners often face increased cognitive load, lack of genre-based instructional design, low digital literacy, and anxiety stemming from the unfamiliarity with digital tools, as well as potential miscommunication due to asynchronous or multimodal communication (Bahari & Gholami, 2022; Zhang et al., 2022). Furthermore, the integration of advanced AI systems introduces unique risks and ethical concerns related to data privacy, content moderation, bias, and the transparency of AI decision-making processes (Kohnke, 2025). Therefore, to ensure the successful integration of educational technology in EFL classrooms, prioritization should be placed on the ongoing teacher training, learner support, and the development of clear guidelines and policies for ethical and effective use.

Present Study

Despite the growing literature on educational technology in language education, several critical gaps remain that the present study seeks to address. Most prior research grounded in the TAM has focused on isolated variables such as perceived usefulness and ease of use (Alfadda & Mahdi, 2021; Liu & Ma, 2023), often overlooking the interplay between these factors and broader institutional and contextual influences such as professional development, digital literacy, and local policy (Moradi, 2025). Furthermore, existing studies frequently center on student perspectives or single aspects of technology integration, with limited attention to the experiences, attitudes, and practical challenges of EFL teachers themselves (Fan, 2023; Ma, 2025). Persistent challenges, including digital anxiety, ethical concerns, and the fading "novelty effect," are well documented (Huang et al., 2022; Kohnke, 2025), yet few works examine how these challenges intersect with the actual adoption, perceived value, and day-to-day realities of technology use in EFL higher education. By directly investigating the types of educational technologies used, teachers' perceived usefulness, the multidimensional factors influencing integration, and the practical barriers encountered, the present study addresses these overlooked areas and provides a holistic, teacher-centered perspective.

Therefore, against the backdrop of rapidly advancing AI and educational technologies, the present study aims to address these gaps by systematically investigating the landscape of educational technology use among EFL teachers in Chinese higher education. Building on the significance of previous studies, this research adopts a broad and integrated approach to capture the interconnectedness of technology adoption, perceived usefulness, influencing factors, and challenges by foregrounding the authentic voices and lived experiences of teachers. By doing so, the study seeks to advance theoretical understanding within the TAM framework and at the same time, provide actionable insights for policy, practice, and professional development in language education. The significance of this research lies in its potential to inform both local and international stakeholders about the multifaceted realities of educational technology integration in EFL settings, ultimately contributing to more effective, equitable, and sustainable language education in the digital age. Specifically, the present study is guided by the following research questions:
RQ 1: What are the commonly used educational technologies in EFL educational settings?
RQ 2: What are the teachers' perceived usefulness of using educational technology in EFL educational settings?
RQ 3: What are the factors affecting the use of educational technology in EFL educational settings? and
RQ 4: What are the challenges faced by EFL teachers in using educational technology?

Methods

Research Design

The objective of this study is to investigate the use, perceived usefulness, influencing factors, and challenges of educational technology among EFL teachers in higher education institutions in China. As illustrated in Figure 1, the research followed a systematic and multi-stage process (Aspers & Corte, 2019). The study began by identifying core research questions, followed by a comprehensive literature review to inform the conceptual framework and the construction of research instruments. Next, appropriate research methods were selected, including the development and administration of a semi-structured electronic survey and the organization of post-survey group discussions with volunteer participants (Shelby et al., 2021). Data collection combined both quantitative survey responses and qualitative insights from group discussions, enabling a richer understanding of teachers' experiences and perspectives. Subsequently, data analysis was conducted to extract both descriptive and thematic findings, which were then synthesized and reported. This integrated approach ensured a robust

exploration of educational technology integration in EFL teaching, while allowing for validation and deepening of key themes.

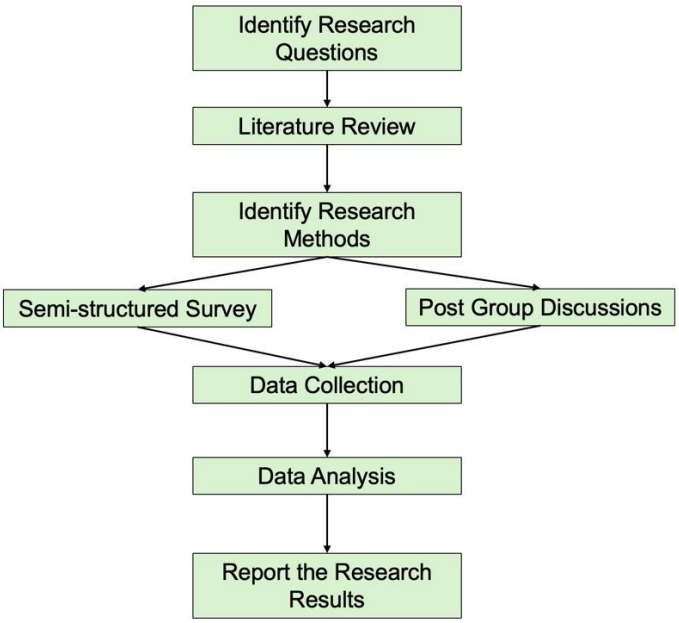

Figure 1. Research process flowchart.

Participants and Data Collection

The participants in this study were EFL teachers from higher education institutions across China, recruited using a combination of convenience sampling and snowball sampling to ensure a diverse and representative sample (Raifman et al., 2022). The electronic survey was distributed via widely used social media platforms, including WeChat, QQ, Sina Weibo, and Little Red Book, which facilitated broad outreach and encouraged peer referrals among potential respondents. Data collection was conducted over a one-month period, from March 1st to April 1st, 2025.

A total of 139 valid responses were obtained during this period. The demographic profile of the participants, presented in Table 1, indicates that the majority were female (70.5%), while males comprised 29.5% of the sample. Most respondents were in the 35 – 54 age range (62.6%), with 28.1% aged 35 – 44 and 34.5% aged 45 – 54. Regarding educational qualifications, over half held a master's degree (52.6%), followed by doctorate degree holders (33.8%) and bachelor's degree holders (13.7%). In terms of professional titles, associate professors made up the largest proportion (62.6%), with lecturers and professors representing 23.0% and 14.4% respectively. The sample also reflected a highly experienced cohort, with more than half (56.1%) having over 10 years of EFL teaching experience, and smaller proportions reporting 6 – 10 years (24.5%), 3 – 5 years (14.4%), and less than 3 years (5.0%).

Table 1. Demographic profile of respondents (N=139).

Demographic	Categories	Frequency	Percentage (%)
Gender	Male	41	29.5
	Female	98	70.5
Age	Under 25	14	10.1
	25 – 34	32	23.0
	35 – 44	39	28.1
	45 – 54	48	34.5
	55 and above	6	4.3
Education Level	Bachelor's degree	19	13.7
	Master's degree	73	52.6
	Doctorate degree	47	33.8

Academic Title	Lecturer	32	23.0
	Associate Professor	87	62.6
	Professor	20	14.4
Teaching Experience	Less than 3 years	7	5.0
	3 – 5 years	20	14.4
	6 – 10 years	34	24.5
	Over 10 years	78	56.1

To enrich the quantitative findings and gain deeper qualitative insights, a purposive sampling technique was employed to select 15 survey respondents representing diverse backgrounds in terms of gender, age, academic qualification, professional title, and teaching experience (see Table 2). These participants were subsequently invited to join a post-survey group discussion, which was conducted in Tencent Meeting on April 7th, 2025 (Hou & Yang, 2025). This follow-up discussion allowed the researchers to explore teachers' experiences with educational technology in greater depth, providing further validation and expansion of the themes identified from the survey data. The demographic diversity of the panel ensured a broad range of perspectives, thereby enhancing the reliability and richness of the qualitative findings.

Table 2. Demographic profile of respondents participated in group discussions (N=15).

Respondent	Gender	Age	Education Level	Title	Teaching Experience
R1	Male	28 years old	Master's Degree	Lecturer	3 years
R2	Male	37 years old	Doctor's Degree	Associate Professor	12 years
R3	Male	52 years old	Doctor's Degree	Professor	26 years
R4	Male	39 years old	Masters' Degree	Associate Professor	8 years
R5	Male	30 years old	Doctor's Degree	Lecturer	5 years
R6	Female	24 years old	Bachelor's Degree	Lecturer	2 years
R7	Female	24 years old	Bachelor's Degree	Lecturer	1 year
R8	Female	38 years old	Doctor's Degree	Associate Professor	10 years
R9	Female	29 years old	Masters' Degree	Lecturer	3 years
R10	Female	55 years old	Doctor's Degree	Professor	28 years
R11	Female	43 years old	Doctor's Degree	Professor	14 years
R12	Female	42 years old	Masters' Degree	Associate Professor	18 years
R13	Female	35 years old	Doctor's Degree	Associate Professor	6 years
R14	Female	33 years old	Doctor's Degree	Associate Professor	9 years
R15	Female	36 years old	Masters' Degree	Associate Professor	11 years

Instrument

This study employed a semi-structured electronic survey, developed and administered using Wenjuanxing (Luo et al., 2023), to systematically investigate the use and perceptions of educational technology among EFL teachers in Chinese higher education. The survey instrument was adapted from established research, including Cai et al. (2023), Cohen et al. (2022), Jiang (2022), Raygan and Moradkhani (2022), Zhang and Fang (2022), and Zhang and Zou (2022), to ensure theoretical and contextual relevance. The survey consisted of six clearly defined sections (Appendix A): demographic information, commonly used educational technologies, perceived usefulness, influencing factors, challenges encountered, and an invitation for follow-up participation. To maximize clarity and respondent engagement, each section began with a brief introduction, and both closed-ended and open-ended questions were included. Notably, the survey was designed to protect participant anonymity and confidentiality, with an informed consent statement provided at the outset.

To ensure the instrument's content validity, the draft survey was reviewed by two experts in educational technology. Based on their feedback, necessary amendments were made to better align the items with

the research questions. In particular, several open-ended questions were revised to instruct respondents to list their answers one by one for greater clarity and consistency, rather than providing general narrative responses. In addition to the survey, qualitative data were collected through post-survey group discussions, for which a structured discussion guide (Appendix B) was developed. The discussion questions were logically sequenced to explore in depth the types, uses, benefits, influencing factors, challenges, and recommendations related to educational technology integration. This combined instrument allowed for a comprehensive and nuanced exploration of EFL teachers' experiences with educational technology in Chinese higher education.

Data Analysis

Quantitative data collected from the closed-ended survey items were systematically analyzed using descriptive statistical methods. Frequencies, percentages, and distributions were calculated for demographic variables as well as for categorical responses regarding types and frequency of educational technology use (Kaarakainen & Saikkonen, 2021). These analyses provided an overview of participants' backgrounds and enabled identification of prevalent patterns in the adoption and integration of technology across EFL teaching contexts. Results including the proportion of teachers using various categories of digital tools as well as reported frequency of use were summarized in tables and figures for clarity and comparison.

Qualitative data, derived from open-ended survey responses and transcribed group discussions, underwent rigorous thematic analysis (Ahmed et al., 2025). First, all responses were read thoroughly to achieve immersion and familiarize the research team with the data (Saunders et al., 2023). Coding was performed inductively, with initial codes assigned to segments of text reflecting similar ideas or experiences. Codes were then reviewed and grouped into broader themes and sub-themes corresponding to each research question, such as perceived usefulness, influencing factors, and challenges (Yang, 2025). Representative quotations were selected to illustrate key themes, with attention paid to preserving the diversity and depth of participants' perspectives. Thematic findings were then synthesized to provide insights into how educational technology supports learner engagement, personalization, inclusivity, collaboration, teaching management, and to highlight both enabling and inhibiting factors including policy, technological, and individual dimensions, as well as ongoing challenges related to knowledge management, education management, and ethical/data security concerns.

Ethical Consideration

Ethical approval was obtained for this study, and all procedures followed institutional and international standards. Participants received clear information about the study's purpose, procedures, and their rights, including voluntary participation and the ability to withdraw at any time. Informed consent was obtained electronically, and all data were anonymized and kept confidential. Personal information collected for follow-up discussions was stored securely and used solely for research purposes, ensuring privacy and participant protection throughout the study.

Results and Findings

RQ 1: What are the commonly used educational technology in EFL educational settings?

Types of Educational Technology

As summarized in Table 2, a wide range of educational technologies are utilized for EFL teaching in Chinese higher education institutions, reflecting the ongoing digital transformation of language instruction. Among the most prominent are AI and large language models such as ChatGPT, DeepSeek,

Claude, Gemini, Kimi, QuillBot, DeepL Write, and Grammarly, which are increasingly used for intelligent writing assistance, translation, and language practice. LMS like MOOCs, NetEase Cloud Classroom, WE Learn, U Campus, ZhiHuiShu, and Super Star Learning APP serve as core platforms for course delivery, resource sharing, and online assessment. Mobile self-regulated learning apps including BaiCiZhan, Shanbay, Duolingo, and Quizlet, support vocabulary acquisition and autonomous practice through gamified and interactive exercises. Social media and content sharing platforms, such as BiliBili, YouTube, TikTok, BBC Learning English, VOA Learning English, WeChat Official Accounts, WeChat Mini Programs, and Kekenet, provide rich and authentic language input, cultural resources, and diverse learning content. Additionally, collaboration and communication tools like Tencent Meeting, DingTalk, WeChat, and Notion facilitate synchronous and asynchronous interaction, group work, and seamless communication between teachers and students, further enriching the EFL learning experience in higher education settings.

Table 3. Major educational technologies for EFL teaching in Chinese higher education.

Types	Examples
AI and Large Language Models	● ChatGPT ● DeepSeek ● Claude ● Gemini ● Kimi ● QuillBot ● DeepL Write ● Grammarly
Learning Management Systems (LMS)	● MOOCs ● NetEase Cloud Classroom ● WE Learn ● U Campus ● ZhiHuiShu / ZhiDao APP ● Super Star Learning APP
Mobile Self-Regulated Learning Apps	● BaiCiZhan APP ● Shanbay APP ● Duolingo APP ● Quizlet APP
Social Media and Content Sharing Platforms	● BiliBili ● YouTube ● Tik Tok ● BBC Learning English ● VOA Learning English ● WeChat Official Account (Economist, China Daily) ● WeChat Mini Programs (OneClass) ● Kekenet
Collaboration and Communication Tools	● Tencent Meeting ● DingTalk ● WeChat ● Notion

Frequency of Use of Educational Technology

Figure 2 presents the frequency of educational technology use among EFL teachers across different age groups. Among teachers under 25 years old, 7 out of 14 (50.0%) reported daily use, 3 (21.4%) used it several times a week, 3 (21.4%) once a week, and 1 (7.1%) rarely or never. In the 25 – 34 age group, 21 of 32 teachers (65.6%) reported daily use, 6 (18.8%) used it several times a week, 3 (9.4%) once a week, and 2 (6.3%) rarely or never. For teachers aged 35 – 44, usage was more evenly distributed: 12 of 39 (30.8%) used it daily, 11 (28.2%) several times a week, 13 (33.3%) once a week, and 3 (7.7%) rarely or never. However, among teachers aged 45 – 54, only 4 out of 48 (8.3%) used educational

technology daily, 13 (27.1%) several times a week, 22 (45.8%) once a week, and 9 (18.8%) rarely or never. For those aged 55 and above, none used it daily; 2 out of 6 (33.3%) reported using it several times a week, 3 (50.0%) once a week, and 1 (16.7%) rarely or never.

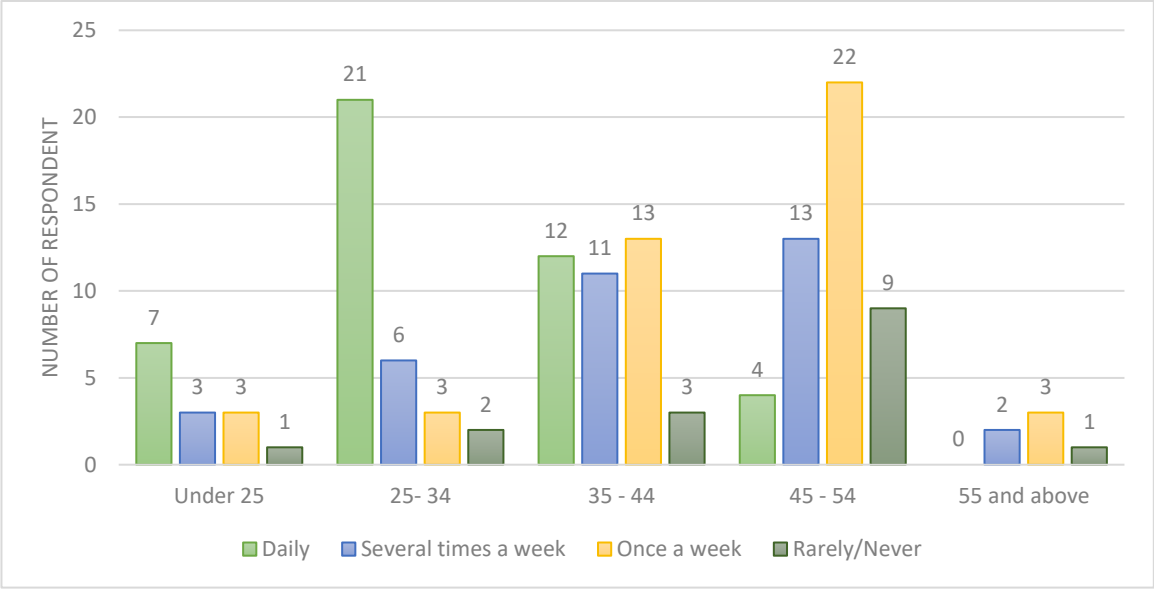

Figure 2. Frequency of educational technology use among EFL teachers (N=139).

These findings reveal a clear generational trend: younger EFL teachers in higher education are more likely to integrate educational technology into their teaching on a daily basis, while older teachers, particularly those aged 45 and above, tend to use technology less frequently, often limiting its use to once a week or less. One possible reason is that older EFL teachers are more likely to hold senior positions such as professor and may not be as frequently involved in day-to-day classroom teaching as their younger colleagues. This pattern suggests that targeted professional development and institutional support for mid-career and senior teachers may be necessary to promote more consistent technology integration across all age groups.

RQ 2: What are the teachers' perceived usefulness of using educational technology in EFL educational settings?

Table 3 shows the thematic analysis results of the EFL teachers' perceived usefulness of educational technology. Altogether, five major themes emerged including 19 sub-themes. These include Learner Engagement and Motivation (interactive learning activities, real-time feedback, multimedia content, increased student participation), Personalization and Adaptivity (adaptive learning systems, data-driven instruction, self-regulated learning), Inclusivity and Flexibility (support for diverse learners, multimodal access, anywhere and anytime learning), Collaboration and Communication (peer collaboration tools, teacher-student communication channels, feedback loops), and Teaching Management and Assessment (assignment distribution and collection, automated assessment tools, progress monitoring and analytics, streamlined record keeping, personalized feedback, and resource organization and sharing).

Table 4. EFL teachers' perceived usefulness of using educational technology.

Themes	Sub-themes
T1_Learner Engagement and Motivation	● Interactive Learning Activities (e.g., gamification, quizzes, discussions) ● Real-time Feedback (instant responses to student input) ● Multimedia Content (audio, video, animations to enhance interest) ● Increased Student Participation (active involvement via digital tools)

T2_Personalization and Adaptivity	● Adaptive Learning Systems (individualized content based on learner progress) ● Data-Driven Instruction (using analytics to inform teaching strategies) ● Self-Regulated Learning (self-paced modules, independent practice)
T3_Inclusivity and Flexibility	● Diverse Learners (students with disabilities, varying proficiency levels) ● Multimodal Access (text, audio, video options for different learning styles) ● Anywhere, Anytime Learning (access to materials outside classroom hours)
T4_Collaboration and Communicate	● Peer Collaboration Tools (shared documents, group projects, online forums) ● Teacher-Student Communication Channels (messaging, discussion boards) ● Feedback Loops (opportunities for peer and teacher feedback)
T5_Teaching Management and Assessment	● Assignment Distribution and Collection (digital submissions, grading) ● Automated Assessment Tools (auto-grading quizzes/tests) ● Progress Monitoring and Analytics (tracking learner performance over time) ● Streamlined Record Keeping (attendance, grades, participation logs) ● Personalized Feedback (individualized comments, rubric-based feedback) ● Resource Organization and Sharing (lesson plans, resources, materials)

Theme 1 Learner Engagement and Motivation

Educational technology plays a significant role in enhancing learner engagement and motivation in EFL settings. Teachers reported that interactive learning activities such as gamified quizzes and online discussions capture students' interest and sustain their involvement throughout the lesson. The ability to provide real-time feedback, for example through instant quiz results, was noted as a strong motivator, encouraging students to review and improve their performance. Additionally, the integration of multimedia content like videos and audio not only makes lessons more dynamic but also helps attract and maintain the attention of even typically reserved students. The use of these digital tools leads to noticeably increased student participation, with more students actively contributing to discussions and class activities. This pattern suggests that combining interactive features, immediate feedback, and diverse media can transform the classroom atmosphere and foster a more inclusive and stimulating learning environment. As one teacher shared:

> *I used the MOOCs in my College English class. I assigned an online quiz, and students got their scores right away, which motivated some to try again for a better grade. We watched a short video together … even my shy students paid close attention. Afterward, a few who rarely speak up posted thoughtful comments in the online discussion … made the lesson lively and really encouraged everyone to participate. (R1)*

Theme 2 Personalization and Adaptivity

Educational technology also significantly supports personalization and adaptivity in EFL teaching. Teachers highlighted the benefits of adaptive learning systems, which can tailor content and tasks to individual learner needs based on ongoing performance, ensuring that all students are appropriately challenged and supported. Data-driven instruction, enabled by analytics features in these platforms, allows teachers to monitor student progress in real time and make informed adjustments to their teaching strategies. Furthermore, technology fosters self-regulated learning by offering self-paced

modules and independent practice opportunities, empowering students to take greater responsibility for their own learning. As one respondent described:

> *I was to be an English reading teacher and used WE Learn to assign adaptive reading tasks for my students … automatically adjust the difficulty of passages based on each student's reading performance, so stronger readers received more challenging texts while those who struggled got extra support. I also noticed students were taking more initiative. For example, they set their own study schedules, practiced writing essays with the smart grading tool, and checked their progress reports on their own … students become more independent. (R2)*

Theme 3 Inclusivity and Flexibility

Teachers reported that educational technology greatly enhances inclusivity and flexibility in EFL classrooms. Digital platforms support a diverse range of learners, including students with disabilities and those at varying proficiency levels, by offering differentiated content and resources tailored to individual needs. The availability of multimodal access—such as text, audio, and video—caters to different learning preferences and helps ensure that all students can engage with materials in ways that work best for them. Furthermore, the ability to access resources anywhere and anytime allows students to extend their learning beyond the classroom, providing flexibility for different schedules and learning paces. As one teacher mentioned:

> *In my English class, I like to use BBC Learning English to assign different lessons based on my students' levels—some worked on Easy English videos while others explored the advanced "Shakespeare Speaks" series. The site's mix of short videos, podcasts, and written transcripts made it easy for everyone to find a format that fit their learning style … they appreciated being able to watch or listen on their phones after class or on weekends, and a few with weaker reading skills said the audio helped them a lot … access materials that really suited their needs, and the flexibility to learn anytime made a big difference in their motivation. (R3)*

Theme 4 Collaboration and Communicate

Teachers claimed that the educational technologies are effective as peer collaboration tools, programs including shared documents, group projects, and online forums can foster teamwork and interactive learning among students. Enhanced teacher-student communication channels like messaging features and discussion boards enable timely exchanges, question resolution, and continuous support. Additionally, the presence of feedback loops, which provide structured opportunities for both peer and teacher feedback, helps students reflect and improve collaboratively. As one teacher noted:

> *During the COVID-19 period, the teaching is almost conducted online so I used Super Star Learning APP to facilitate my teaching … It was great to see them use the app's group chat to organize their tasks and upload drafts for everyone to review. I was able to send reminders, answer questions, and give suggestions directly through the messaging function, which kept the communication clear and instant … gave feedback through the comment section, making it easy for everyone to see suggestions and improve together. (R5)*

Theme 5 Teaching Management and Assessment

Teaching management and assessment are also recognized by EFL teachers. They reported that digital platforms can streamline assignment distribution and collection, allowing for efficient submission and grading of student work. Automated assessment tools further reduce workload by providing instant grading for quizzes and tests. Progress monitoring and analytics functions enable teachers to track learner performance over time, identify students who need extra support, and intervene promptly.

Streamlined record keeping consolidates attendance, grades, and participation logs in one accessible location. Additionally, technology allows for personalized feedback on assignments and facilitates the organization and sharing of lesson plans and resources. As one teacher explained:

> *I've used Zhihuishu to organize my English classes, and it has made teaching management much more efficient. I can assign reading and writing tasks online, collect all student submissions digitally, and use the platform's auto-grading for quizzes and some tests. The system tracks every student's progress … attendance, grades, and participation records … check at any time … I can give personalized feedback directly on assignments and share lesson materials, reference readings, and videos with the whole class. (R9)*

RQ 3: What are the factors affecting the use of educational technology in EFL educational settings?

As illustrated in Figure 3, the factors affecting the use of educational technology among EFL teachers can be summarized into three main pillars: policy factors (including infrastructure, leadership, curriculum, financial support, and professional development), technological factors (such as usability and accessibility, reliability and functionality, compatibility, and content quality), and individual factors (comprising teachers' attitudes and beliefs, technological pedagogical knowledge, digital literacy, and work pressure).

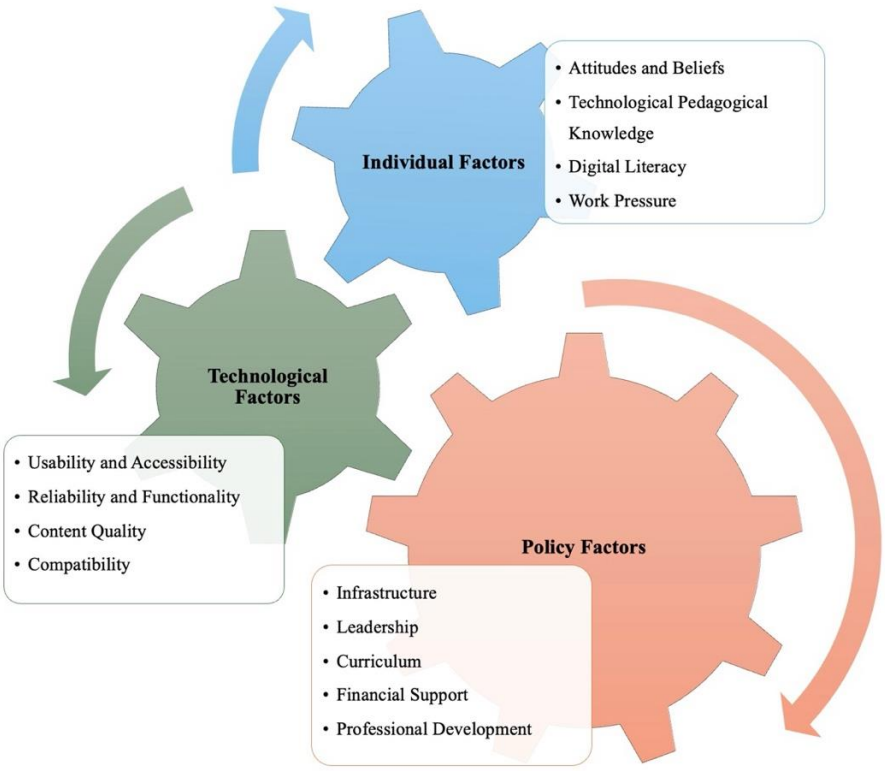

Figure 3. Factors affecting the use of educational technology among EFL teachers.

Theme 1 Policy Factors

Policy factors at the institutional level play a crucial role in shaping EFL teachers' use of educational technology. Teachers emphasized that the availability of adequate infrastructure, such as reliable internet and smart classroom equipment, is fundamental for effective technology integration. Supportive leadership and encouragement from department heads, alignment with curriculum goals, sufficient

financial resources, and opportunities for professional development and training all significantly influence teachers' willingness and ability to adopt new tools. As one respondent shared:

> *Honestly … depends a lot on the school's support. For example, our department leaders … encourage us to try new tools and even invite lecturers to help us learn apps like Super Star and Zhihuishu. Our classrooms have WiFi and smart boards, which makes it possible to use things like MOOC videos and Quizlet live games … I have to stick to the textbook because our budget doesn't always cover paid apps or enough tablets for everyone. It also helps that some online platforms … fit our curriculum goals and are free to use. When the school offers training and updates our tech equipment, I find it much easier and more motivating to use new technology in my teaching. (R4)*

Theme 2 Technological Factors

Technological factors are also central to EFL teachers' decisions about whether and how to use educational technology. Usability and accessibility, such as intuitive interfaces and ease of access across devices, are essential for successful adoption. Compatibility with existing hardware and software, as well as the overall quality of content provided, further influence teachers' choices and their students' learning experiences. Challenges such as connectivity issues, login problems, or inconsistent performance can impede effective use and reduce motivation to integrate these tools regularly. As one teacher reflected:

> *When I use tools like DeepSeek or Grammarly in my Computer-assisted translation classes, what matters most to me is whether students can easily access and understand how to use them. DeepSeek, for example … but sometimes students struggle with slow connections or login problems, especially in the computer rooms … some platforms, like DeepL Write or QuillBot, are reliable for rewriting and checking essays, while others (like Gemini or Claude) occasionally time out or don't handle long texts as smoothly. (R6)*

Theme 3 Individual Factors

Individual factors, such as teachers' attitudes and beliefs toward technology, their technological pedagogical knowledge, digital literacy, and work pressure, significantly influence the adoption and use of educational technology in EFL teaching. Teachers who initially view new tools as complicated may develop more positive attitudes after receiving relevant training and gaining practical experience, which in turn boosts their confidence and willingness to integrate digital resources. However, heavy workloads and the demands of managing multiple classes can create time constraints and limit teachers' ability to fully explore and utilize new technologies. As one teacher shared:

> *As a college English teacher for non-English majors, I teach five different classes this semester, and my attitude toward using technologies like … depends on my prior knowledge about them. At first, I thought these tools were complicated, but after the school organized some hands-on training and I got more digital practice, I … understand they could actually help me manage all five classes more efficiently. However, with so many students and so much grading, I sometimes feel overwhelmed and don't always have time to explore every new app. (R7)*

RQ 4: What are the challenges faced by EFL teachers in using educational technology?

Figure 4 presents a range of challenges encountered by EFL teachers when using educational technology, which can be grouped into three major themes. Knowledge management challenges include difficulties in accessing reliable technology, creating and storing digital resources, and effectively sharing materials with students, often due to platform limitations or uneven access among learners. Education management covers obstacles in instructional design, such as adapting activities to digital

formats, sustaining student engagement, managing classroom behavior in online settings, and ensuring the integrity of assessment when technology is involved. Lastly, ethical and data security concerns revolve around protecting students' personal information, maintaining cyber security, and ensuring the responsible and ethical use of digital tools in the classroom.

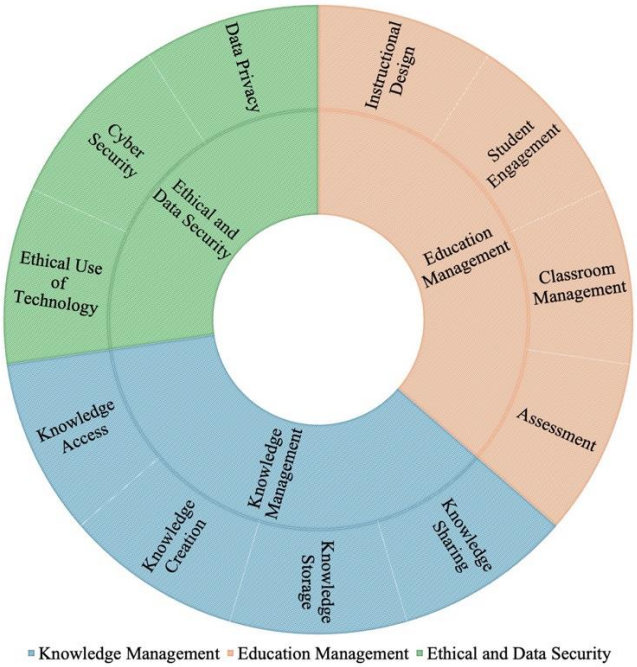

Figure 4. Challenges of using educational technology among EFL teachers.

Theme 1 Knowledge Management

Knowledge management is a persistent challenge for EFL teachers using educational technology. Teachers experience difficulties with knowledge access, as reliable internet connectivity, app accessibility, and platform limitations such as participant caps on video conferencing tools, can restrict the smooth delivery of instruction. Knowledge creation and sharing may be hindered when students have unequal access to digital tools or encounter technical barriers, resulting in fragmented or inconsistent participation. Additionally, effective knowledge storage is not always guaranteed if platforms are limited in their capacity or require premium subscriptions for full functionality. As one teacher explained:

> *I teach college English writing … However, Tencent Meeting limits the number of students unless I pay for the premium version … have to ask from time to time about whether all my students have stable internet or can even access certain apps such as ChatGPT, since some need VPNs or aren't available on all phones. (R12)*

Theme 2 Education Management

Education management presents significant challenges for EFL teachers when integrating technology into their instruction. Teachers often encounter difficulties in instructional design, as adapting traditional activities to digital platforms can require extra planning and adjustment. While online tools may initially boost student engagement, maintaining that engagement over time can be challenging, with some students becoming easily distracted or disengaged during class. Classroom management becomes more complex in an online environment, where monitoring student focus and behavior is less straightforward than in face-to-face settings. Assessment is also a key concern, as verifying the authenticity of student work is increasingly difficult given the ease of access to online resources and AI tools. As one teacher observed:

> *I had an experience teaching English writing at my college, and I introduced the Super Star Learning to hand out the writing assignment and encouraged students to use Grammarly to check grammar before uploading their work. At first, students seem more engaged … but … some get distracted and start doing other things on their devices during class … I can't always tell if students are actually focused or just pretending. When it comes to assessing their writing, I sometimes struggle to judge if the work is really theirs or if they've copied from the internet or used AI tools to do it for them. (R8)*

Theme 3 Ethical and Data Security

Ethical and data security concerns are increasingly prominent for EFL teachers as they incorporate more digital tools into their classrooms. Teachers are particularly apprehensive about data privacy, uncertain about how students' personal information and submitted assignments are stored and who may have access to this data on various education platforms. As one teacher noted:

> *Since using more technologies in my classes, I've started to worry about data privacy and online safety … when students upload their assignments or personal information on platforms like Zhihuishu or Super Star Learning … where all that data goes or who can see it … some students have received spam or even telecom fraud messages after joining our online class groups, which really worries me. (R14)*

Discussion

Synthesis of the Findings

The present study aims to investigate the types, perceived usefulness, influencing factors, and challenges of educational technology among EFL teachers in China's higher education institutions. First of all, the study finds that various types of educational technologies are widely utilized by EFL teachers in China, including AI-powered tools (e.g., ChatGPT, Grammarly), Learning Management Systems (e.g., MOOCs, Zhihuishu), mobile learning apps (e.g., Duolingo, Quizlet), and social media platforms (e.g., BiliBili, WeChat Official Accounts). This thus demonstrating a clear digital transformation within EFL educational contexts, highlighting teachers' readiness to incorporate a diverse range of technology-enhanced tools to support language teaching. This extensive integration aligns closely with previous research, such as Zhang and Zou (2020), who identified similar categories of technology and affirmed their critical roles in facilitating interactive, personalized, and authentic language learning. However, the present study reveals a novel insight regarding generational differences in technology use frequency, indicating younger teachers integrate these technologies more frequently than older ones, emphasizing a need for targeted institutional policies and professional training to support consistent integration across all age groups.

Regarding perceived usefulness, teachers recognized five primary advantages of educational technology: increased learner engagement and motivation, personalized adaptive learning, inclusivity and flexible access, enhanced collaboration and communication, and improved teaching management and assessment efficiency. These findings underscore the central role of technology in facilitating active, customized, and accessible learning experiences, which are crucial for meeting diverse student needs in EFL classrooms. This aligns with prior studies (Cohen et al., 2022; Teng & Wang, 2021; Yang et al., 2024) that emphasize technology's ability to enhance motivation and engagement. However, this study extends these insights by highlighting how personalization and adaptive learning technologies empower learners' autonomy and reduce anxiety, echoing Chen's (2022) findings but providing richer, teacher-centered perspectives. The detailed teacher reflections from this study reveal specific scenarios where digital tools profoundly reshaped student-teacher interplay, thus contributing novel practical examples to the existing literature.

In addition, the present study also revealed three main interrelated categorical factors influencing the adoption of educational technology among EFL teachers: institutional policy (infrastructure, leadership, professional development), technological factors (usability, reliability, compatibility), and individual factors (teacher attitudes, digital literacy, workload). This finding is significant as it illustrates the complexity and interdependence of factors necessary for effective technology integration, emphasizing that successful adoption extends beyond mere technological usability or individual attitudes. Aligning closely with prior studies by Raygan and Moradkhani (2020), and Wang et al. (2021), the present research confirms the essential roles of perceived usefulness, ease of use, supportive school climate, and self-efficacy within the TAM. However, a novel insight emerges from this study regarding how institutional support and leadership directly influence teachers' individual attitudes and digital confidence, which calls for systematic institutional approaches that address these interconnected factors comprehensively.

Besides influencing factors, this study also uncovered substantial challenges encountered by teachers when using educational technology, including difficulties in knowledge management (resource access, creation, sharing), education management (instructional adaptation, maintaining engagement, assessment integrity), and ethical concerns (data privacy and cybersecurity). These challenges significantly impact teachers' capacity and motivation to sustainably integrate digital tools into their instructional practices, underscoring the critical importance of institutional strategies to address these barriers effectively. Consistent with existing research by Bahari and Gholami (2022), Zhang et al. (2022), and Kohnke (2025), these challenges reaffirm previously documented issues such as technical limitations, increased cognitive load, and ethical risks related to data privacy. Nevertheless, this research provides new insights into the "novelty effect," revealing how initial enthusiasm quickly fades without sustained support, resulting in limited long-term adoption of education technology in EFL classrooms. This thus highlights the critical need for continuous professional development, institutional commitment, and clear ethical guidelines to sustain teachers' long-term integration of educational technologies.

In conclusion, this study comprehensively addresses critical aspects of educational technology integration in EFL teaching within China's higher education institutions, including prevalent technologies, perceived benefits, determinants, and practical challenges. The findings of present study offer novel, contextually rich insights into generational technology-use patterns, the interplay of institutional, technological, and individual determinants, and challenges in real-world integration. By foregrounding EFL teachers' lived experiences and detailed perspectives, this study significantly contributes to theoretical understanding within the TAM framework and provides actionable recommendations for institutional policies, targeted professional training, and effective teaching management practices. Ultimately, this enriched understanding helps stakeholders optimize technology-enhanced language education, fostering a more sustainable and equitable digital transformation in higher education contexts.

Implications

The findings of this study highlight the crucial role of institutional policies in shaping the successful integration of educational technology in EFL teaching. University administrators and policymakers should therefore prioritize investment in robust digital infrastructure, ensuring that all classrooms are equipped with reliable internet access and up-to-date hardware as suggested by Dashtestani and Hojatpanah (2020). Furthermore, institutional leadership should cultivate a supportive culture for innovation by providing clear guidance on curriculum alignment and offering sufficient financial resources to cover software licenses and devices (Alkhateeb et al., 2025). Regular and accessible professional development opportunities, including hands-on workshops and continuous training in digital tools, should also be established to empower teachers with the skills and confidence necessary to adopt and maximize educational technology in their instruction (Park & Son, 2020). Policymakers should also address equity by ensuring that students and teachers in all departments have equal access to educational technology (Maleki, 2024), thus supporting inclusive and high-quality language education.

Secondly, technological effectiveness and user experience emerged as key determinants of successful technology adoption in EFL classrooms. Therefore, technology providers and educational institutions should collaborate to select and deploy platforms that prioritize usability, accessibility, and reliability, with interfaces designed to accommodate users of varying digital literacy levels (Wulyani et al., 2024). Regular system updates, technical support, and feedback mechanisms are essential for minimizing disruptions and maintaining teacher and student engagement. Attention should also be paid to content quality and compatibility with existing curricula and assessment standards (Zhao & Zhao, 2023). Moreover, to address growing concerns around data privacy and cybersecurity, institutions should adopt and enforce rigorous data protection protocols and educate all stakeholders about responsible and ethical technology use (Bachtiar, 2025).

Finally, the results of this study also suggest that the pedagogical integration of educational technology requires a thoughtful and adaptive approach. In this regard, EFL teachers should be encouraged and supported to experiment with a range of digital tools such as AI-powered writing assistants, mobile learning apps, and online collaboration platforms to enhance learner engagement, personalize instruction, and foster self-regulated learning (Wei, 2023; Zou et al., 2025). Moreover, they should also be guided to use education technology effectively by designing multimodal and differentiated activities that cater to diverse learners, promoting authentic communication, and supporting formative and summative assessment practices (Phuong et al., 2024). At the same time, education managers should also offer strategies to them so as to improve classroom management and assessment integrity in digital environments by establishing clear participation guidelines and employing plagiarism detection tools (Mulenga & Shilongo, 2024). Last but not least, professional development initiatives should therefore include best practices in technology-enhanced pedagogy, collaborative lesson design, and the critical evaluation of digital resources to empower teachers as both innovators and facilitators in technology-rich EFL classrooms (Su & Zou, 2020).

Conclusion, Limitation and Future Research

This study provides a comprehensive examination of the current landscape of educational technology use among EFL teachers in Chinese higher education, highlighting the types of technologies adopted, their perceived usefulness, the key factors influencing their integration, and the challenges encountered in practice. The findings demonstrate that while a wide range of digital tools including AI-powered platforms, learning management systems, and mobile learning apps, are actively employed to enhance learner engagement, personalization, inclusivity, and teaching management, successful adoption depends on a dynamic interplay of institutional policy, technological quality, and individual teacher factors. More importantly, the study identifies critical areas, such as equity, digital literacy, and ethical data use, which at the current educational context driven by AI, require ongoing attention for sustainable and effective implementation.

This study is not perfect. Firstly, the data were collected through online surveys targeting Chinese EFL teachers in Chinese higher education institutions, which may be influenced by response bias and may not fully capture actual classroom practices in the world EFL educational contexts. Future research should consider employing mixed-methods approaches, including classroom observations and student perspectives, to gain a more holistic understanding of technology integration. Longitudinal studies are also recommended to track the evolving impact of emerging technologies, such as AI-driven tools, on language teaching and learning over time. Finally, further research should also consider developing and testing interventions that address the digital divide, promote ethical technology use, and optimize teacher professional development in diverse educational settings.

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Appendix A. Survey Instrument

Survey on the Use and Perceptions of Educational Technology among EFL Teachers in Chinese Higher Education

Introduction and Consent Statement

Thank you for participating in this survey on the use of educational technology in English as a Foreign Language (EFL) teaching in Chinese higher education. The purpose of this survey is to understand the types of educational technology you use, your perceptions of its usefulness, the factors influencing your use, and the challenges you encounter. Your responses are completely anonymous and confidential, and the data will be used solely for academic research purposes. Participation is voluntary, and you may withdraw at any time. By completing this survey, you are giving your informed consent to participate.

Section 1: Demographic Information

This section collects background information to help us understand the characteristics of participants.

1. **What is your gender?**
   □ Male
   □ Female
2. **What is your age?**
   □ Under 25
   □ 25–34
   □ 35–44
   □ 45–54
   □ 55 and above
3. **What is your highest academic degree?**
   □ Bachelor's
   □ Master's
   □ Doctorate
4. **What is your academic position?**
   □ Lecturer
   □ Associate Professor
   □ Professor
5. **How many years have you been teaching EFL in higher education?**
   □ Less than 3 years
   □ 3–5 years
   □ 6–10 years
   □ Over 10 years

Section 2: Commonly Used Educational Technology

This section aims to learn about the education technologies you use in your EFL teaching and how frequently you use them.

6. **What education technologies do you most commonly use in your EFL teaching?** *Please list them and briefly describe how you use them in your classes.*

   .

7. **How often do you use education technologies in your EFL teaching?**
   □ Daily
   □ Several times a week
   □ Once a week
   □ Several times a month
   □ Rarely/Never

Section 3: Perceived Usefulness

This section explores your opinions about the usefulness of educational technology in EFL teaching.

8. **Do you think it is useful or helpful to use educational technology for EFL teaching?**
   □ Yes
   □ No
9. **How do you find educational technology useful in your teaching?** *Please give specific examples or experiences.*

   _____.

Section 4: Factors Affecting the Use of Educational Technology

This section investigates the main factors that influence your use of educational technologies in EFL teaching.

10. **What are the main factors influencing your use of educational technology in EFL teaching?** *(You may select more than one.)*
    □ Access to reliable technology and equipment
    □ Support and training provided by the institution
    □ Your own technological skills and confidence
    □ Time available to learn and use new technologies
    □ Support from colleagues/peer sharing
    □ Perceived relevance to EFL curriculum
    □ Student readiness and digital literacy
    □ Cost or funding of technology
    □ Other (please specify): _____
11. **Please elaborate on your selected options.**

Section 5: Challenges

This section seeks to understand the challenges or concerns you face when using educational technologies in your teaching.

12. **What challenges do you face when using education technologies in EFL teaching?** *(You may select more than one.)*
    □ Lack of technical support
    □ Insufficient training opportunities
    □ Limited access to devices or internet
    □ Resistance to change among faculty
    □ Low student engagement
    □ Incompatibility with curriculum
    □ Lack of time to prepare technology-based lessons

□ Concerns about students' over-reliance on technology
□ Other (please specify): _____

13. **Please elaborate on your selected options.**

_____.

Section 6: Invitation to Follow-Up Group Discussion

To gain more in-depth insights, we plan to conduct follow-up group discussions via Tencent Meeting. If you are interested in participating, please leave your contact information below. Your participation is entirely voluntary, and your identity will remain confidential.

My background is as follows:

Full name	:
Education Background	:
Teaching Experience	:
Academic Title	:
Email	:
Mobile Phone Number	:

Appendix B. Group Discussion Schedule

- Question 1: Which educational technologies do you currently use most often in your EFL teaching, and for what purposes?
- Question 2: What motivated you to start using these technologies, and how did you first discover or learn about them?
- Question 3: Can you share specific examples of how these technologies have enhanced your teaching practices or improved student learning outcomes?
- Question 4: What factors have most influenced your decision to adopt and consistently use educational technology in your teaching?
- Question 5: How have your institution's policies, available resources, or training opportunities supported or limited your use of technology?
- Question 6: What significant challenges or barriers have you encountered in the process of integrating educational technology into your EFL classes?
- Question 7: What strategies or resources have you found most effective in overcoming these challenges?
- Question 8: Based on your experiences, what recommendations would you offer to institutions or policymakers to better support the effective integration of educational technology in EFL teaching?

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methodology, project administration, resources, writing—review and editing; Shuai Hou: Data curation, software, investigation, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Sustainable Development Goals (SDGs)

This study is linked to the following SDG(s): Quality education (SDG 4).

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Data Accessibility Statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics and Consent

The present study involved human participants and was approved by Dalian University of Foreign Languages. It was conducted in accordance with the local legislation and institutional requirements and all participants provided their informed consent to participate in this study.

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