Qian Liu, Mengjie Jiang, Yonghua (Yoka) Wang* and Liqun He

AI literacy in shadow education: exploring Chinese EFL practitioners' perceptions and experiences

https://doi.org/10.1515/jccall-2025-0011
Received March 24, 2025; accepted June 12, 2025; published online July 10, 2025

Abstract: Artificial intelligence (AI) is increasingly reshaping education by identifying students' learning challenges and enhancing academic performance. However, many teachers lack a comprehensive understanding of AI, limiting their ability to fully utilise its potential in teaching. While existing research has examined students' AI literacy in formal education, little is known about the perceptions and experiences of English as a Foreign Language (EFL) practitioners in shadow education. To address this gap, this study employed in-depth semi-structured interviews with nine Chinese EFL practitioners in shadow education to explore their perceptions and practices regarding AI literacy. The findings reveal diverse perspectives on AI, varying levels of AI-related knowledge, different approaches to applying and evaluating AI tools, and ethical considerations, all of which are shaped by distinct teaching experiences across various contexts. These insights illustrated key dimensions of existing AI literacy frameworks within the new context of Chinese shadow education. We also highlighted the importance of considering AI's implications for educational equity and social justice, which informed the development of a five-dimensional AI literacy framework for EFL practitioners in the shadow education sector. This framework encompasses a human-centred mindset, AI knowledge and understanding, AI application and evaluation, AI ethics, and systemic and societal implications of AI. Our study offered recommendations for EFL teachers in shadow education, teacher educators, and educational institutions seeking to equip language teachers with the necessary attitudes, knowledge and skills to navigate the evolving landscape of AI-driven language education.

***Corresponding author: Yonghua (Yoka) Wang**, School of Foreign Languages, Jimei University, Xiamen, China, E-mail: yokawang090318@gmail.com
Qian Liu, IOE, UCL's Faculty of Education and Society, University College London, London, UK, E-mail: q.liu@ucl.ac.uk. https://orcid.org/0000-0001-7416-1497
Mengjie Jiang, International Office, University of Lincoln, Lincoln, UK, E-mail: gjiang@lincoln.ac.uk. https://orcid.org/0000-0003-2320-1916
Liqun He, UCL Knowledge Lab, University College London, London, UK, E-mail: liqun.he@ucl.ac.uk. https://orcid.org/0000-0002-0837-5857

Keywords: AI literacy; shadow education; EFL practitioners; teacher perceptions

1 Introduction

Shadow education, also known as private supplementary tutoring (PST), refers to "tutoring in academic subjects that is provided for a fee and that takes place outside standard school hours" (Bray and Lykins 2012, p. 1). The term "shadow" metaphorically reflects how PST closely mirrors mainstream education (Yung 2021). Shadow education is a profit-driven enterprise facilitated by individual tutors or institutional service providers (Yu and Zhang 2022). It has gained considerable prominence in China due to the prevalence of high-stakes examinations and an exam-oriented educational culture (Xiong et al. 2022; Yu and Zhang 2022). For example, tutors are often viewed as "*exam expert-star-teachers*" in Hong Kong SAR, China (Yung and Yuan 2020). Moreover, with the global spread of English, the subject has become one of the most sought-after areas of shadow education across Asian countries, including China (e.g., Hamid et al. 2018).

The expansion of shadow education in China is shaped by both market demands and local/national policies. First, tutors are required to navigate dual roles as both educators and salespeople (Xiong et al. 2022). In addition, regulatory policies have also impacted the sector's trajectory. For instance, the announcement and implementation of *Opinions on Further Reducing the Burden of Homework and Off-Campus Training for Compulsory Education Students* (i.e., Double Reduction policy) in 2021 led to a marked contraction in the scale and scope of the shadow education industry (Yu and Zhang 2022). Therefore, institutions offering subject-specific tutoring were compelled to either shut down or restructure their operations (Yang and Li 2022; Yu and Zhang 2022).

Driven by the goal of enhancing students' English test performance, the pedagogical practices of private tutors are predominantly test-oriented and mechanistic. For example, Zhang et al. (2023) found that Chinese private tutors preparing students for English writing assessments in study-abroad examinations frequently employed test-taking strategies, direct instruction, and model-based writing approaches (e.g., providing standardised writing templates).

The rapid advancement of artificial intelligence (AI) has brought new opportunities for EFL teaching and learning. These include AI-driven personalised tutoring systems, AI-powered chatbots, and generative AI tools (e.g., Balcı 2024; Du and Daniel 2024). However, the mere availability of AI-driven technologies does not guarantee their effective implementation and positive learning outcomes. Realising their potential requires the interplay of multiple factors at personal, institutional, and technological levels within specific educational contexts (Luckin and Cukurova 2019).

Educators' AI literacy, a widely acknowledged yet underexplored concept, is a key factor influencing the effectiveness of AI-integrated pedagogy. Existing research on AI literacy is still in its infancy, with definitions and frameworks varying based on target audiences, such as K-12 students, teachers/educators, and higher or adult education learners (e.g., Laupichler et al. 2022; Ng et al. 2021; UNESCO 2024). However, the specific AI literacy required for EFL teachers remains underdeveloped, and AI literacy training is insufficiently integrated into teacher education programmes (Dilek et al. 2025). Research on tutors' AI literacy is particularly scarce within shadow education. Furthermore, existing AI literacy frameworks are primarily developed through top-down approaches led by researchers or expert panels. Whether educators find these frameworks relevant or applicable to their day-to-day teaching practices remains unclear. Given that educators' agency is interconnected with their levels of AI literacy (Wu and Miller 2025), it is crucial to explore their perspectives on AI literacy within the context of English language teaching in shadow education.

Against this backdrop, our exploratory study aims to investigate EFL practitioners' perceptions and experiences of AI literacy in China's shadow education sector. In addition, we seek to identify the professional development opportunities and resources that educators consider valuable for enhancing their perceived AI literacy. Recognising the importance of diverse perspectives and practices, our study includes nine participants with varied roles, including institutional tutors and leaders, independent tutors managing their own studios, and AI technology researchers in EFL education. This study seeks to bridge the knowledge gap regarding AI literacy among practitioners in informal EFL teaching contexts. Furthermore, it contributes to broader discussions on the definition of AI literacy for shadow education practitioners, the stakeholders responsible for shaping this definition, and how AI literacy can be meaningfully development in alignment with existing scholarship.

2 Literature review

The rapid advancement of AI technology, especially generative AI (GenAI), has positioned AI literacy as a critical research and policy development area. However, the definitions and constructs of AI literacy vary depending on the purpose, target population, domain, and field of study (Almatrafi et al. 2024). One widely accepted definition of AI literacy by Long and Magerko (2020) describes AI literacy as "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (p. 2). This definition highlights the multifaceted nature of AI literacy.

Several influential frameworks further conceptualise AI literacy. For example, Ng and colleagues (2021) identified four primary dimensions, including 1) knowing and understanding AI; 2) using and applying AI; 3) evaluating and creating AI; and 4) considering ethical issues of AI. This framework has been adapted to measure the AI literacy of primary and secondary school teachers in China, with modifications in the second and third dimensions (Zhao et al. 2022). Similarly, Almatrafi et al. (2024) synthesised six key constructs of AI literacy: Recognise, Know and Understand, Use and Apply, Evaluate, Create, and Navigate Ethically, based on an analysis of 47 studies published between 2019 and 2023. Compared to Ng et al.'s (2021) framework, *Recognise (be aware)* is an additional component that highlights the importance of identifying AI technologies and making informed interactions with AI (Almatrafi et al. 2024; Wang et al. 2023).

AI literacy is often explored in the context of students and teachers. However, compared to students' AI literacy, research and policy discussions on teachers' AI literacy remain relatively underdeveloped (Sperling et al. 2024; UNESCO 2024). To address this gap, UNESCO (2024) published an AI competence framework for teachers, comprising five aspects: human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional development. The framework also introduces three progression levels: *acquire*, *deepen,* and *create*, emphasising the developmental nature of AI literacy for educators. This framework has been applied in an empirical study investigating two university language teachers' AI literacy perceptions and practices in Macao SAR, China (Wu and Miller 2025). Additionally, Dilek et al. (2025) synthesised five core components of AI literacy for educators: fundamental AI concepts and applications, ethical awareness and reflection, pedagogical integration, empowerment for advocacy and action, and societal implications. The latter two components highlight teacher agency and a commitment to equity and social justice, aligning with the broader concept of critical AI literacy (Bali 2023).

Emerging empirical research highlights both the impact of teachers' AI literacy and strategies for its development. A lack of AI literacy has been associated with heightened anxiety among teachers regarding AI tools in educational settings (Kim and Kwon 2023). Moreover, understanding AI is fundamental for teachers to effectively apply and evaluate AI in their practice (Carolus et al. 2023; Zhao et al. 2022). However, mastering abstract AI concepts such as machine learning, deep learning, natural language processing, and AI ethics remains a significant challenge (Kim and Kwon 2023).

Several studies have explored effective strategies for supporting teachers in AI literacy development. A key principle in AI-related professional development (PD) is to empower teachers through active, collaborative, and participatory approaches (Luckin et al. 2022; Mouta et al. 2025; Sperling et al. 2024). Wu and Miller (2025)

underscore the importance of teacher agency in this process. Additionally, AI literacy development is progressive, necessitating sustained support for teachers beyond initial PD programmes (Dilek et al. 2025). Various strategies have been identified as effective. For example, Ding et al. (2024) found that combining direct instruction with case-based discussions in AI-related PD programmes significantly enhanced AI literacy among seven middle-school science teachers in the United States, particularly in understanding AI fundamentals. Similarly, a critical co-inquiry approach – incorporating collective inquiry, critical reflection, participatory engagement, and knowledge co-creation – has improved educators' comprehension of AI concepts, ethical considerations, and context-specific applications (Dilek et al. 2025). Furthermore, Su et al. (2022) emphasise the importance of bridging research and practice through PD methods such as lesson study, action research, and portfolio examination. However, the effectiveness of PD programmes depends not only on sound pedagogical principles but also on contextual factors, including policy, leadership, and institutional culture.

Research on teachers' AI literacy is still in its infancy in language education, mirroring trends in other subject areas. Ma et al. (2024) identified six key constructs of ChatGPT literacy – benefits, limitations, prompts, evaluation, assessment, and ethics. However, these constructs, like those in broader AI literacy frameworks, are largely literature-driven rather than informed by language teachers' own perspectives. As Sperling et al. (2024) argue, educational practitioners should actively define AI literacy within their specific contexts and shape its content and pedagogical approaches.

Moreover, existing research primarily focuses on teachers' AI literacy in formal education settings (e.g., K–12 schools and universities), with limited understanding of AI literacy in informal education, particularly shadow education. In EFL education, shadow education is crucial in Chinese students' language learning. Given shadow education providers' diverse contexts, cultures, and operational models (e.g., private tutoring institutions and independent studios), further research is needed to explore language educators' perceptions and practices of AI literacy in these settings.

3 Research methods

This study adopted a qualitative research design to explore Chinese English language tutors' perceptions and experiences regarding AI literacy in shadow education. Given the complex, socially constructed and context-dependent nature of these perceptions and experiences, a qualitative approach allows for a rich, in-depth understanding of the tutors' perceptions and lived experiences (Denzin and Lincoln 2018). A phenomenological research design was specifically employed, allowing

researchers to investigate tutors' perceptions of AI integration in their teaching, helping to understand how individuals construct reality through their subjective experiences (Marshall and Rossman 2016). This research design facilitates a nuanced exploration of the tutors' pedagogical perceptions and experiences, their challenges, and AI's opportunities in shadow education settings. Furthermore, phenomenological inquiry aligns with the interpretivist paradigm, which acknowledges that knowledge is co-constructed through social interactions and is shaped by cultural, institutional, and technological factors (Vagle 2018).

3.1 Participants

Participants were invited using a combination of purposive and convenience sampling (Cohen et al. 2018). To ensure the relevance and depth of insights, participants met the following inclusion criteria:

1) *Current engagement in English language tutoring within China's shadow education sector.*
2) *Experience in incorporating AI tools into their teaching practices, including but not limited to AI-driven language assessment, automated feedback systems, virtual tutoring, and adaptive learning technologies.*
3) *Willingness to participate in semi-structured interviews and provide reflections on their teaching practices.*

Twenty potential participants were identified through the authors' professional networks in the shadow education industry. Following an initial email inquiry regarding their willingness and availability, nine tutors from diverse tutoring contexts, including private tutoring institutions, online platforms, and freelance settings, consented to participate (see Table 1).

Ethical considerations were rigorously observed throughout the study. Participants were informed about the study's purpose, data collection methods, and rights. Ethical approval was obtained following institutional guidelines, and participants provided informed consent. All data were pseudonymised to maintain confidentiality, and any identifying details were removed before reporting the results.

3.2 Data collection

Data for this study were collected exclusively through one-to-one semi-structured interviews, which were used to explore the complexity of tutors' perceptions and practices regarding AI literacy in China's shadow education. The second and fourth

Table 1: Profiles of participants from shadow education.

Name	Gender	Role	Education background	Teaching experience	Target students
Fang	Male	Tutor/leader	BA in Translation	12 years of experience in teaching TOEFL writing	– High school students
An	Female	Tutor/leader	BA in Portuguese MA in Education Evaluation	6 years of experience in teaching TOEFL reading	– High school students – University students
Yuan	Male	Tutor/ entrepreneur	BA in English MA in TESOL	2 years of experience in teaching at an institution and 6 years of experience in running a personal English tutoring studio	– Primary school students – University students – Adult learners
Lu	Male	Technology development researcher	BA in Advertising MA in Education Evaluation PhD in language Education	4 years of experience in teaching IELTS reading	– Junior school students – High school students – University students
Guo	Female	Tutor/leader	BSc in Environmental Science MA in English literature MA in Educational Technology	8 years of experience in teaching TOEFL skills	– International high school students – University students
Fei	Female	Tutor/leader	BA in Mass Communication MA in Mass Communication	10 years of experience in teaching English online	– Children aged between 4 and 12
Yu	Female	Tutor/ entrepreneur	BA in Media and Communication MA in Media and Communication	3 years of experience in teaching IELTS listening and speaking	– Adult learners aged between 18 and 35
Tang	Male	Freelancer (tutor)	BSc in Economics MA in interpreting PhD in Education	7 years of experience in teaching IELTS speaking and writing	– University students
Wang	Male	Freelancer (tutor)	BA in International Journalism MA in TESOL PhD in Education	15 years as a freelance English teacher	– High school students – University students – Adult learners

authors conducted interviews between August and September 2024 via Tencent Meeting, a widely used online conferencing platform in China. The interview protocol was developed based on a comprehensive review of existing literature on AI literacy in general education and language education. While the core set of questions was theory-driven, interviewers also incorporated probes and follow-up questions in response to participants' individual reflections and experiences, ensuring a context-sensitive and participant-driven inquiry (Tisdell et al. 2025). Each interview lasted between 45 and 120 mins, resulting in a total recording length of 822 mins, and they were audio-recorded with participants' informed consent to ensure the accuracy and completeness of the data for subsequent analysis. The recordings were later transcribed verbatim to facilitate rigorous thematic analysis (see Section 3.3).

3.3 Data analysis

The collected interview data were analysed using thematic analysis, following the six-phase framework proposed by Braun and Clarke (2006). First, all interview recordings were transcribed verbatim using the *IFLYREC*, an online transcription platform. To ensure transcription accuracy and reliability, the transcripts were sent back to the participants for member verification (Lincoln and Guba 1985). Additionally, the second and fourth authors conducted multiple readings of the transcripts to develop a deep understanding of the data. This familiarisation stage (Nowell et al. 2017) allowed for the identification of initial patterns, potential themes, and interconnections within the data.

Second, the second and fourth authors conducted line-by-line coding to identify recurrent ideas, concepts, and practices emerging from the data. An initial coding was developed based on both inductive (data-driven) and deductive (theory-driven) approaches (Braun and Clarke 2019). The inductive approach ensured emergent themes from the data, while the deductive approach allowed for mapping findings onto existing theoretical frameworks related to AI literacy.

Following the initial coding, similar or related codes were grouped into broader themes that encapsulated participants' core beliefs, attitudes, and practices regarding AI integration in shadow education. The thematic categorisation helped uncover key pedagogical concerns, challenges, and perceived benefits of AI-assisted teaching.

Moreover, group checking and discussions were conducted to enhance the credibility and validity of the findings. The first and second authors independently reviewed and validated the identified themes by comparing them with participants' original transcripts to ensure that the interpretations accurately reflected their

perspectives and practices. Discrepancies were discussed and resolved through consensus to minimise potential researcher bias (Creswell and Poth 2016).

Fifth, the refined themes (see Appendix A) were clearly defined and labelled to ensure they captured the essence of participants' perspectives and practices. Each theme was supported by interview excerpts, demonstrating how the practitioners constructed and negotiated their AI literacy in different teaching contexts. Additionally, themes were linked to existing literature on AI-assisted language education and professional development to provide a contextualised interpretation of the findings.

Sixth, the reported data were translated into English by the first and second authors, who have extensive academic translation experience. To ensure translation fidelity, the translated transcripts were cross-checked against the original Chinese texts and refined through a back-translation process. In addition, a peer-review procedure was conducted by the third author, who is a professional Chinese-English translator (van Nes et al. 2010).

3.4 Trustworthiness

Reflexivity protocols were implemented to critically examine our positionality and minimise biases and potential influences throughout the research process, thereby ensuring transparency, ethical integrity, and credibility in this study (Lincoln and Guba 1985). Reflective memos were utilised during both data collection and analysis to document our ideas, thoughts, assumptions, and evolving interpretations. Regular group discussions among the four authors were held to challenge assumptions and refine interpretations. Participants were invited to review transcripts and preliminary findings to further enhance credibility and validate our analysis. These practices helped identify and mitigate potential biases, ensuring that personal perspectives did not unduly influence the interpretation of the collected data.

4 Results

Based on the methods described in Section 3.3, five key themes emerged from the analysis, including 1) attitudes towards AI application in teaching, 2) understanding and fundamental knowledge of AI, 3) AI application and evaluation, 4) considerations of AI ethics, and 5) professional development. Each theme is discussed, leading to the subsequent Discussion and Conclusion sections.

4.1 Attitudes towards AI application in teaching

Participants expressed varying attitudes towards the use of AI in teaching. Some held positive views, perceiving AI as a valuable assistant tool. For example, Tang highlighted AI's ability to retrieve suitable teaching materials and provide a rich corpus to enhance the quality of instruction, stating:

> "Current AI applications are already extensive, and future advancements could enable AI to handle more complex tasks, which could potentially assist a lot of teaching activities." (Interview, Tang)

Others echoed this perspective:

> "I think it is quite positive. As for its role, I believe it can largely serve as a powerful aid for teachers." (Interview, An)

> "I think AI plays the role of a 'military strategist'." (Interview, Yuan)

These perspectives indicate that some tutors view AI as an assistant, while also recognising that it remains human-led. Yuan, for instance, likened AI to a 'military strategist' because he saw its potential to enrich teaching content behind the scenes, although it could not directly interact with students. Most participants regarded AI positively, acknowledging its potential to enhance efficiency, reduce workload, and support student learning.

However, some tutors expressed caution towards AI integration in teaching, primarily due to institutional constraints and strong goal-oriented expectations from parents. As Guo explained:

> "It's not that AI couldn't be useful, but my company has rigid instructional structures. For example, in a six-to-eight-person class, I must start by introducing vocabulary, then practice short sentences, then move on to listening, explain exercises and so on. There's no flexibility to just 'insert AI' into this process. Besides, classes are recorded, and it is hard to say if they will comply with institutional regulations. Unless the institution says, we are now using AI in class. You simply follow the existing structure." (Interview, Guo)

This statement highlights how predetermined lesson structures may limit tutors' autonomy to experiment with AI in teaching. Guo further emphasised that the primary goal in her institution was to improve students' test scores, and tutors risked receiving complaints if they introduced innovative methods:

> "Students care about how you can improve their grades, and it seems they are not concerned about whether you use some novel method. Parents pay tuition fees expecting structured lessons. If I use AI for discussion-based activities and spend 10 minutes letting students talk, I could easily get complaints. If that happens, the teacher is fully responsible, and there's no way around it." (Interview, Guo)

Participants (e.g., Guo and Lu) also described a disconnect between decision-makers and end-users in AI adoption. They noted that school administrators sometimes purchase AI products that do not align with teachers' or students' actual needs, resulting in a mismatch between design and practical application. As Guo pointed out, teachers are often expected to adapt to AI products rather than use those specifically designed to support teachers' instructional needs.

Some tutors also described a transition in their attitudes towards AI. Wang, for example, initially resisted AI due to several factors, including his belief that his age made it more challenging to adapt to new technologies. He also felt that his background in the humanities created a natural resistance to technical tools, which he perceived AI tools as complex and inconvenient. The costs and accessibility of specific AI tools further discouraged him. However, after trying some AI tools, he recognised their practical benefits, particularly in lesson planning and assisting with grading.

Tutors' perceptions greatly shaped their instructional strategies and approaches to technology integration. Research suggests that teachers are more likely to adopt technological tools when they perceive them as beneficial to teaching and learning (Deng et al. 2014). In this study, not all participants immediately embraced AI upon first encountering it, but most acknowledged that its development and increasing prevalence in education are irreversible trends. Some participants (e.g., Fei and Yu) emphasised the importance of embracing AI to stay relevant, warning that ignoring this shift could result in being left behind. Additionally, Yu noted that basic and repetitive teaching tasks could be easily replaced by AI, posing potential risks to the role of teachers. This awareness prompted her to explore ways to adapt her pedagogy by focusing on creativity and human-centred teaching skills.

Despite the perceived benefits, participants also raised concerns about AI's pedagogical integration, particularly regarding regulatory constraints and the risk of overreliance on AI. Yu, for instance, expressed concerns that large language models could be misused, as students sometimes fail to validate AI-generated content, which could negatively impact their knowledge acquisition and skill development. She warned that excessive reliance on AI might lead to declines in students' critical thinking, analytical skills, and language proficiency, as AI-generated content often lacks specificity. To mitigate these risks, she stressed the need for training and management measures to regulate AI use, ensuring that students and educators can use AI tools effectively and responsibly.

Additionally, some tutors exhibited a teacher-centred attitude toward AI, as reflected in the following statement:

> "We need to understand that AI is a tool to support our teaching but not a replacement for our role. In the teaching process, it's important to strengthen interaction with students and pay attention to their learning needs. In general, tutors hope their students do well and they often

> feel guilty if this goal is not met. However, AI is not accountable for outcomes. AI only responds to tutors' requests. That is why tutors must rely on their own judgement and take ownership of their responsibilities." (Interview, An)

An's statement underscores the belief that while AI can assist educators, the ultimate responsibility for student outcomes rests with teachers. Her perspective highlights the importance of maintaining human interaction in the classroom and using AI ethically within a pedagogically sound framework.

4.2 Understanding and fundamental knowledge of AI

Most participants indicated that their understanding of AI was primarily derived from informal sources such as social media, peer recommendations, and self-directed online research. They also highlighted a lack of institutional training on integrating AI into teaching and learning practices (e.g., Fei). A recurring theme among participants was the necessity for tutors to understand AI's fundamental principles and operational mechanisms. As two participants articulated:

> "Tutors should understand the basic principles of AI and know how it works to use it effectively. Tutors should also have data awareness and recognise that AI's localisation requires local data." (Interview, Fang)

> "Tutors should first understand the underlying principles of AI and avoid misinterpreting it. Then, they should master its practical applications in teaching, such as combining it with voice recording technologies." (Interview, Lu)

Wang echoed the view that tutors need only a basic understanding of AI functionality. However, he observed that most English tutors likely lack a clear concept of AI literacy. Some tutors (e.g., Fang, An, and Wang) also emphasised the importance of enhancing human-AI collaboration by learning how to craft precise prompts to optimise AI-generated output. For example:

> "Teachers need to be proficient in using AI tools provided by the company, and they must learn how to communicate effectively with AI. By writing good prompts, they can get more accurate results and make the tool serve our teaching better. For example, when using an essay grading system, they need to give clear instructions to receive valuable feedback." (Interview, Fang)

> "If I use certain prompts, the output can be much better, because sometimes it is just a small detail, even a single word that can make a big difference in the result." (Interview, Wang)

These insights reflect tutors' understanding of how large language models respond to human input and underscore educators' need to develop skills in prompt engineering. Additionally, Lu suggested that effective AI integration requires

interdisciplinary knowledge, encompassing both technical AI functions and pedagogical applications. This includes the ability to critically evaluate AI-generated content and apply AI-driven methods in pedagogically sound ways. While some tutors acknowledged their ability to use AI in practice, they admitted a lack of deep understanding of its underlying technical logic. One tutor illustrated a contrast between technical staff and English tutors in their approaches to AI integration:

> "Compared to frontline teachers, our technical staff have shown more interest in and ability to apply AI. Some of our programmers started researching AI early on, which is why we were able to integrate speech recognition into our app for post-lesson pronunciation correction. As a live-streamed English tutor, my approach is different. The technical staff aim for precision, and they focus on refining prompts and training AI tools to improve accuracy. I prefer using AI for the first draft and then applying my own edits drawing on my ten-year teaching experience. I just need it as a good starting point, and I do not want to spend too much time fine-tuning the AI." (Interview, Fei)

This account highlights the differing priorities between technical staff and tutors. While technical teams concentrate on optimising AI performance, tutors leverage AI primarily as a support tool for instructional purposes rather than engaging deeply with its technical intricacies.

4.3 AI application and evaluation

Participants identified several key factors influencing their adoption and selection of AI tools, including accessibility (e.g., Tang), content quality (e.g., Yuan), perceived usefulness of functions (e.g., Fei), ease of use (e.g., Guo), and affordability (e.g., Yuan).

Most tutors reported utilising AI to assist with time-intensive teaching activities, particularly in developing instructional materials. Interview data suggest that AI primarily supports curriculum development, lesson planning, instruction, assessment, and reflection. For instance, Fang and Tang described how they used AI to generate extensive teaching materials:

> "I share my teaching objectives and the content I plan to cover with the GenAI, and it might be able to generate a relatively structured lesson plan for me. Then, I could make some personal adjustments within that framework, which would make lesson preparation more efficient." (Interview, Fang)

An and Fang noted that while they rely on GenAI to generate lesson plans and PPT drafts, they still need to personalise the content to align with pedagogical objectives and student needs.

Regarding curriculum development, Yuan described AI as an essential tool for retrieving resources and generating example sentences tailored to students'

proficiency levels. AI also facilitates the design of teaching activities, such as generating practice questions and creating engaging speaking exercises:

> "AI saves me a lot of time for lesson preparation and helps me find suitable materials and example sentences. It also provides new teaching methods, such as designing engaging speaking activities." (Interview, Yuan)

Beyond lesson planning, participants recognised AI's potential to enhance teaching content by providing a richer corpus of linguistic resources and improving language expression quality (e.g., Yuan and Wang). Tang emphasised the AI's role in speaking instruction, highlighting its ability to generate speaking demonstration texts for IELTS preparation. Guo observed that some teachers use GenAI for interactive speaking practices, supporting their language skill development.

Despite AI's advantages, participants acknowledged its limitations. An and Fang pointed out that AI-generated content often requires revision, as it does not necessarily address specific teaching experiences or student characteristics. A further concern was that novice teachers might over-rely on AI-generated lesson plans, potentially introducing errors into their teaching. Wang similarly noted that while AI is useful for gathering background knowledge on unfamiliar speaking topics, its effectiveness in classroom teaching remains limited:

> "When it comes to using AI in the classroom, it might not be that effective. In class, students want to learn knowledge of the language, and test-taking strategies. These are areas where AI cannot provide much help." (Interview, Wang)

These findings suggest that while tutors generally perceive AI as a valuable tool for enhancing educational practices, they also advocate for a more structured approach to AI integration. For instance, Fang proposed the development of an 'AI Pedagogy' to establish best practices for AI-assisted teaching:

> "AI has brought many opportunities for English tutors. However, there are also challenges. I feel that many existing teaching methods are still outdated. I'm not saying they're without value, but they are somewhat old-fashioned because they don't include the AI dimension, what we might call 'AI pedagogy'. It's still unclear how we should approach and integrate AI into our teaching, but this is worth discussing and exploring." (Interview, Fang)

Overall, the study underscores the need for structured AI literacy training for tutors, critical evaluation skills for AI-generated content, and further discussion on best practices for AI-assisted pedagogy.

4.4 Considerations of AI ethics

During the interview, participants discussed various ethical implications of AI, including inaccuracy, privacy, and anxiety about job security. First, participants reported instances of inaccuracies in GenAI responses. Fang, for example, expressed concerns about the reliability of GenAI:

> "It is typical for AI to make mistakes. When it does not understand something, it may also produce hallucinations. If you are conducting research or dealing with important issues, having some inputs with hallucinations and biases is not good." (Interview, Fang)

Due to the absence of a precise accountability mechanism for AI tools, Guo raised concerns about potential biases in AI-driven classroom assessment tools. She noted that such tools often prioritise quantitative indicators and rely on surface-level data to predict learning outcomes, potentially overlooking critical qualitative aspects such as learners' backgrounds and psychological states. Beyond content evaluation, participants emphasised that ethical considerations are an integral component of AI literacy. Most participants stressed the importance of teachers making informed decisions regarding when and how to integrate AI into their pedagogical practices.

Second, participants also voiced concerns about the privacy and potential misuse of personal data. Guo, for instance, highlighted issues related to registration forms and consent checkboxes that require users to provide personal information, such as phone numbers and identity documents, without clearly specifying how this data is used. She further raised concerns about technologies such as facial recognition, webcams, and video calls, which, although seemingly innocuous, could be exploited by unauthorised surveillance software. Fei echoed these concerns, particularly regarding data security and privacy, stating:

> "Regarding data privacy, such as student records or even my own voice, there are concerns. I think the increasing use of AI in daily life and its growing precision can lead to potential privacy breaches. Platforms like ByteDance and Didi, which integrate AI, highlight this risk. Sometimes, after discussing a topic with a friend or conducting a search, I receive highly targeted recommendations from shopping apps. Or even before I have fully formed my thoughts, related suggestions appear. This targeted precision is disconcerting." (Interview, Fei)

Third, participants expressed apprehension regarding the impact of AI on job security in English language education. Yu observed that routine, repetitive tasks such as grading assignments and providing feedback were at high risk of automation. She

argued that to remain relevant, teachers must enhance their pedagogical approaches by integrating AI while emphasising creativity, which is an aspect that AI cannot replicate.

Fei discussed how AI-powered foreign language education disrupted the live-streamed English teaching industry. She cited examples such as Pocket Tutor and AI Foreign English Teacher, which simulate native North American teachers' voices and offer students cost-effective alternatives for daily language practice. While these AI-driven platforms enhance affordability and accessibility, they also present a competitive challenge to traditional live instruction.

Despite these concerns, many participants acknowledged the limitations of AI. Some (e.g., An, Yuan, Lu, and Wang) noted that while AI can support education, it lacks essential human attributes such as emotion and responsibility. As An stated:

> "The drive of responsibility makes teachers accountable, and I feel very happy when students perform well, and I feel sorry when they encounter difficulties. I share meaningful connections with students, which is an important part of my teaching life." (Interview, An)

Similarly, Yuan emphasised:

> "A teacher's ability to empathise, understand emotions, and provide emotional support remains a key characteristic that cannot be replaced by AI." (Interview, Yuan)

4.5 Professional development

Participants unanimously agreed on the importance of maintaining an open mindset and continually enhancing their AI literacy. However, opinions varied regarding the necessity of formal organisational training. Additionally, some participants identified external support, particularly government policies, and third-party educational content, as crucial to fostering comprehensive AI literacy development.

Most participants underscored the critical role of ongoing AI literacy development in effectively integrating AI into teaching. Yuan, for instance, emphasised the need for teachers to engage with AI technologies proactively. Despite initial challenges, he believed that consistent practice could significantly improve their proficiency:

> "Teachers should maintain an open mindset to understand AI applications in teaching. Although there may be difficulties, continuous learning and practice can enhance our AI capabilities." (Interview, Yuan)

Some participants expressed differing perspectives on the value of structured AI training programmes within institutions. Several participants recognised the

benefits of formal training. Lu, for example, viewed the training offered by his organisation as advantageous because it provided targeted, practical examples tailored to specific teaching contexts. He also argued that institutional training could foster a culture of innovation regarding AI use in education:

> "Because AI usage varies by subject, organisational training can effectively summarise best practices for specific subjects. It provides teachers with domain-specific practices they can directly implement. Additionally, sharing innovative ideas within the organisation can foster an environment conducive to AI innovation and openness among teachers." (Interview, Lu)

Similarly, An noted that attending AI training sessions helped her recognise AI's potential in her teaching:

> "Before the training, I primarily used AI tools for paraphrasing without systematically considering their teaching applications. After attending the training, I became aware of AI's potential in areas such as providing writing feedback and oral instruction, directly benefiting my teaching. I found this very inspiring." (Interview, An)

Conversely, some participants questioned the necessity and efficacy of formal training. Guo, for instance, contended that practical necessity would naturally drive teachers to develop AI literacy independently:

> "If AI use becomes mandatory, people can learn quickly without formal training. Just like when touchscreen smartphones appeared, no extensive training was necessary. Teachers do not need in-depth expertise; basic operational skills suffice." (Interview, Guo)

Wang preferred informal, self-directed learning methods, such as short instructional videos and content shared on Xiaohongshu (RedNote, a Chinese social networking platform). He also cautioned against prematurely institutionalising AI training programs, suggesting that some might be commercially motivated:

> "Training might not be particularly necessary right now. Prompt-writing skills and using AI tools can be self-taught through platforms like Xiaohongshu. Formal training systems haven't yet matured." (Interview, Wang)

Beyond institutional AI training, participants highlighted the critical role of external support, particularly from government agencies and third-party content creators, in advancing AI literacy among educators. Lu advocated for increased government support in the form of policies, funding, and regulatory frameworks to ensure the responsible integration of AI into education:

> "Governments should enhance policy support, funding, and regulation for AI applications in education. Clear standards need to be established to guide and regulate the use of AI within educational contexts." (Interview, Lu)

Participants also emphasised the value of third-party educational content in supporting professional development. Concise, accessible instructional materials were seen as effective in demonstrating AI applications to teachers. Wang, for instance, suggested:

> "Short, clear, practical demonstration videos could effectively communicate AI's usefulness, illustrating its benefits clearly and succinctly." (Interview, Wang)

5 Discussion

This study has highlighted practitioners' diverse attitudes and perspectives regarding AI literacy, shaped by their varied experiences in teaching, organisational management, and technology development.

5.1 Practitioners' perceptions of AI: a human-centred perspective

Regarding their perceptions of AI, all participants emphasised the importance of adopting a human-centred mindset when selecting and using AI tools. This aligns with UNESCO's (2024) framework, which advocates for AI to be assistive rather than replace or undermine teachers' agency and accountability in pedagogical decision-making (Mouta et al. 2025). While the practitioners highlighted their irreplaceable role in making instructional decisions and providing emotional support, some also expressed concerns about job insecurity. For instance, GenAI tools, acting as dialogic partners (Liu 2024; Wegerif and Major 2019), can offer rich feedback on students' written assignments and oral practice. These tools provide cost-effective alternatives for learners, potentially reducing course enrolments and profits in the shadow education sector. However, this concern was reframed as an external stimulus that motivated practitioners to embrace the opportunities presented by AI and develop AI-integrated pedagogical approaches.

Participants paid little attention to the broader systemic and societal implications of AI use and educators' social responsibilities. It is crucial that practitioners understand the risks and challenges associated with AI in teaching and recognise how AI may exacerbate social injustice, inequality, and structural exclusion (Dilek et al. 2025). This reflects Bali's (2023) concept of critical AI literacy, highlighting the importance of ethical and equitable awareness in AI integration. Similarly, UNESCO (2024) stresses that teachers need to adopt a human-centred mindset and uphold

their social responsibility to promote inclusivity and cultural pluralism for all students, regardless of background (e.g., gender, ethnicity, socio-economic status, and ability).

This study also revealed that not all practitioners held positive attitudes towards AI, with both external factors (e.g., institutional constraints, exam-oriented goals, and limited access to AI technology) and internal factors (e.g., personal beliefs) influencing their perspectives. For example, Guo reported that her institution enforced standardised teaching practices to meet parental and student expectations for high test performance, leaving little room for experimentation with new technologies. Professional autonomy was constrained in such cases, as standardised curricula and teaching approaches – proven effective across multiple settings – were prioritised. Given shadow education's market-driven, customer-centred, and profit-oriented nature (Xiong et al. 2022), institutions often favour standardisation over pedagogical innovation. Additionally, Wang's initial reluctance to use GenAI stemmed from limited access and self-perceived barriers (e.g., age and non-technical background). This aligns with Teng's (2019) argument that teacher agency is shaped by "personal disposition and internal beliefs" (p. 203). However, Wang's attitude became more positive after using GenAI for lesson planning, as he experienced its practical benefits (e.g., time efficiency and access to richer materials), which encouraged him to explore further applications.

5.2 Practitioners' experiences of AI: limited classroom integration

Generative AI has the potential to support teachers in both routine and creative tasks (Firaina and Sulisworo 2023). This study provides insights into tutors' perceptions of AI integration in teaching and their perceived AI literacy. Overall, tutors appreciated AI tools for their ability to assist with lesson planning, the development of customised teaching resources, and the provision of timely feedback – findings consistent with previous literature (e.g., Jia et al. 2022).

However, while most English tutors in shadow education recognised the potential of AI, its application was primarily confined to activities outside the classroom, such as lesson preparation and assessment, with limited use in live instructional settings. This finding underscores the complexities of AI integration in classroom practice, which is often shaped by institutional policies and the expectations of parents and students. Furthermore, many AI tools are developed without sufficient input from educators, leading to a misalignment between technological affordances and classroom realities (Luckin 2017). This, coupled with concerns about

algorithmic bias and data-driven inequities (Baker et al. 2019), highlights the need for a more critical and inclusive approach to AI adoption (UNESCO 2024).

5.3 Developing practitioners' AI literacy: a need for holistic support

For effective implementation of AI in educational settings, it is essential to provide educational practitioners with comprehensive training that covers both the technical aspects and the ethical implications associated with its uses in teaching and learning (Yeh 2025). This study has emphasised the need for a more holistic approach. As Mishra and Koehler (2006) argue in their TPACK framework, effective technology integration requires an understanding of the dynamic relationships between content knowledge, pedagogical strategies, and technological tools. Therefore, standalone technical training is insufficient; AI integration should be context-sensitive, subject-specific, and strategically applied. For meaningful AI integration, practitioners require a more critically reflective approach to AI literacy – one that empowers them to use AI tools effectively and examine their ethical, pedagogical, and societal implications through a critical co-discovery approach (Dilek et al. 2025).

The findings of this study have important implications for practice and policy. First, tutors require sustained, context-specific professional development that fosters critical AI literacy, moving beyond technical training to include pedagogical relevance and ethical reflection. Second, educational technology developers should engage in inclusive co-design with educators to ensure that AI tools align with real classroom needs, remain accessible, and uphold ethical standards (Baker et al. 2019). Finally, educational institutions should invest in long-term, integrated strategies that embed AI literacy within both pre-service teacher education and ongoing professional learning, as emphasised by Dilek et al. (2025) and UNESCO (2024). By fostering a more comprehensive and critically informed AI literacy framework, educators can enhance their professional autonomy and contribute to a more inclusive, ethical, and pedagogically sound integration of AI in education.

6 Conclusions

This study contributes to the expanding body of research on AI literacy by foregrounding the perspectives of nine EFL practitioners working in China's shadow education sector. Findings from individual semi-structured interviews reveal practitioners' diverse perceptions of AI, their varying degrees of AI-related knowledge, their approaches to applying and evaluating AI tools, and their ethical

considerations, all of which are shaped by their distinct teaching experiences across different contexts. Building on existing AI literacy frameworks, we argue for the need to incorporate the dimension of societal and systemic implications into the conceptualisation of AI literacy for EFL practitioners in shadow education. Accordingly, we propose a five-dimensional AI literacy framework that encompasses 1) a human-centred mindset, 2) AI knowledge and understanding, 3) AI application and evaluation, 4) AI ethics, and 5) the systemic and societal implications of AI.

Our findings also highlight key challenges and constraints in developing AI literacy among EFL practitioners in shadow education, notably limited teacher autonomy and insufficient professional development opportunities. The practitioners' insights into the internal and external forms of support necessary for enhancing their AI literacy offer valuable implications for professional development providers. Crucially, we advocate for recognising practitioners as co-creators in professional learning, emphasising the importance of their voices and agency in shaping inclusive, meaningful, and contextually relevant professional development initiatives.

While this exploratory study provides novel and nuanced insights into EFL practitioners' AI literacy in shadow education, its findings are limited by the small sample size and the specific cultural and organisational contexts. Since no more than one participant was recruited from the same institution, individual perspectives could not be corroborated or further validated within a shared organisational setting. Future research could build on the proposed framework by conducting large-scale surveys to examine AI literacy among a broader population of EFL practitioners in shadow education. Additionally, observational methodologies could enhance data triangulation and offer deeper insights into the enactment of AI in teaching practices. Given the intricate interplay between personal perceptions, pedagogical practices, institutional structures, and broader sociocultural and policy contexts, ethnographic research presents a promising avenue for generating richer, more situated understandings of AI integration in EFL shadow education.

Acknowledgments: The authors sincerely appreciate the participants for their invaluable support and extend heartfelt gratitude to the reviewers for their insightful comments, which have greatly contributed to improving this manuscript.
Research ethics: The study has been approved by School of Foreign Languages, Jimei University, China.
Informed consent: Informed consent was obtained from all individuals included in this study.
Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.
Competing interests: Authors state no conflict of interest.

Research funding: This work was supported by University-Industry Collaborative Education Program, Ministry of Education of the People's Republic of China [Grant No. 240902767243558].

Appendix A: AI Literacy Coding Scheme

Theme	Code	Description	Example
Attitudes towards AI application in teaching	*Positive Attitude towards AI*	Expressed positive beliefs about AI's role and potential in educational contexts	"I think it is quite positive. As for its role, I believe it can largely serve as a powerful aid for teachers."
	Negative Attitude towards AI	Expressed negative beliefs about AI's role and potential in educational contexts	"Reliance on AI might lead to declines in students' critical thinking, analytical skills, and language proficiency."
	Shift in Attitude	Expressed how attitude was changed after using AI	"I think I was initially somewhat resistant, mainly because I wondered if it was due to my age." "When it became publicly available, I started exploring it! Then I realised in many ways, it provides a lot of help, especially in education, for example, assisting with lesson planning."
Understanding and fundamental knowledge of AI	*Informal Learning Sources*	Expressed gaining AI knowledge through social media, self-study, and peer communication	"My understanding of AI is from what I see on social media and from communicating with friends."
	Need Foundational Understanding	Expressed needs to understand AI principles and operations for effective teaching use	"Teachers need to be proficient in using AI tools provided by the company, and they must learn how to communicate effectively with AI."
	Prompt Engineering Techniques	Recognised the importance of crafting accurate prompts to enhance AI output quality	"By writing good prompts, they can get more accurate results and make the tool serve the teaching better."
	Human-AI Collaboration	Viewed AI as supportive tools	"I prefer using AI for a first draft and then applying my own edits drawing on my ten years of teaching experience."

(continued)

Theme	Code	Description	Example
	Technical vs Pedagogical focus	Expressed that tutors perceived AI through a pedagogical lens, while technicians focused more on the technical aspects	"Technical staff aim for precision…I use AI to get started quickly based on my teaching experience."
Factors influencing AI adoption	*Accessibility*	Expressed that accessibility was one of factors that influenced their AI uses	"If a tool is hard to access and doesn't bring much value to your work, it might not be worth using."
	Content Quality	Expressed that content quality generated by AI influenced their AI uses	"Whether it's reliable and convincing, I think these three aspects, accuracy, reliability, and persuasiveness, are key."
	Perceived Usefulness	Perceived usefulness impacts participants' uses of AI	"I would consider whether the tool has complete features or if a specific function is particularly strong."
	Ease of Use	Perceived ease of use impacts participant's uses of AI	"Some AI apps are too complicated, and the interface is hard to understand. If it feels overwhelming, I just won't use it."
	Affordability	Expressed that price impacts adoption	"Since AI is a machine, people generally expect it to be cheaper or even free."
AI application	*Curriculum Development*	Expressed that using AI to tailor content caters for students' needs	"As I often create teaching materials, I rely heavily on AI now. I usually ask it to find language examples that match students' proficiency levels. I Also use it to check grammar mistakes and let AI help generate practice questions."
	Instructional Planning	Expressed that using AI to help with lesson plans	"I share my teaching objectives and content for the day with AI, and it can generate a lesson plan and a PPT outline for me, which helps with my lesson preparation."
	Classroom Teaching		"In speaking instruction, AI can provide students with

(continued)

Theme	Code	Description	Example
		Expressed that using AI to help with classroom teaching activities	authentic examples of spoken expressions for them to imitate and learn from, which helps improve their speaking skills."
	AI-assisted assessment for personalised feedback	Expressed that AI was used to support assessment, especially in speaking and writing tasks	"Outside of class, students often use our essay correction system to revise their writing and also use AI tools for speaking practice."
AI evaluation	*Proposal for 'AI Pedagogy'*	Suggested developing structured guidance for integrating AI into teaching	"…What we might call 'AI pedagogy'… unclear how we should approach and integrate AI into our teaching…"
	Limited Classroom Use	Viewed that AI's usefulness in live classroom settings was limited	"When it comes to using AI in the classroom, it might not be that effective."
	Need for AI Literacy Development	Addressed the importance of AI literacy-focused training	"Structured AI literacy training for tutors, critical evaluation skills, and discussion on best practices for AI-assisted pedagogy is important."
AI ethics considerations	*AI Hallucination*	Raised concerns about AI producing false or biased content	"It is typical for AI to make mistakes…hallucinations and biases… not good for research or important issues."
	Privacy Concerns	Raised concerns about data privacy and unclear personal data use	"They ask phone numbers and ID, but don't say how the data is used."
	Job Security Threat	Raised concerns about job security	"Apps like Pocket Tutor simulate native speakers and offer cheaper options, affecting live-streamed classes."
	Emotional Intelligence & Human Connection	Expressed that AI cannot replace human as it lacks empathy, care, and emotional intelligence	"I feel happy or sorry with my students… Meaningful connections matter."
Professional development for AI literacy	*Open mindset*	Expressed that they remained open-minded towards learning AI	"Continuous learning can enhance our AI capabilities."
	Call for Formal training	Expressed that formal training would be helpful to	"Formal training should include nationally certified programmes (e.g., provincial

(continued)

Theme	Code	Description	Example
		provide practical examples and inspiring ideas	vocational training with certification) and institution-led sessions. Internal training is encouraged to link instructor promotion with pay and to offer practical cases (e.g., applying AI in TOEFL reading) to support effective integration of AI into teaching."
	Self-learning	Expressed that self-learning can help develop AI literacy	"I learn from Xiaohongshu videos."
	Need for policy support	Expressed that government should provide clear AI policies and funding support	"Governments should enhance policy support and regulation."
	Third Party Educational Content	Expressed that practical AI demonstration content would be useful and accessible	"Short, clear, practical demonstration videos could effectively communicate AI's usefulness."

References

Almatrafi, Omaima, Aditya Johri & Hyuna Lee. 2024. A systematic review of AI literacy conceptualization, constructs, and implementation and assessment efforts (2019–2023). *Computers and Education Open* 6(1). 100173.

Baker, Toby, Laurie Smith & Nandra Anissa. 2019. *Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges*. London: Nesta Foundation.

Balcı, Ömer. 2024. The role of ChatGPT in English as a Foreign Language (EFL) learning and teaching: A systematic review. *International Journal of Contemporary Educational Studies* 3(1). 66–82.

Bali, Maha. 2023. *What I mean when I say critical AI literacy*. Reflecting Allowed. https://blog.mahabali.me/educational-technology-2/what-i-mean-when-i-say-critical-ai-literacy/ (accessed 20 January 2025).

Braun, Virginia & Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2). 77–101.

Braun, Virginia & Victoria Clarke. 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 11(4). 589–597.

Bray, Mark & Chad Lykins. 2012. *Shadow education: Private supplementary tutoring and its implications for policy makers in Asia*, Vol. 58, 809–811. Asian Development Bank.

Carolus, Astrid, Martin Koch, Samantha Straka, Marc E. Latoschik & Carolin Wienrich. 2023. MAILS – meta AI literacy scale: Development and testing of an AI literacy questionnaire based on well-founded competency models and psychological change- and meta-competencies. Available at: https://doi.org/10.48550/arXiv.2302.09319.

Cohen, Louis, Lawrence Manion & Keith Morrison. 2018. *Research methods in education*, 8th ed. London: Routledge.

Creswell, John W. & Cheryl N. Poth. 2016. *Qualitative inquiry and research design: Choosing among five approaches*. Los Angeles: SAGE publications.

Deng, Feng, Ching S. Chai, Chin-Chung Tsai & Min-Hsien Lee. 2014. The relationships among Chinese practicing teachers' epistemic beliefs, pedagogical beliefs and their beliefs about the use of ICT. *Journal of Educational Technology & Society* 17(2). 245–256.

Denzin, Norman K. & Yvonna S. Lincoln. 2018. *The SAGE handbook of qualitative research*, 5th ed. Los Angeles: SAGE publications.

Dilek, Melis, Evrim Baran & Ezequiel Aleman. 2025. AI literacy in teacher education: Empowering educators through critical co-discovery. *Journal of Technology and Teacher Education* 33(1). 45–68.

Ding, Ai-Chu E., Lehong Shi, Haotian Yang & Ikseon Choi. 2024. Enhancing teacher AI literacy and integration through different types of cases in teacher professional development. *Computers and Education Open* 6(4). 100178.

Du, Jinming & Ben K. Daniel. 2024. Transforming language education: A systematic review of AI-powered chatbots for English as a foreign language speaking practice. *Computers and Education: Artificial Intelligence* 6. 100230.

Firaina, Radha & Dwi Sulisworo. 2023. Exploring the usage of ChatGPT in higher education: Frequency and impact on productivity. *Buletin Edukasi Indonesia* 2(01). 39–46.

Hamid, Obaidul M., Asaduzzaman Khan & M. Monjurul Islam. 2018. The spread of private tutoring in English in developing societies: Exploring students' perceptions. *Discourse: Studies in the Cultural Politics of Education* 39(6). 868–886.

Jia, Fenglin, Daner Sun, Qing Ma & Chee-Kit Looi. 2022. Developing an AI-based learning system for L2 learners' authentic and ubiquitous learning in English language. *Sustainability* 14(23). 15527.

Kim, Keunjae & Kyungbin Kwon. 2023. Exploring the AI competencies of elementary school teachers in South Korea. *Computers and Education: Artificial Intelligence* 4. 100137.

Laupichler, Matthias C., Alexandra Aster, Jana Schirch & Tobias Raupach. 2022. Artificial intelligence literacy in higher and adult education: A scoping literature review. *Computers and Education: Artificial Intelligence* 3. 100101.

Lincoln, Yvonna S. & Egon G. Guba. 1985. *Naturalistic inquiry*. Beverly Hills: SAGE Publications.

Liu, Qian. 2024. Who is talking: Transforming teacher-student dialogue with ChatGPT. In Michael A. Peters & Richard Heraud (eds.), *Encyclopedia of Educational Innovation*, 1–6. Singapore: Springer.

Long, Duri & Brian Magerko. 2020. What is AI literacy? Competencies and design considerations. In *Proceedings of the 2020 CHI conference on human factors in computing systems*. Honolulu, USA: Georgia College of Tech Computing.

Luckin, Rose. 2017. Towards artificial intelligence-based assessment systems. *Nature Human Behaviour* 1(3). 0028.

Luckin, Rosemary & Mutlu Cukurova. 2019. Designing educational technologies in the age of AI: A learning sciences-driven approach. *British Journal of Educational Technology* 50(6). 2824–2838.

Luckin, Rosemary, Mutlu Cukurova, Carmel Kent & Benedict D. Boulay. 2022. Empowering educators to be AI-ready. *Computers and Education: Artificial Intelligence* 3. 100076.

Ma, Qing, Peter Crosthwaite, Daner Sun & Di Zou. 2024. Exploring ChatGPT literacy in language education: A global perspective and comprehensive approach. *Computers and Education: Artificial Intelligence* 7. 100278.

Marshall, Catherine & Gretchen B. Rossman. 2016. *Designing qualitative research*, 6th ed. Thousand Oaks: SAGE Publications.

Mishra, Punya & Matthew J. Koehler. 2006. Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record* 108(6). 1017–1054.
Mouta, Ana, Eva M. Torrecilla-Sánchez & Ana M. Pinto-Llorente. 2025. Comprehensive professional learning for teacher agency in addressing ethical challenges of AIED: Insights from educational design research. *Education and Information Technologies* 30(3). 3343–3387.
Ng, Davy T. K., Jac K. L. Leung, Samuel K. W. Chu & Maggie S. Qiao. 2021. Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence* 2. 100041.
Nowell, Lorelli S., Jill M. Norris, Deborah E. White & Nancy J. Moules. 2017. Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods* 16(1). 1–13.
Sperling, Katarina, Carl-Johan Stenberg, Cormac McGrath, Anna Åkerfeldt, Fredrik Heintz & Stenliden Linnéa. 2024. In search of artificial intelligence (AI) literacy in teacher education: A scoping review. *Computers and Education Open* 6. 100169.
Su, Jiahong, Yuchun Zhong & Davy T. K. Ng. 2022. A meta-review of literature on educational approaches for teaching AI at the K-12 levels in the Asia-Pacific region. *Computers and Education: Artificial Intelligence* 3. 100065.
Teng, (Mark) Feng. 2019. Understanding teacher autonomy, teacher agency, and teacher identity: Voices from four EFL Student Teachers. *English Teaching & Learning* 43(2). 189–212.
Tisdell, Elizabeth J., Sharan B. Merriam & Heather L. Stuckey-Peyrot. 2025. *Qualitative research: A guide to design and implementation*, 5th ed. Hoboken: John Wiley & Sons.
UNESCO. 2024. AI competency framework for teachers. https://doi.org/10.54675/ZJTE2084.
Vagle, Mark D. 2018. *Crafting phenomenological research*. London: Routledge.
Van Nes, Fenna, Tineke Abma, Hans Jonsson & Dorly Deeg. 2010. Language differences in qualitative research: Is meaning lost in translation? *European Journal of Ageing* 7. 313–316.
Wang, Bingcheng, Pei-Luen P. Rau & Tianyi Yuan. 2023. Measuring user competence in using artificial intelligence: Validity and reliability of artificial intelligence literacy scale. *Behaviour & Information Technology* 42(9). 1324–1337.
Wegerif, Rupert & Louis Major. 2019. Buber, educational technology, and the expansion of dialogic space. *AI & Society* 34(1). 109–119.
Wu, Junjie G. & Lindsay Miller. 2025. Smart or sweat: The bittersweet journey of teachers' AI literacy. *International Journal of TESOL Studies*. 1–10.
Xiong, Tao, Qiuna Li & Guangwei Hu. 2022. Teaching English in the shadow: Identity construction of private English language tutors in China. *Discourse: Studies in the Cultural Politics of Education* 43(1). 73–85.
Yang, Dachuan & Jianming Li. 2022. The status quo and problems of the implementation of the double reduction policy and regulatory measures at county level -Based on the investigation into the governance of shadow education institutions in X county, Yunnan province. *Journal of Chengdu Normal University* 38(1). 1–8.
Yeh, Hui-Chin. 2025. The synergy of generative AI and inquiry-based learning: Transforming the landscape of English teaching and learning. *Interactive Learning Environments* 33(1). 88–102.
Yu, Jiangran & Rui Zhang. 2022. A review of shadow education. *Science Insights Education Frontiers* 11(2). 1579–1593.
Yung, Kevin W. H. 2021. Shadow education as a form of oppression: Conceptualizing experiences and reflections of secondary students in Hong Kong. *Asia Pacific Journal of Education* 41(1). 115–129.
Yung, Kevin W. H. & Rui Yuan. 2020. 'The most popular star-tutor of English': Discursive construction of tutor identities in shadow education. *Discourse: Studies in the Cultural Politics of Education* 41(1). 153–168.

Zhang, Cong, Yi Zhang & Yun Gao. 2023. The “secrets” of English private tutoring in China: Chinese students’ experiences of study abroad test preparation in cram schools. *Frontiers in Psychology* 14. 1120768.
Zhao, Leilei, Xiaofan Wu & Heng Luo. 2022. Developing AI literacy for primary and middle school teachers in China: Based on a structural equation modeling analysis. *Sustainability* 14(21). 14549.

Bionotes

Qian Liu
IOE, UCL’s Faculty of Education and Society, University College London, London, UK
q.liu@ucl.ac.uk
https://orcid.org/0000-0001-7416-1497

Qian Liu received her PhD from the University of Cambridge and is currently a Research Fellow at IOE, UCL’s Faculty of Education and Society, United Kingdom. Her research interests include technology-supported pedagogy, teacher professional development, and equitable participation in STEM.

Mengjie Jiang
International Office, University of Lincoln, Lincoln, UK
gjiang@lincoln.ac.uk
https://orcid.org/0000-0003-2320-1916

Mengjie Jiang received her PhD in Education from the University of Leicester and is currently an International Officer at the University of Lincoln, United Kingdom. Her research interests include the internationalisation of higher education, technology-enhanced learning, and the development of digital literacy skills.

Yonghua (Yoka) Wang
School of Foreign Languages, Jimei University, Xiamen, China
yokawang090318@gmail.com
https://orcid.org/0000-0003-3216-4192

Yonghua (Yoka) Wang received his PhD from the University of Bath and is currently a Lecturer at the School of Foreign Languages, Jimei University, China. His research interests include applied linguistics, sociolinguistics, language education, and teacher development.

Liqun He
UCL Knowledge Lab, University College London, London, UK
liqun.he@ucl.ac.uk
https://orcid.org/0000-0002-0837-5857

Liqun He is currently a PhD student in Educational Technology at the Knowledge Lab, University College London, United Kingdom. His research interests include educational LLM evaluation, automated dialogue analysis, and design research.