

## Research Article

# AI Integration in Vocational EFL in China: A Qualitative Pedagogical Capability Framework from Teachers' Perspectives

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**ABSTRACT**

Artificial intelligence (AI) is increasingly reshaping English as a Foreign Language (EFL) instruction, yet its integration in vocational education remains insufficiently explained by adoption-oriented or tool-centered models. In vocational EFL, teachers must ensure that AI-supported learning is pedagogically meaningful, workplace-relevant, and ethically governed. This study develops an empirically informed pedagogical capability framework for integrating AI into vocational EFL teaching in China, from teachers' perspectives. A qualitative exploratory design was employed with 41 vocational EFL teachers from six vocational and technical institutions in Yunnan Province, China. Data were collected through 18 semi-structured interviews and 23 extended open-ended survey responses. Reflexive thematic analysis was used to generate themes and synthesize framework dimensions, supported by coding summaries, source comparison, and reflexive memoing. Three themes emerged: teacher pedagogical capability and readiness, institutional and ethical barriers, and instructional applicability of AI tools. Teachers distinguished general digital competence from AI-specific pedagogical judgment, particularly in validating AI feedback, designing workplace-oriented tasks, protecting learner agency, and addressing privacy, authorship, bias, and overreliance. AI tools were perceived as useful for writing feedback, chatbot-based workplace simulation, pronunciation practice, adaptive learning, learner analytics, and occupation-specific vocabulary support, but only under teacher mediation and institutional support. Meaningful AI integration in vocational EFL depends on four interdependent dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance. The framework extends TPACK, TAM, UTAUT, digital competence, and AI literacy by repositioning AI integration as a relational, human-centered, and context-sensitive pedagogical process.

**KEYWORDS** AI-mediated instruction • digital transformation • educational sustainability • quality education • teacher capability • vocational pedagogy • workplace communication

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## 1. INTRODUCTION

Artificial intelligence (AI) has become a major force in contemporary educational transformation, particularly through machine learning, natural language processing, adaptive learning systems, automated feedback, learner analytics, and generative AI. These technologies are changing how teachers design learning activities, provide feedback, interpret learner performance, and support individualized learning [1], [2]. In language education, AI applications have expanded rapidly through automated writing evaluation, speech recognition, machine translation, intelligent tutoring systems, chatbot-mediated interaction, pronunciation support, vocabulary learning, and data-informed feedback [3], [4]. For English as a Foreign Language (EFL) learners, who often have limited exposure to authentic English communication beyond the classroom, AI-assisted learning may provide additional opportunities for practice, feedback, and personalized language development [5].

Despite these opportunities, AI integration in education cannot be understood merely as a matter of technological access or tool adoption. AI-generated language output may appear fluent but remain inaccurate, decontextualized, biased, ethically problematic, or misaligned with the communicative purpose of a task [6]–[8]. Generative AI also raises concerns about learner authorship, academic integrity, privacy, overreliance, algorithmic bias, and the reliability of automated feedback [9], [10]. These concerns are especially important in language education because teachers must evaluate not only the grammatical accuracy of AI-generated output, but also its appropriateness, meaning, tone, cultural sensitivity, and pedagogical value. Therefore, teachers remain central actors in AI-mediated learning because they select tools, design tasks, validate feedback, guide learner use, and determine whether AI supports intended learning outcomes [11]–[13].

This issue becomes more complex in vocational EFL. Unlike general EFL instruction, vocational EFL is directly connected to employability, workplace communication, professional identity, and occupation-specific discourse. Learners may need English to write technical reports, prepare for job interviews, handle customer service interactions, explain safety procedures, read manuals, produce workplace emails, deliver presentations, and use profession-specific vocabulary [4], [8], [14]. In this context, the usefulness of AI tools cannot be assessed only by their ability to correct grammar, generate fluent sentences, or increase learner engagement. AI tools must also be evaluated for their ability to support authentic, workplace-oriented communication. For instance, a chatbot becomes pedagogically meaningful only when it is designed around a relevant occupational scenario and assessed through professional communication criteria. Similarly, an automated writing tool may support grammar correction but still be inadequate for technical reporting if it fails to address genre conventions,

disciplinary accuracy, audience awareness, and workplace tone.

The Chinese vocational education context further strengthens the relevance of this issue. Vocational education in China has been positioned as a strategic mechanism for preparing skilled workers and strengthening industry–education integration. Recent policy directions emphasize high-quality vocational education, digital transformation, employability, and closer alignment between education and changing labor-market needs [15], [16]. At the same time, AI is increasingly associated with educational innovation, teacher competence development, digital governance, and technology-enhanced learning in technical and vocational education [14], [17]. These developments create both opportunities and challenges for vocational EFL teachers. While AI may support individualized practice, simulated workplace communication, adaptive learning, and rapid feedback, teachers must also decide whether AI-generated language is accurate, reflects occupational discourse, protects learner data, and keeps students active language users rather than passive consumers of automated suggestions.

Existing studies have provided important insights into AI-assisted language learning, teacher readiness, technology acceptance, digital competence, and AI literacy [17]–[19]. However, much of this literature remains tool-centered, learner-centered, or acceptance-centered. Tool-centered studies tend to focus on what AI applications can do, such as automated feedback, chatbot interaction, adaptive practice, or pronunciation support. Learner-centered studies often examine engagement, motivation, or perceived usefulness. Acceptance-centered studies, often informed by the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), explain teachers' willingness to adopt technology in terms of perceived usefulness, ease of use, social influence, and facilitating conditions [20], [21]. These perspectives are valuable, but they do not sufficiently explain how vocational EFL teachers evaluate, adapt, supervise, and ethically manage AI tools for workplace-oriented language teaching.

Theoretical frameworks such as Technological Pedagogical Content Knowledge (TPACK), TAM, UTAUT, digital competence, and AI literacy are therefore useful but incomplete for explaining AI integration in vocational EFL. TPACK explains the relationship between technological, pedagogical, and content knowledge [13]. However, generative AI requires additional forms of professional judgment because AI systems generate, modify, and recommend language output rather than deliver fixed digital content. TAM and UTAUT explain adoption intention and enabling conditions [20], [21], but acceptance does not guarantee pedagogical quality. Digital competence refers to teachers' operational ability to use digital tools, while AI literacy refers to an

understanding of AI's functions, limitations, biases, and responsible use [17], [19], [22]. However, vocational EFL teachers also require a broader pedagogical capability: the professional capacity to select, evaluate, adapt, supervise, and ethically manage AI tools in relation to specific vocational communication objectives.

Despite the rapid expansion of AI research in language education, limited empirical attention has been given to vocational EFL teachers' perspectives on AI integration, particularly regarding workplace communication, institutional readiness, instructional applicability, and ethical governance. This gap matters because vocational EFL teachers face layered pedagogical decisions: whether AI chatbots can model authentic workplace dialogue, whether automated feedback can support technical writing, whether AI pronunciation tools are reliable for professional speaking tasks, whether learner analytics should guide interventions, and whether student data are handled responsibly. These decisions cannot be explained by adoption models alone; they require empirical investigation of how teachers understand readiness, barriers, feasible applications, and ethical responsibility in their own institutional contexts.

Accordingly, this qualitative exploratory study develops an empirically informed pedagogical capability framework for AI integration in vocational EFL teaching in China. Drawing on semi-structured interviews and open-ended survey responses from vocational EFL teachers at six vocational and technical institutions in Yunnan Province, the study examines teachers' readiness for AI-assisted instruction, the institutional, pedagogical, and ethical barriers to AI integration, and the AI-supported applications deemed feasible for vocational EFL classrooms. The study contributes theoretically by extending TPACK, TAM, UTAUT, AI literacy, and digital competence through the concept of pedagogical capability. It contributes methodologically by demonstrating how interview and open-ended survey data can be synthesized through reflexive thematic analysis to build a qualitative framework. It contributes practically by offering guidance for teacher education, institutional policy, and curriculum design in AI-mediated vocational language education. In doing so, the study synthesizes teacher readiness, institutional support, instructional relevance, and ethical governance as interdependent dimensions of meaningful AI integration in vocational EFL education.

## 2. LITERATURE REVIEW

### 2.1. AI-Assisted and Gen-AI in Language Learning

AI-assisted language learning has expanded rapidly with the development of automated writing evaluation, intelligent tutoring systems, speech-recognition tools, machine translation, adaptive platforms, chatbots,

learner analytics, and generative AI. Recent reviews show that AI is increasingly used in English language teaching to support writing feedback, oral practice, vocabulary development, pronunciation training, translation, personalized learning, and student engagement [3], [23], [24]. In EFL contexts, these tools can be valuable because learners often have limited opportunities to use English in authentic communicative situations outside the classroom. AI-supported practice may therefore extend exposure to English, provide immediate feedback, and help learners engage in individualized learning activities [5].

However, recent literature also shows that AI-supported language learning is not automatically pedagogically effective. While AI can produce fluent language output and offer rapid feedback, it may generate inaccurate, biased, generic, culturally inappropriate, or contextually weak responses [1], [7], [8]. Automated writing evaluation tools may support grammar, spelling, cohesion, and sentence-level correction. However, they may not fully capture rhetorical intention, disciplinary meaning, professional tone, audience awareness, or genre-specific appropriateness [6], [18]. Similarly, chatbot-based interaction may create opportunities for conversational practice. However, its educational value depends on task design, prompt quality, teacher supervision, and post-task reflection [24], [25].

Generative AI has intensified these debates because it does not merely deliver fixed digital content; it produces, revises, summarizes, translates, and evaluates language output. This creates new pedagogical possibilities but also new risks. Students may receive immediate feedback, simulate professional dialogue, or generate model texts. However, they may also become dependent on AI-generated responses, accept inaccurate feedback, or lose authorship over their own writing [9], [17]. Therefore, the central issue in AI-assisted language learning is not whether AI can generate language, but whether teachers can transform AI output into meaningful, accurate, ethical, and context-sensitive learning.

### 2.2. Teacher Readiness, AI Literacy, and Pedagogical Capability

Teacher readiness is a decisive factor in AI integration, as effective AI use depends not only on technological access but also on teachers' knowledge, confidence, evaluative judgment, ethical awareness, and institutional support. Earlier technology-integration research has often used Technological Pedagogical Content Knowledge (TPACK), the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), digital competence, and AI literacy to explain teachers' readiness and adoption behavior.

TPACK remains useful because it explains that effective technology integration requires the interaction of technological, pedagogical, and content knowledge [13]. In EFL teaching, this means that teachers must

understand how digital tools can support grammar, vocabulary, pronunciation, writing, speaking, discourse competence, and communicative practice. However, generative AI complicates TPACK because AI systems not only support access to learning materials but also actively generate and evaluate language. Teachers must therefore validate AI-generated feedback, identify inaccurate or biased output, protect learner authorship, and determine whether AI-generated language is appropriate for a specific communicative task [7], [10].

TAM and UTAUT also provide useful but limited explanations. TAM explains technology acceptance in terms of perceived usefulness and perceived ease of use [20], while UTAUT adds performance expectancy, effort expectancy, social influence, and facilitating conditions [21]. These constructs help explain why teachers may be willing to use AI tools. However, acceptance does not guarantee pedagogical appropriateness. A teacher may consider an AI tool useful and easy to use. However, it may still produce feedback or interactions that are unsuitable for professional communication, technical reporting, workplace dialogue, or occupation-specific vocabulary. For vocational EFL, the question is therefore not only whether teachers accept AI, but whether they can evaluate, adapt, and govern AI use pedagogically.

Digital competence and AI literacy extend this discussion. Digital competence refers to teachers' ability to use digital resources, manage technology-enhanced learning, support student engagement, and integrate digital tools into teaching [19]. AI literacy is more specific because it involves understanding how AI systems work, recognizing their limitations, evaluating AI outputs, identifying bias, and using AI responsibly [17], [22]. UNESCO's AI competency framework further emphasizes that teachers need competence in human-centered AI use, AI ethics, AI foundations, AI pedagogy, and AI-supported professional learning [17]. Nevertheless, AI literacy alone is insufficient for vocational EFL, as teachers must also align AI use with occupational communication and employability-oriented outcomes.

In this study, pedagogical capability is used to describe this broader professional capacity. Pedagogical capability refers to teachers' ability to select, evaluate, adapt, supervise, and ethically manage AI tools in relation to specific vocational EFL objectives. It includes AI-specific pedagogical knowledge, prompt and task design, feedback validation, ethical decision-making, human oversight, learner-data awareness, and vocational task alignment. This construct does not replace TPACK, TAM, UTAUT, digital competence, or AI literacy. Rather, it integrates and extends them by shifting the focus from technology adoption to pedagogically responsible and context-sensitive AI use.

### 2.3. AI Integration in Vocational EFL

Vocational EFL differs from general EFL because language learning is directly linked to employability,

workplace performance, professional communication, and occupation-specific discourse. Learners in vocational and technical institutions may need English to write technical reports, prepare for job interviews, handle customer service interactions, explain safety procedures, read manuals, produce workplace emails, deliver presentations, and use profession-specific vocabulary [4], [8], [14]. Therefore, vocational EFL competence is not limited to grammatical accuracy or general fluency; it also involves the ability to use English appropriately in professional, technical, and workplace-specific contexts.

Recent studies suggest that AI tools may support vocationally oriented language learning in several ways. Chatbots can simulate workplace conversations, service encounters, interviews, and role-play scenarios. Automated writing tools can support workplace emails, technical descriptions, reports, and professional summaries. Speech-recognition tools may assist pronunciation and oral fluency practice. Adaptive learning platforms can personalize vocabulary and grammar practice, while learner analytics can help teachers identify students who need additional support [25]. These affordances are relevant to vocational EFL because they can create additional opportunities for task-based, communicative, and workplace-oriented practice.

However, the vocational value of AI depends on curriculum alignment and teacher mediation. A chatbot conversation is not automatically vocational simply because it is interactive. It becomes vocationally meaningful only when it is designed around authentic occupational scenarios, supported by appropriate prompts, and assessed according to professional communication criteria. Similarly, automated writing feedback may improve surface-level accuracy but remain inadequate for technical reporting if it fails to address genre conventions, disciplinary precision, workplace tone, safety implications, or audience awareness. This distinction is important because vocational EFL requires AI tools to be evaluated against workplace communication outcomes rather than solely on general language output.

This issue is particularly relevant in the Chinese vocational education context, where vocational education has been positioned as a strategic pathway for developing skilled workers, enhancing the quality and responsiveness of vocational schools, and strengthening the integration between industry and education [15], [16]. At the same time, international discussions on technical and vocational education and training increasingly emphasize digital transformation, AI integration, industry relevance, ethical standards, and future-oriented skills [14]. These developments suggest that vocational EFL teachers are not only language instructors; they also mediate between English learning, workplace readiness, digital transformation, and AI-supported professional communication.

## 2.4. Institutional, Ethical, and Curriculum-Alignment Issues

Institutional conditions also shape AI integration. Teachers may be interested in using AI but may be constrained by weak internet access, limited devices, a lack of licensed platforms, insufficient technical support, unclear policies, limited professional development, or rigid curriculum structures. Without institutional readiness, AI use may remain fragmented, experimental, and dependent on individual teachers' personal initiative. This is problematic because responsible AI integration requires not only teacher motivation but also infrastructure, training, approved tools, data-protection rules, curriculum guidance, and quality assurance.

Ethical governance is equally central. AI-supported teaching may involve learner data, automated evaluation, generated text, algorithmic recommendations, third-party platforms, and opaque decision-making processes. These conditions raise concerns about privacy, transparency, bias, fairness, academic integrity, authorship, overreliance, and human oversight [1], [6], [9]. In vocational EFL, these ethical concerns become more consequential because learners may use English for professional and safety-sensitive communication. Inaccurate AI-generated language in workplace emails, technical reports, safety instructions, or customer service exchanges may lead to misunderstandings, reduce professional credibility, or weaken learner accountability.

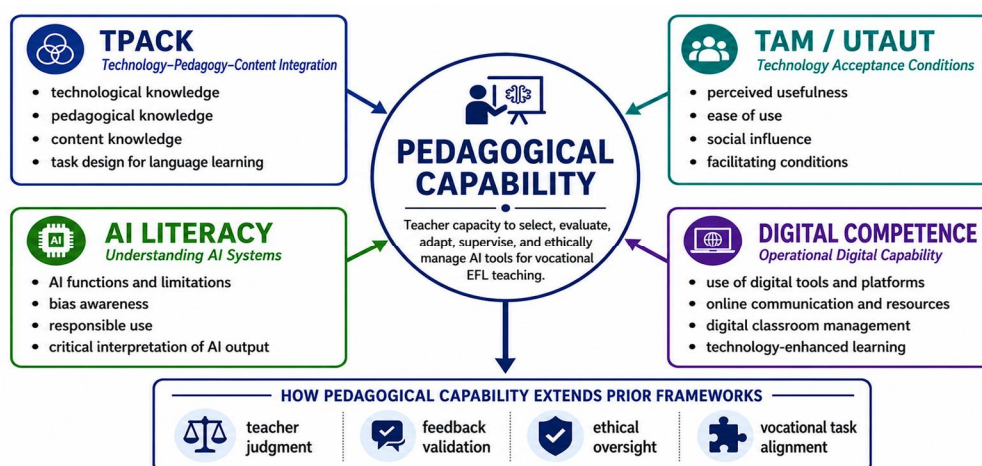
Curriculum alignment is another critical issue. Many AI tools are designed for broad language support rather than occupation-specific communication. As a result, AI-generated examples may not reflect the terminology, tone, genre, or communicative expectations of specific vocational fields. Teachers, therefore, need to adapt prompts, evaluate outputs, design assessment criteria, and scaffold student use. This indicates that AI integration

in vocational EFL is not merely a technical issue; it is a curriculum design, teacher development, and institutional-governance issue.

A responsible approach to AI in vocational EFL should therefore include institutional policies on acceptable AI tools, learner-data protection, academic integrity, transparent assessment, human oversight, and professional development. UNESCO's guidance on generative AI emphasizes the need for regulatory oversight and human-centered capacity-building. At the same time, the AI competency framework for teachers highlights ethics, pedagogy, and professional learning as central dimensions of teacher preparation [11], [17]. These perspectives support the argument that AI should be used as a supervised instructional aid rather than an autonomous replacement for teacher expertise or learner effort.

## 2.5. Conceptual Positioning of the Study

The literature indicates that existing frameworks provide useful but partial explanations of AI integration in vocational EFL. TPACK explains the relationship among technology, pedagogy, and content knowledge, but it does not fully address the evaluative and ethical responsibilities arising from generative AI. TAM and UTAUT explain technology acceptance and adoption intention, but they do not determine whether AI use is pedagogically responsible. Digital competence refers to teachers' operational ability to use digital tools, while AI literacy refers to awareness of AI's functions, limitations, risks, and responsible use. However, vocational EFL requires a broader construct that connects AI use with workplace communication, professional discourse, institutional readiness, curriculum alignment, and ethical governance.



**Figure 1.** Conceptual positioning of the study: from technology-adoption and AI-literacy frameworks to pedagogical capability in vocational EFL.

This study, therefore, positions pedagogical capability as an integrative construct. It draws on TPACK by

recognizing the importance of connecting technology, pedagogy, and language content. It draws on TAM and

UTAUT by acknowledging that perceived usefulness, ease of use, facilitating conditions, and institutional support influence teachers' willingness to use AI. It draws on digital competence and AI literacy by emphasizing operational competence, awareness of AI limitations, responsible use, and ethical judgment. However, it extends these frameworks by focusing on teachers' ability to transform AI tools into meaningful vocational EFL instruction.

From this perspective, meaningful AI integration in vocational EFL depends on four interrelated dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance. Teacher pedagogical capability enables teachers to evaluate and adapt AI output. Institutional readiness determines whether AI use can be supported through infrastructure, training, policy, and technical assistance. Instructional applicability ensures that AI tools are connected to workplace-oriented language outcomes. Ethical governance protects learners, preserves human oversight, and ensures responsible use of AI-generated

output. Together, these dimensions provide the conceptual basis for the pedagogical capability framework developed in this study.

### 3. MATERIALS AND METHODS

#### 3.1. Research Design

This study employed a qualitative exploratory design with a framework-building orientation to examine AI integration in vocational EFL as an emerging pedagogical issue requiring interpretive inquiry rather than hypothesis testing or causal measurement [26], [27]. Guided by an interpretive qualitative orientation, teachers' accounts were treated as situated professional meanings shaped by classroom experience, institutional context, and vocational language demands [28]. Because RQ4 required conceptual synthesis, the analysis moved from participant accounts to codes, categories, themes, and an empirically informed pedagogical capability framework [29], [30].

**Table 1.** Alignment of research questions, data sources, analytic focus, and manuscript outputs

Research question	Data sources	Analytic focus	Manuscript output
RQ1. How do vocational EFL teachers perceive their readiness for AI-assisted instruction?	Semi-structured interviews and open-ended survey responses	Digital competence, AI-specific pedagogical knowledge, feedback validation, teacher confidence, and training needs	Theme 1: coded confidence indicators; professional development needs
RQ2. What institutional, pedagogical, and ethical barriers influence AI integration in vocational EFL teaching?	Semi-structured interviews and open-ended survey responses	Infrastructure, policy guidance, institutional support, curriculum alignment, data privacy, bias, authorship, and human oversight	Theme 2: institutional and ethical barrier analysis
RQ3. What AI-supported instructional applications are considered feasible and relevant for vocational EFL classrooms?	Semi-structured interviews and open-ended survey responses	Automated writing feedback, chatbot simulation, pronunciation support, adaptive learning, learner analytics, and workplace communication tasks	Theme 3: actual and potential instructional uses of AI
RQ4. How can teacher readiness, institutional support, instructional relevance, and ethical governance be synthesized into a pedagogical capability framework for vocational EFL education?	Integrated thematic findings, coding summaries, and reflexive memos	Cross-theme comparison of pedagogical capability, institutional readiness, instructional applicability, and ethical governance	Pedagogical Capability Framework; framework development matrix

The study integrated semi-structured interviews and open-ended survey responses as complementary data sources to capture both depth and participant variation. Data were analyzed using reflexive thematic analysis to identify patterned meanings while acknowledging the researcher's interpretive role [31], [32]. Coding summaries were calculated only after coding to improve transparency; frequencies and percentages were not treated as inferential statistics, standardized measures, or population estimates. This limited use of numbers is appropriate when it clarifies qualitative patterns without replacing interpretation [33], [34].

The reporting of this study was guided by the Standards for Reporting Qualitative Research (SRQR) and the Consolidated Criteria for Reporting Qualitative Research (COREQ). SRQR provides 21 items for

transparent qualitative reporting, while COREQ offers a 32-item checklist for reporting interview- and focus group-based qualitative studies [35], [36]. These standards were used to strengthen transparency in reporting the research design, sampling logic, data collection, researcher reflexivity, data analysis, trustworthiness, ethical considerations, and the presentation of findings. They were applied as reporting guidance rather than as rigid methodological checklists.

#### 3.2. Participants and Sampling

Participants were 41 vocational EFL teachers from six vocational and technical institutions in Yunnan Province, China. These institutions were selected because they represent applied vocational education contexts in which

English instruction is closely connected to employability, workplace communication, technical reporting, customer interaction, job interviews, safety communication, and occupation-specific language use. As shown in Table 1, the participating institutions covered diverse vocational fields, allowing the study to capture variation across technical and applied educational settings.

Purposive sampling was used to recruit information-rich participants whose teaching experience was directly relevant to workplace-oriented and employability-related English instruction [37], [38]. This strategy was appropriate because the study sought contextual depth,

interpretive relevance, and theoretically meaningful variation rather than statistical representativeness [26]. Recruitment was conducted via institutional email invitations, departmental contacts, and professional teacher networks from March to May 2024. Of 60 invited teachers, 43 responded; 17 declined or did not respond, and 2 withdrew or provided incomplete data. The final analyzed sample consisted of 41 participants: 18 from semi-structured interviews and 23 from extended open-ended surveys. Only accounts with informed consent and sufficient qualitative detail were included.

**Table 2.** Institutional contexts of participating vocational EFL teachers

No.	Institution	Vocational field represented
1	Kunming Metallurgy College	Metallurgy
2	Yunnan Communications Vocational and Technical College	Transportation and communications
3	Yunnan Polytechnic College of Mechanical and Electrical Engineering	Mechanical and electrical engineering
4	Yunnan Forestry Technological College	Forestry
5	Yunnan National Defense Industry Vocational and Technical College	National defense industry
6	Kunming Industrial Vocational and Technical College	Industrial technology

**Table 3.** Recruitment flow and participant characteristics of the qualitative sample.

Section	Indicator	Category / Description	n	Base (n)	%
Recruitment flow	Invited to participate	Vocational EFL teachers contacted	60	60	100.0
	Responded to the invitation	Teachers who responded to the invitation	43	60	71.7
	Declined or did not respond	Teachers who declined or gave no response	17	60	28.3
	Withdrawn or incomplete data	Responses excluded before analysis	2	43	4.7
Final sample	Final analyzed sample	Participants included in the qualitative analysis	41	60	68.3
Data source	Semi-structured interviews	Participants providing interview data	18	41	43.9
	Open-ended survey responses	Participants providing extended written responses	23	41	56.1
Teaching experience	Career-stage variation	Early-career, mid-career, and senior teachers represented	41	41	100.0
Prior AI familiarity	Basic	Limited familiarity with AI-supported or digital teaching tools	15	41	36.6
	Moderate	Regular but not advanced familiarity	12	41	29.3
	Advanced	Frequent or confident use of AI-supported or digital teaching tools	14	41	34.1

Participants were eligible if they were current vocational or technical EFL teachers, had at least 1 year of teaching experience, taught English for workplace-oriented or employability-related purposes, were familiar with digital or technology-enhanced teaching practices, and were willing to discuss AI integration in teaching. The sample included early-career, mid-career, and senior teachers across varied institutional contexts and vocational fields, with varying prior familiarity with AI-supported or digital teaching tools, ranging from basic to advanced.

The digital-teaching familiarity criterion may have introduced selection bias, as teachers with little or no digital-teaching experience were less likely to be

included. This may partly explain the generally receptive attitudes toward AI reported in the findings. Therefore, the findings should not be generalized to all vocational EFL teachers in China, but interpreted as reflecting teachers with some prior exposure to digital teaching who could provide informed reflections on AI-assisted instruction.

Sample adequacy was assessed through the principle of information power, which emphasizes the specificity, relevance, and richness of participant accounts rather than sample size alone [39]. Given the focused research aim, the specific participant group, theory-informed research questions, and the framework-

building analytic strategy, the sample was deemed sufficient for reflexive thematic analysis. The interviews provided in-depth accounts of teacher reasoning, classroom decision-making, institutional constraints, and ethical concerns. At the same time, the open-ended survey responses broadened the range of perspectives and supported cross-source comparisons. During analysis, additional accounts began to repeat patterns related to AI-specific pedagogical knowledge, feedback validation, institutional support, ethical governance, and vocational task alignment. The final sample was therefore adequate for developing an empirically informed pedagogical framework [40], [41].

### 3.3. Data Collection Procedures

Data were collected through semi-structured interviews and open-ended survey responses. This two-source qualitative design combined the depth of interview accounts with broader written reflections, enabling complementary perspectives on AI readiness, pedagogical capability, institutional barriers, instructional applicability, and ethical concerns in vocational EFL teaching [26], [42].

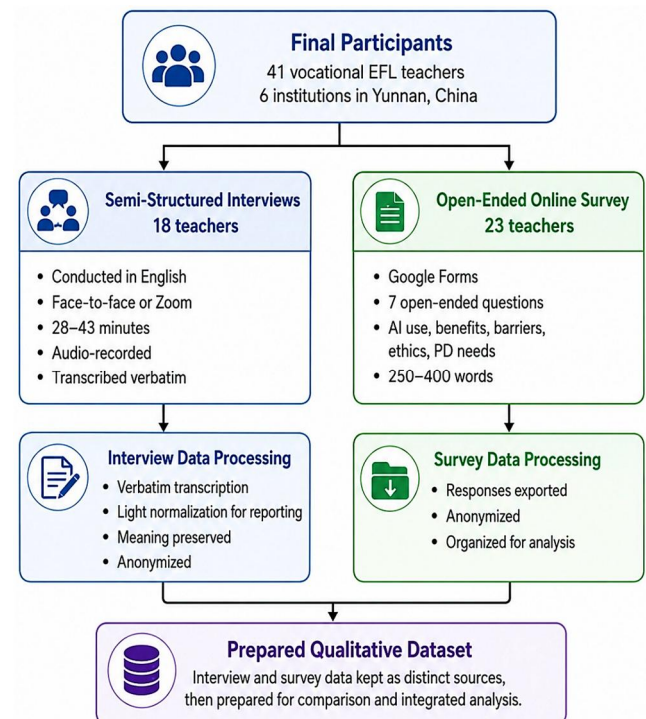
Eighteen participants took part in semi-structured interviews, a method suitable for exploring participants' experiences, meanings, and professional reasoning in depth [43], [44]. Interviews were conducted by the researcher in English, either face-to-face or via Zoom, and lasted 28–43 minutes. Follow-up questions were used to clarify meanings and obtain examples of AI-related teaching practices, risks, and classroom applications. With consent, interviews were audio-recorded and transcribed verbatim. When light grammatical normalization was needed for quotation reporting, the intended meaning was preserved.

Because interviews were conducted in English, participants first confirmed their comfort level with English. To reduce language-related bias, they were encouraged to ask for clarification, pause, rephrase, or explain ideas as accurately as possible. During transcription and analysis, the researchers prioritized intended meaning over linguistic correction.

Twenty-three participants completed an open-ended online survey via Google Forms. The survey contained seven open-ended questions on the use of digital or AI-supported tools, perceived benefits, adoption barriers, classroom applications, learner data, academic integrity, professional development needs, and workplace communication alignment. Responses averaged 250–400 words and were designed to generate qualitative reflections rather than numerical ratings [40].

Two language education experts reviewed the interview and survey protocols for clarity, relevance, and alignment with the research questions. Because interviews and surveys differ in depth and interactional structure, they were first examined separately and then integrated. Interview data provided richer accounts of

teacher reasoning and classroom tensions, while survey responses broadened the range of participants. This comparison helped identify convergence, divergence, and source-specific patterns, strengthening credibility and transparency in qualitative interpretation [32], [45].



**Figure 2.** Data collection procedure and integration of semi-structured interview and open-ended survey data.

### 3.4. Data Analysis

The data were analyzed using reflexive thematic analysis with a framework-building orientation. This approach was selected because it identifies patterned meanings across qualitative data while recognizing that themes are actively developed through researcher interpretation rather than mechanically extracted from the dataset [31], [40], [41]. It was appropriate for interpreting vocational EFL teachers' meanings around AI readiness, pedagogical capability, institutional constraints, instructional applicability, and ethical governance, rather than testing variables or measuring AI effectiveness. Interview transcripts and open-ended survey responses were treated as one qualitative corpus, while source labels were retained to distinguish evidentiary depth.

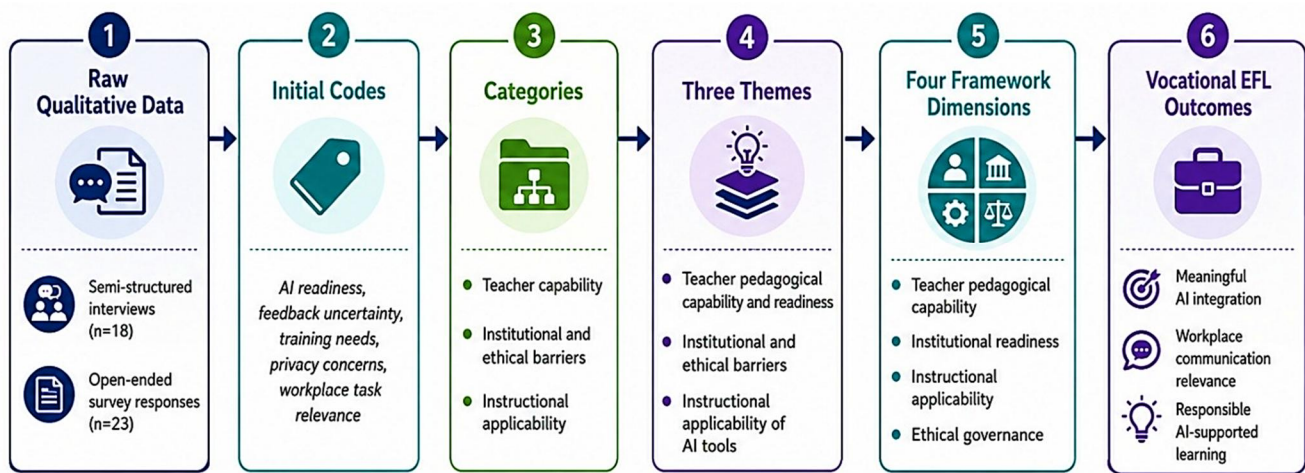
The first stage involved familiarization and initial coding. The researchers repeatedly read all transcripts and written responses to identify recurrent meanings, tensions, contrasts, and contextual references, consistent with the principle that qualitative analysis begins with immersion before coding and theme construction [31], [32], [46]. Line-by-line coding was conducted in Microsoft Excel, with initial codes kept close to participants' language, including AI readiness, feedback uncertainty, AI-focused training needs, lack of institutional policy,

unstable internet access, chatbot role-play, privacy concerns, learner overreliance, workplace vocabulary support, and teacher supervision.

The second stage involved category development and theme refinement. Related codes were grouped into three analytic categories: teacher pedagogical capability, institutional and ethical barriers, and instructional applicability. These categories covered digital competence, AI awareness, feedback validation, infrastructure, policy, learner data, bias, authorship, automated writing feedback, pronunciation support, chatbot simulation, learner analytics, technical reporting, and occupation-specific vocabulary. They were then reviewed against the full dataset and refined into three themes: teacher pedagogical capability and readiness; institutional and ethical barriers; and the instructional applicability of AI tools. Theme refinement emphasized

conceptual coherence, analytic depth, and relevance to the research questions rather than coding agreement or frequency alone [31], [41].

The third stage transformed the themes into final framework dimensions. The researchers compared the themes in relation to one another to examine how teacher capability, institutional conditions, instructional applications, and ethical concerns interacted in AI-supported vocational EFL teaching. This synthesis produced four framework dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance. Teacher pedagogical capability was positioned as the central mediating mechanism, institutional readiness as an enabling condition, instructional applicability as the classroom-level alignment dimension, and ethical governance as a cross-cutting regulatory condition.



**Figure 3.** Data-to-framework analytic pathway from raw qualitative data to final framework dimensions and vocational EFL outcomes.

Framework development was conducted through relational comparison across the final themes. The researchers examined how teacher capability, institutional conditions, instructional uses, and ethical concerns interacted across participant accounts. These relationships were then organized into a framework development matrix that links thematic evidence to framework dimensions, functions, and expected contributions to vocational EFL.

Analytic transparency was ensured through reflexive memoing, source comparison, coding documentation, and an audit trail covering protocols, anonymized transcripts, coding matrices, category records, theme notes, and framework synthesis decisions. These procedures supported credibility, dependability, confirmability, and transparency [32], [45]. Inter-coder reliability statistics were not used because the study adopted a reflexive, not coding-reliability, model of thematic analysis; instead, quality was supported through reflexive engagement, repeated corpus checking, and transparent documentation of interpretive decisions [40], [41].

Descriptive coding summaries were calculated only after coding to show how many participant accounts contained a coded idea, serving as a transparency device rather than inferential statistics, standardized scores, or population estimates [33], [34]. Reporting was informed by SRQR and COREQ principles to strengthen qualitative transparency [35], [36].

### 3.5. Researcher Reflexivity and Positionality

Researcher reflexivity was maintained throughout the study because the analysis involved interpretive engagement with teachers' perceptions of AI integration. The researchers approached the study from backgrounds in language education and educational technology, which supported sensitivity to EFL pedagogy, vocational communication, digital learning, and AI-assisted instruction. At the same time, this position posed the risk of overinterpreting AI integration or viewing teacher concerns primarily as training deficits. To address this, reflexive memos were used during data collection, coding, theme refinement, and framework development to

document assumptions, analytic decisions, emerging interpretations, and possible biases [47], [48].

Reflexivity was also used to ensure that cautious, negative accounts were not treated as resistance to innovation but rather as meaningful evidence. Participants' concerns about unreliable AI feedback, learner overreliance, weak institutional policy, data privacy, bias, authorship, and loss of teacher judgment were therefore incorporated into the development of the ethical governance and human oversight dimensions of the framework. This approach is consistent with reflexive thematic analysis, which recognizes the researcher's interpretive role while requiring transparent engagement with the data [31].

### 3.6. Trustworthiness

Trustworthiness was strengthened through credibility, dependability, confirmability, and transferability strategies [32], [45]. Credibility was supported by using two complementary qualitative data sources: semi-structured interviews and open-ended survey responses. Interview data provided depth, while survey responses broadened participant variation and enabled cross-source comparison. Themes were repeatedly checked against the full dataset, and representative quotations were used to connect interpretation to participant accounts.

Dependability was supported through an audit trail covering recruitment, data collection, transcription, coding, category development, memoing, theme refinement, and framework decisions. Confirmability was strengthened through reflexive memoing and attention to divergent cases related to AI reliability, privacy, authorship, and overreliance. At the same time, transferability was enhanced through contextual description of the vocational EFL setting, participant criteria, institutional conditions, and pedagogical relevance of AI-supported instruction. Although full member checking was not conducted and is acknowledged as a limitation, the use of two qualitative data sources, systematic coding documentation, representative quotations, and repeated comparison between themes and the full corpus strengthened the transparency, plausibility, coherence, and analytic rigor of the findings [49].

### 3.7. Ethical Considerations

The study was conducted in accordance with institutional ethical procedures for low-risk educational research. Formal written informed consent was obtained from all participants before data collection. Identifying information was removed during transcription, coding, and reporting, with interview participants coded as T1–T18 and open-ended survey participants coded as S1–S23. Audio recordings, transcripts, and written responses were stored securely and accessed only for research purposes. At the same time, raw data were not made publicly available because they may contain identifiable

contextual information about participants, institutions, or local teaching conditions.

## 4. RESULTS

The results are presented according to the analytic logic described in the methodology: from participant accounts to initial codes, analytic categories, themes, and, finally, an empirically informed pedagogical capability framework. Three themes emerged from reflexive thematic analysis: teacher pedagogical capability and readiness, institutional and ethical barriers, and the instructional applicability of AI tools. These themes were then synthesized into four framework dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance.

The numerical values reported in the tables are descriptive coding summaries rather than inferential statistics, standardized scores, or population estimates. They indicate the number of participant accounts in which a coded idea appeared at least once. Each participant was counted only once per coded category, even when the same idea appeared repeatedly in the same interview or written response. The purpose of these summaries is to enhance transparency in the qualitative analytic process, not to quantify prevalence statistically. Interpretation remains grounded in participant quotations, cross-source comparison between interviews and open-ended survey responses, and relational synthesis across themes.

### 4.1. Theme 1: Teacher Pedagogical Capability and Readiness

This theme addresses RQ1 by examining how vocational EFL teachers perceived their readiness for AI-assisted instruction. The main finding is that participants distinguished between general digital competence and AI-specific pedagogical capability. Most teachers reported confidence in using routine digital teaching tools, including online platforms, digital materials, video conferencing, and communication applications. However, this operational confidence did not automatically translate into readiness to use AI pedagogically.

Participants repeatedly emphasized that AI-assisted teaching required more than the ability to operate a tool. It required the ability to judge whether AI-generated feedback was linguistically accurate, contextually appropriate, ethically acceptable, and relevant to vocational communication tasks. For example, T4 explained:

*“I can use online teaching platforms, but I am not sure how to judge whether AI feedback is suitable for my students' workplace tasks.”*

Similarly, S9 wrote:

*“AI is useful, but teachers need training on when to accept its suggestions and when to correct them.”*

These accounts show that the central readiness gap was not basic digital literacy, but the professional capacity to evaluate and mediate AI output.

This distinction is especially important in vocational EFL because the instructional target is not merely grammatical correctness or general fluency. Students are expected to use English in professional contexts, such as workplace emails, technical reports, safety instructions, customer service exchanges, job interviews, and occupational presentations. In such contexts, an AI-generated sentence may be grammatically acceptable but still inappropriate in tone, genre, terminology, or professional meaning. Therefore, teacher readiness was strongly linked to feedback validation, task design, occupational language awareness, and classroom supervision.

The descriptive coding summaries support this interpretation. Participants expressed stronger confidence in general digital teaching tools than in AI-specific systems, learner analytics, and pedagogical integration of AI. This pattern indicates that AI readiness should not be reduced to access to technology or digital familiarity. Rather, it should be understood as a layered pedagogical capability involving technical, linguistic, ethical, and vocational judgment. Cautious responses further strengthened this interpretation. T15 stated:

*“AI should not replace teacher judgment, especially in language learning where context matters.”*

This view does not represent resistance to innovation. Instead, it highlights a key condition for responsible AI use: teachers must remain active mediators between AI-generated output and language-learning objectives. In this sense, teacher hesitation became analytically important because it revealed the limits of tool-based adoption and justified the central position of teacher pedagogical capability in the final framework.

The professional development needs identified by participants also confirm this synthesis. The most frequently coded need was not merely technical training, but AI-supported digital pedagogy. Teachers wanted to learn how to align AI tools with communicative and vocational tasks, evaluate AI-generated feedback, manage ethical risks, and design classroom activities that preserve student agency. This indicates that effective teacher training for AI integration should move beyond demonstrations of platforms and instead focus on pedagogical decision-making, feedback validation, prompt design, learner data awareness, and vocational task alignment.

**Table 4.** Teacher readiness and AI-specific pedagogical capability indicators derived from qualitative coding.

Capability	Strong confidence	Moderate confidence	Limited confidence	Qualitative interpretation	Implication for teacher development
General digital teaching tools	28	10	3	Participants commonly reported familiarity with routine digital platforms, online materials, video conferencing, and classroom communication tools.	Professional development should not be limited to only basic digital training.
AI-specific systems	10	16	15	Teachers were less certain about using chatbots, generative AI, adaptive platforms, and automated feedback systems for instructional purposes.	Training should include selecting AI tools, designing prompts, and evaluating outputs.
Learner data and analytics awareness	9	14	18	Many participants needed support in interpreting learner analytics responsibly and ethically.	Training should address learner data protection, privacy, and responsible interpretation.
Integration of AI into vocational EFL pedagogy	8	16	17	The weakest area was transforming AI functions into purposeful vocational EFL tasks.	Training should focus on task design, workplace communication, feedback validation, and human oversight.

Note. Confidence categories were derived from qualitative coding of participant accounts and should not be interpreted as standardized scale scores.

#### 4.2. Theme 2: Institutional and Ethical Barriers

This theme addresses RQ2 by analyzing the institutional, pedagogical, and ethical barriers that shaped AI integration in vocational EFL teaching. The findings show that teachers’ willingness to use AI was constrained by five interrelated barriers: infrastructure, institutional support, policy guidance, curriculum alignment, and ethical governance. These barriers were conceptually distinct but practically connected.

The technical infrastructure affected the feasibility of classroom implementation. Participants cited unstable internet connectivity, limited devices, a lack of licensed platforms, and insufficient technical support. T7 explained:

*“Sometimes we want to use online tools, but the internet connection is not stable enough for classroom activities.”*

This type of barrier influenced whether AI-supported activities could be conducted consistently rather than only experimentally.

Institutional and policy barriers affected legitimacy, continuity, and accountability. Teachers reported uncertainty about which AI tools were acceptable, how student data should be handled, and whether AI-generated work could be used in assessment. S14 wrote:

*“There is no official policy telling us which AI tools are acceptable or how student data should be protected.”*

This statement indicates that participants were not simply asking for better technology. They were asking for institutional governance that could define acceptable use, protect learners, guide teachers, and standardize responsible practice.

Curriculum alignment also emerged as a major barrier. Participants recognized that AI tools could support grammar correction, translation, vocabulary

learning, and conversational practice, but they questioned whether generic AI outputs could adequately support occupation-specific communication. Vocational EFL requires attention to workplace tone, technical vocabulary, safety-sensitive language, professional genre conventions, and audience awareness. Without teacher adaptation, AI tools risk producing general language practice rather than vocationally meaningful learning.

Ethical concerns cut across all other barriers. Participants mentioned learner data privacy, authorship, overreliance, bias, transparency, and the need for human oversight. These concerns were especially strong in professional writing and technical reporting, where inaccurate or decontextualized AI-generated language could undermine students’ accountability and professional competence. Some participants worried that students might treat AI output as automatically correct, even when the output lacked contextual or occupational appropriateness.

**Table 5.** Institutional and ethical barriers affecting AI integration in vocational EFL teaching.

Barrier category	Participant-based evidence	How the barrier affects AI integration	Pedagogical consequence	Framework dimension
Infrastructure and access	Participants referred to unstable internet, outdated devices, a lack of licensed platforms, and insufficient technical support.	AI-supported tasks cannot be implemented consistently when access and connectivity are unreliable.	AI use remains occasional, experimental, and dependent on individual teacher effort.	Institutional readiness.
Institutional policy guidance	Teachers reported uncertainty about acceptable AI tools, learner-data protection, and assessment rules.	Teachers lack institutional legitimacy and clear boundaries for classroom AI use.	AI integration becomes fragmented and inconsistent across courses or teachers.	Institutional readiness / Ethical governance.
Professional development	Participants requested training on AI pedagogy, feedback validation, ethical use, and vocational task design.	Teachers may know AI tools exist, but remain unsure how to use them meaningfully.	AI use risks becoming tool-driven rather than pedagogy-driven.	Teacher pedagogical capability.
Curriculum alignment	Participants questioned whether generic AI tools could support occupation-specific communication.	AI outputs may not match workplace genres, technical vocabulary, professional tone, or safety-sensitive communication.	AI may improve surface-level language accuracy without supporting vocational competence.	Instructional applicability.
Data privacy and learner protection	Participants raised concerns about student data, authorship, bias, overreliance, and human oversight.	AI use creates ethical risks when student data and AI-generated content are not governed.	Learner agency, accountability, and academic integrity may be weakened.	Ethical governance.
Reliability of AI-generated output	Some teachers worried that students might treat AI feedback as automatically correct.	AI-generated language may be fluent but inaccurate, generic, or unsuitable for occupational contexts.	Teachers must verify feedback before it informs student learning or assessment.	Teacher pedagogical capability / Ethical governance.

These findings show that ethical governance cannot be treated as an additional or optional element after implementation. It must be embedded in institutional policy, teacher training, classroom task design, and assessment practice. In the final framework, ethical governance therefore functions as a cross-cutting dimension that protects learner agency, preserves teacher judgment, and regulates the use of AI-generated output.

**4.3. Theme 3: Instructional Applicability of AI Tools**

This theme addresses RQ3 by identifying AI-supported applications considered feasible and relevant for vocational EFL classrooms. Participants discussed six main applications: automated writing feedback, chatbot-based workplace simulation, pronunciation and speech-recognition tools, adaptive learning support, learner analytics, and occupation-specific vocabulary support.

However, the findings also show that participants differentiated between actual use and perceived potential.

Some teachers had already used grammar checkers, translation tools, or writing-support applications in limited ways. Others had not used more advanced AI systems but considered them potentially useful if adequate training, infrastructure, and policy guidance were available. This suggests that AI integration in the participating institutions was still at an early or transitional stage. Teachers were not describing mature, systematic AI implementation. Rather, they were describing cautious experimentation and conditional readiness.

Automated writing feedback was viewed as useful for helping students notice grammar, cohesion, and sentence-level problems. However, participants emphasized that teacher mediation remained necessary. T9 stated:

*“The tool helps students notice grammar problems, but I still need to explain whether the sentence is suitable for a formal workplace email.”*

This account illustrates the distinction between linguistic correction and vocational appropriateness. In vocational EFL, writing feedback must address not only accuracy but also genre, tone, audience, and professional purpose.

Chatbot-based simulation was viewed as promising for workplace role-play, including customer-service dialogue, interview practice, safety communication, and professional interaction. S18 wrote:

*“Chatbots can help students practice customer conversations, but the teacher must design the situation and check the response.”*

This shows that the pedagogical value of chatbots depends on scenario design, prompt quality, assessment criteria, and post-task reflection. AI interaction becomes vocationally meaningful only when embedded in authentic occupational contexts.

Pronunciation tools and speech-recognition systems were perceived as useful for oral practice, but participants were cautious about the reliability of automated feedback. They noted that pronunciation feedback should be interpreted carefully, especially when students' accents, fluency development, and communicative intelligibility are involved. Adaptive learning and learner analytics were also viewed positively, but participants had limited direct experience with them. Their perceived value was connected to individualized support, progress monitoring, and targeted intervention, provided that learner data were interpreted ethically and pedagogically.

Occupation-specific vocabulary support was considered particularly relevant to vocational EFL. Participants saw potential in using AI to generate glossaries, workplace phrases, technical vocabulary lists, and contextual examples. However, they also emphasized that AI-generated terminology must be checked for domain accuracy. This confirms that AI tools cannot be assumed to understand specialized vocational contexts without teacher verification.

Taken together, the findings indicate that AI tools were not perceived as autonomous instructional agents. Participants viewed them as conditional pedagogical resources whose usefulness depended on teacher design, institutional support, curriculum alignment, and ethical supervision. This theme, therefore, provides the classroom-level basis for the instructional applicability dimension of the framework.

**Table 6.** Instructional applicability, pedagogical risks, and required teacher mediation for AI-supported tools in vocational EFL.

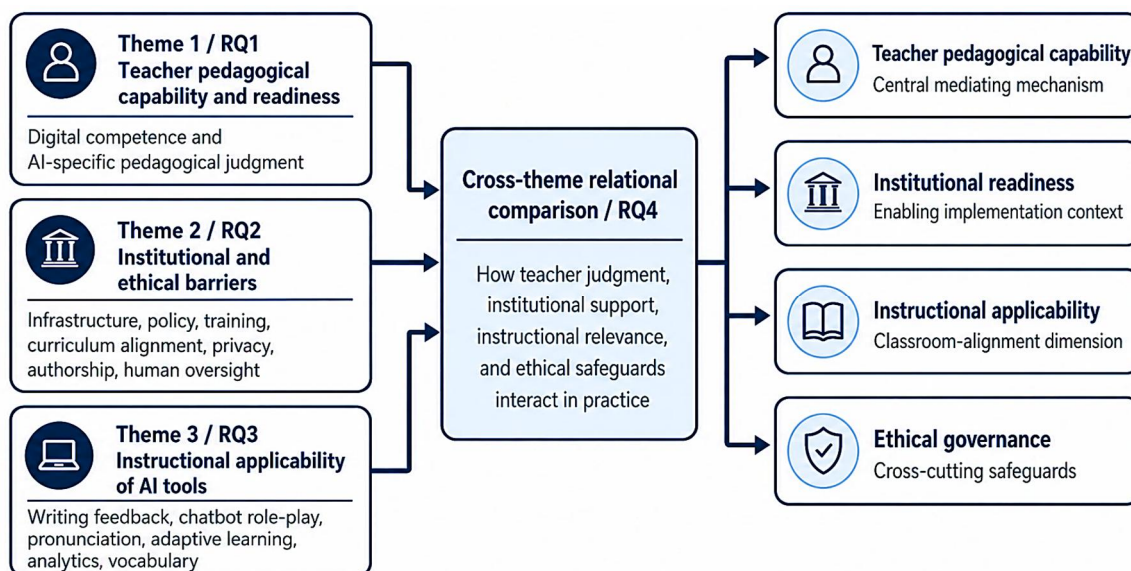
AI-supported application	Reported or perceived use	Vocational EFL relevance	Pedagogical risk if unsupervised	Required teacher mediation
Automated writing feedback	Used or considered useful for grammar, cohesion, sentence correction, and workplace writing	Supports professional emails, short reports, technical descriptions, and formal written communication.	Feedback may focus on surface accuracy while ignoring tone, genre, audience, and occupational meaning.	Validate accuracy, genre fit, workplace tone, and learner authorship.
Chatbot-based workplace simulation	Viewed as promising for role-play and conversational practice	Supports customer service interactions, job interviews, workplace dialogue, and safety communication.	Dialogue may become generic, unrealistic, culturally inappropriate, or misaligned with workplace scenarios.	Design prompts, occupational scenarios, performance criteria, and post-task reflection
Pronunciation and speech-recognition tools	Considered useful for oral practice and fluency support	Supports presentations, workplace speaking, interview preparation, and communicative intelligibility.	Automated feedback may misread accents or overemphasize native-like pronunciation.	Interpret feedback cautiously and connect it to intelligibility and communicative purpose.
Adaptive learning support	Viewed as potentially useful for individualized practice	Supports vocabulary, grammar, fluency development, and differentiated support.	Activities may become decontextualized drill practice if not linked to vocational outcomes.	Align adaptive tasks with course objectives and learner needs.

AI-supported application	Reported or perceived use	Vocational EFL relevance	Pedagogical risk if unsupervised	Required teacher mediation
Learner analytics	Seen as useful for progress monitoring and targeted intervention	Helps identify students needing support in writing, speaking, vocabulary, or task performance	Learner data may be misinterpreted or used without sufficient ethical safeguards.	Interpret data pedagogically and protect learner privacy.
Occupation-specific vocabulary support	Used informally through translation, glossary, or AI-generated examples	Supports technical terminology, safety language, job-specific phrases, and professional communication.	AI may generate inaccurate, non-standard, or contextually inappropriate terminology.	Check domain accuracy and adapt output to specific vocational fields.

#### 4.4. Integrated Synthesis: Pedagogical Capability Framework

This section addresses RQ4 by synthesizing the three themes into an empirically informed pedagogical capability framework for AI integration in vocational EFL. The framework was not imposed before the analysis. It

was developed through relational comparison across themes, coding summaries, representative quotations, and reflexive memos. The synthesis identified four interdependent dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance.



**Figure 4.** Cross-theme relational synthesis linking generated themes to the four dimensions of the pedagogical capability framework.

Figure 4 shows that the three generated themes did not function as separate findings, but as interconnected analytic pathways leading to the four framework dimensions. Teacher pedagogical capability emerged from the readiness data; institutional readiness and ethical governance emerged from the barrier data; and instructional applicability emerged from teachers' accounts of feasible AI-supported classroom practices. The framework was therefore developed through relational comparison across themes rather than imposed prior to analysis.

Teacher pedagogical capability is positioned as the central dimension because the findings consistently show that teachers mediate the relationship between AI tools and vocational EFL outcomes. AI-generated feedback, chatbot interaction, adaptive practice, and learner analytics do not become meaningful simply because they are technologically available. They become meaningful

when teachers evaluate their accuracy, adapt them to occupational tasks, guide student use, and connect them to communicative learning outcomes.

Institutional readiness functions as the enabling condition. Without reliable infrastructure, licensed or approved tools, technical support, professional development, and policy guidance, AI use is likely to remain fragmented and dependent on individual teacher initiative. The findings show that teachers need institutional systems that clarify acceptable AI use, support responsible experimentation, and ensure continuity beyond isolated classroom practices.

Instructional applicability represents the classroom alignment dimension. AI tools must be aligned with vocational EFL objectives, such as workplace dialogue, professional email writing, technical reporting, safety communication, interview preparation, and occupation-specific vocabulary. This dimension emphasizes that AI

integration should be judged not only by technological novelty or student engagement, but by its relevance to professional communication and employability-oriented language learning.

Ethical governance functions as a cross-cutting regulatory condition. It addresses privacy, authorship, bias, transparency, overreliance, academic integrity, and human oversight. The findings show that ethical concerns were not separate from pedagogy. They directly affected how teachers evaluated AI feedback, supervised students, designed writing tasks, interpreted learner data, and protected student agency.

The framework, therefore, explains AI integration in vocational EFL as an interaction among four conditions rather than as a linear adoption process. Teacher capability without institutional support may produce isolated experimentation. Institutional access without teacher judgment may lead to superficial use of the tool. AI applications without vocational alignment may improve surface-level language accuracy but fail to support workplace communication. Ethical governance without pedagogical integration may remain a formal policy concern rather than a classroom practice. Meaningful AI integration emerges only when these dimensions operate together.

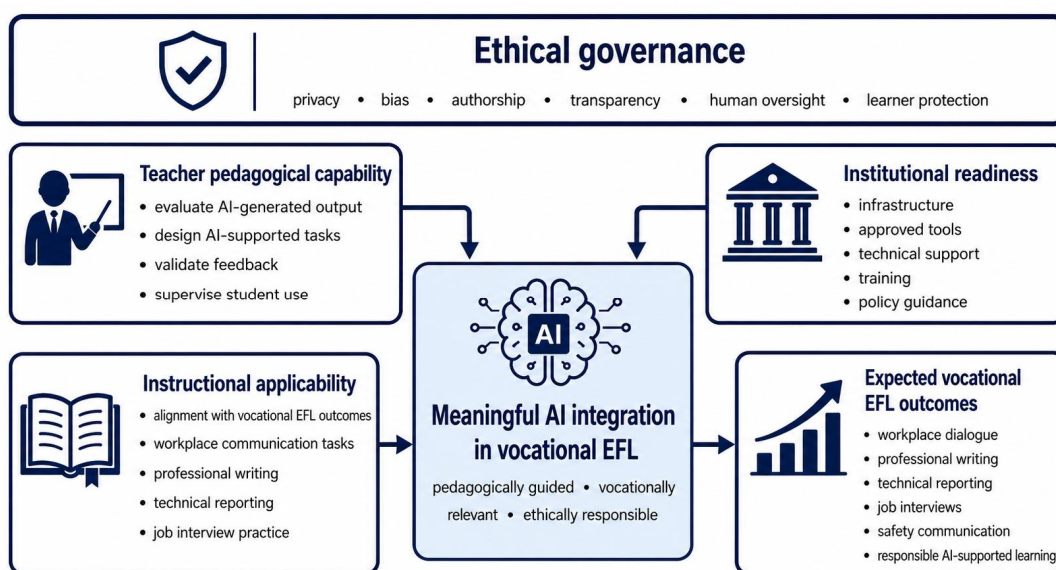


Figure 5. Pedagogical capability framework for responsible AI integration in vocational EFL teaching.

Table 7. Framework synthesis matrix linking generated themes, framework dimensions, and expected vocational EFL contributions.

Generated theme	Core analytic finding	Framework dimension	Function in the model	Expected contribution to vocational EFL
Teacher pedagogical capability and readiness	Teachers distinguished general digital competence from AI-specific pedagogical judgment.	Teacher pedagogical capability	Mediates the relationship between AI tools and vocational EFL learning outcomes	Strengthens feedback validation, task design, contextual judgment, and workplace relevance
Institutional and ethical barriers	AI use was shaped by infrastructure, policy, professional development, curriculum alignment, and ethical concerns.	Institutional readiness	Enables or constrains sustainable AI implementation beyond individual experimentation	Supports implementation consistency, institutional accountability, and quality assurance
Institutional and ethical barriers	Ethical concerns about data privacy, bias, authorship, overreliance, and human oversight were cross-cutting	Ethical governance	Regulates AI-supported teaching across all stages of design, use, feedback, and assessment	Protects learner agency, academic integrity, privacy, and responsible AI use
Instructional applicability of AI tools	AI tools were viewed as useful only for workplace-oriented language tasks.	Instructional applicability	Aligns AI functions with vocational communication objectives	Improves relevance to professional writing, workplace dialogue, technical reporting, interviews, and safety communication
Cross-theme synthesis	Meaningful AI integration requires interaction among teacher judgment, institutional	Integrated pedagogical	Explains AI integration as a relational and context-	Provides theoretical and practical guidance for AI-

Generated theme	Core analytic finding	Framework dimension	Function in the model	Expected contribution to vocational EFL
	support, instructional relevance, and ethical safeguards.	capability framework	sensitive process rather than a linear adoption process	mediated vocational EFL education

This synthesis extends existing technology-adoption perspectives by shifting the focus from whether teachers accept or use AI to how they transform AI into responsible, context-sensitive, and vocationally relevant language instruction. In this study, pedagogical capability is therefore not simply a teacher attribute. It is a relational construct that connects teacher judgment, institutional conditions, instructional design, and ethical responsibility. This is the central theoretical contribution of the findings.

## 5. DISCUSSION

This study shows that AI integration in vocational EFL is a capability-building process rather than simple tool adoption. Based on teachers' accounts from six vocational and technical institutions in Yunnan Province, China, effective AI use depends on the interaction among AI-specific pedagogical capability, institutional readiness, instructional relevance, and ethical governance. Although teachers were familiar with routine digital tools, they remained cautious about AI-mediated feedback, learner analytics, workplace simulations, and accountability. This indicates that AI readiness requires professional judgment in evaluating accuracy, contextual appropriateness, bias, privacy, authorship, and alignment with vocational communication outcomes.

The findings suggest that AI may support vocational EFL through writing feedback, pronunciation practice, workplace role-play, adaptive learning, learner analytics, and the development of occupation-specific vocabulary. However, teachers did not perceive AI as independently transformative; its value depends on teacher supervision, curriculum alignment, institutional support, data protection, academic integrity, and clear accountability mechanisms. Thus, the study advances an empirically grounded framework for vocational EFL AI capability and argues that AI becomes pedagogically meaningful not through automation itself, but through human-centered, professionally mediated, and ethically governed implementation [17], [50]–[53].

### 5.1. Teacher Readiness as Pedagogical Capability

The first major finding shows that vocational EFL teachers distinguished between general use of digital tools and pedagogically meaningful AI integration. This finding extends technology adoption perspectives such as TAM and UTAUT, which explain technology use through perceived usefulness, ease of use, performance expectancy, social influence, and facilitating conditions [20], [21]. While these models remain relevant for explaining teachers' willingness to try AI, the present

findings suggest that adoption intention alone is insufficient in vocational EFL contexts, as teachers must also assess whether AI use supports language accuracy, workplace relevance, learner autonomy, and instructional goals.

Teachers were not merely concerned with whether AI tools were efficient or easy to use, but also with whether AI-generated feedback could be trusted, whether chatbot responses reflected authentic workplace communication, whether automated writing suggestions maintained a professional tone, and whether students might become overdependent on AI-generated language. This supports recent arguments that generative AI complicates conventional technology integration because it can generate, evaluate, and revise language, not simply deliver digital content [7], [18], [54], [55]. Therefore, the findings extend TPACK by showing that vocational EFL teachers require AI-specific pedagogical judgment, including the ability to validate AI output, identify contextual inaccuracies, protect learner authorship, and align AI use with occupational communication tasks.

This interpretation is also consistent with recent AI literacy and teacher AI competency literature, which emphasizes responsible use, bias awareness, transparency, ethical judgment, human oversight, and pedagogical decision-making [17], [22], [56]. However, the present study adds that AI literacy in vocational EFL must be situated within workplace discourse. Teachers need to understand how AI-generated language applies to job interviews, customer service interactions, workplace emails, safety instructions, technical reports, and occupation-specific terminology. Thus, pedagogical capability in vocational EFL includes AI literacy but extends beyond it by integrating vocational task alignment, professional communication awareness, and ethical supervision.

### 5.2. Institutional Readiness and Ethical Governance

The second major finding indicates that institutional and ethical barriers significantly shaped AI integration in vocational EFL. These barriers included infrastructure, technical support, licensed platforms, institutional policy, professional development, curriculum alignment, data privacy, authorship, bias, learner overreliance, and human oversight. This finding suggests that AI integration cannot be reduced to individual teachers' readiness, because even teachers willing to use AI may be constrained by unstable internet access, unclear regulations, inadequate training, limited institutional support, and uncertainty about how AI-generated work should be treated in assessment. This supports recent arguments that responsible AI adoption requires an ecological and

institutionally governed framework that combines pedagogical, operational, and governance dimensions [9], [57], [58].

Ethical governance also emerged as a cross-cutting issue directly connected to classroom practice rather than as a separate administrative concern. Teachers had to decide whether students could use AI-generated writing, how much AI assistance was acceptable, how learner data should be protected, whether automated feedback could be trusted, and how academic integrity could be maintained. These concerns are consistent with recent studies showing that generative AI creates risks related to plagiarism, authorship ambiguity, assessment validity, learner dependency, privacy, bias, and the reliability of AI-generated output [6], [59], [60]. Therefore, institutional AI policies should clarify which tools are approved, data protection procedures, assessment rules, transparency requirements, and the limits on AI use in student work.

In vocational EFL, these issues are especially important because students are being prepared for professional and workplace communication. Errors in AI-generated workplace emails, technical reports, safety instructions, job interviews, or customer-service dialogues may affect not only linguistic accuracy but also professional credibility and communicative responsibility. Thus, AI should not be implemented as an unsupervised writing shortcut, but as a pedagogically supervised resource aligned with vocational communication outcomes. The findings reinforce the need to integrate ethical governance into teacher training, institutional policy, curriculum design, and assessment practices from the beginning of AI implementation, while maintaining human oversight as a core principle of responsible AI-supported language learning [7], [18].

### 5.3. Instructional Applicability

The third major finding concerns the instructional applicability of AI tools in vocational EFL. Participants recognized the potential of automated writing feedback, chatbot-based workplace simulation, pronunciation tools, adaptive learning, learner analytics, and occupation-specific vocabulary support. However, these tools were evaluated not for technological novelty but for their relevance to vocational communication outcomes. This finding is significant because vocational EFL extends beyond grammar accuracy and general fluency. It prepares learners to use English for specific workplace purposes, including professional interaction, technical explanation, formal correspondence, customer service, safety communication, and occupation-specific genres [4], [61].

This finding is consistent with recent studies showing that AI can support language learning through chatbot interaction, automated feedback, AI-enabled assessment, personalized learning, and teacher-guided task design [18], [62], [63]. Nevertheless, this study adds that AI affordances in vocational EFL must be judged

through workplace relevance. A tool that improves sentence-level accuracy may still be pedagogically limited if it does not address professional tone, audience awareness, technical terminology, pragmatic appropriateness, genre conventions, and communicative responsibility. Therefore, AI-supported tasks become meaningful only when teachers design authentic occupational scenarios, guide the use of prompts, define communicative goals, and evaluate outputs using vocational communication criteria.

Thus, instructional applicability should be understood as the extent to which AI tools can be pedagogically integrated into authentic vocational language tasks under teacher supervision. Automated writing feedback, for example, may support grammar and clarity, but teachers remain essential in assessing terminology, genre fit, contextual accuracy, tone, and professional purpose. This interpretation is supported by recent literature emphasizing that generative AI in language learning requires teacher mediation, learner agency, reflective evaluation, and awareness of AI's limitations in producing socially and culturally appropriate language [18], [24], [64]. In vocational EFL, therefore, AI should function as a supervised pedagogical resource for workplace-oriented communication practice rather than as an autonomous language generator.

### 5.4. Theoretical Contribution

The main theoretical contribution of this study is the development of a pedagogical capability framework for AI integration in vocational EFL. This framework shifts the analytical focus from whether teachers accept or use AI to how they evaluate, adapt, supervise, and ethically manage AI to support vocational language learning. It integrates four interrelated dimensions: teacher pedagogical capability as the central mediating mechanism; institutional readiness as the enabling condition; instructional applicability as the classroom-alignment dimension; and ethical governance as a cross-cutting regulatory condition.

This framework does not reject existing perspectives such as TPACK, TAM, UTAUT, digital competence, or AI literacy; rather, it extends them for the specific context of vocational EFL. While TPACK explains the integration of technology, pedagogy, and content knowledge, TAM and UTAUT explain intention to adopt and facilitating conditions. Digital competence and AI literacy address the operational and responsible use of AI. The present framework adds that vocational EFL teachers require the ability to integrate AI tools into occupational discourse, workplace-oriented communication tasks, and institutional conditions, while adhering to ethical safeguards.

### 5.5. Practical Implications

The findings offer practical implications for teacher education, institutional policy, and the design of

vocational EFL curricula. Professional development should move beyond basic demonstrations of AI tools and focus on teachers' ability to evaluate AI-generated feedback, design effective prompts, create workplace-based learning scenarios, supervise student use, interpret learner analytics, and address ethical issues such as privacy, authorship, and overreliance. This is necessary because the findings show that teachers were more confident in using general digital tools than in integrating AI pedagogically into vocational EFL instruction.

At the institutional and curricular levels, clear AI-use policies are needed to ensure consistent, fair, and responsible implementation. These policies should govern acceptable tools, learner-data protection, assessment practices, academic integrity, and human oversight. Curriculum designers should also align AI-supported activities with vocational communication outcomes through authentic tasks such as professional email writing, job interview practice, customer service role-play, technical reporting, safety communication, and occupation-specific vocabulary development. Thus, AI should be positioned as a supervised pedagogical resource that supports language development rather than as a replacement for teacher expertise or learner effort.

### 5.6. Limitations and Future Research

Several limitations should be acknowledged. This study involved 41 vocational EFL teachers from six vocational and technical institutions in Yunnan Province; therefore, the findings offer contextual depth but cannot be statistically generalized to all vocational EFL teachers in China or to other contexts. In addition, participants had some prior familiarity with digital or technology-enhanced teaching, which may have shaped their relatively receptive views toward AI. The study also relied on teachers' self-reported perspectives from interviews and open-ended survey responses, and it did not directly examine classroom implementation, student learning outcomes, or the comparative effectiveness of specific AI tools.

Although credibility was supported by multiple qualitative data sources, reflexive memoing, source comparison, representative quotations, and systematic coding documentation, full member checking with all participants was not conducted. Future research could, therefore, examine how the proposed pedagogical capability framework operates in real-world classroom practice through classroom observation, design-based research, intervention studies, or longitudinal inquiry. Further studies may also include student perspectives, comparisons across different vocational fields, analyses of the implementation of institutional AI policies, and investigations into how AI-supported tasks influence workplace-oriented English performance across different institutional or regional contexts.

## 6. CONCLUSION

This study explored vocational EFL teachers' perspectives on AI integration in six vocational and technical institutions in Yunnan Province, China. Based on semi-structured interviews and open-ended survey responses, the study developed an empirically informed pedagogical capability framework consisting of four interrelated dimensions: teacher pedagogical capability, institutional readiness, instructional applicability, and ethical governance. The findings show that AI integration in vocational EFL should not be understood merely as the adoption of digital tools. AI was perceived as useful for writing feedback, pronunciation practice, chatbot-based workplace simulation, adaptive learning, learner analytics, and occupation-specific vocabulary support, but only when teachers could evaluate AI-generated output, adapt it to vocational communication tasks, supervise student use, and align it with learning objectives.

The study concludes that teacher readiness for AI requires AI-specific pedagogical capabilities beyond general digital competence, including feedback validation, prompt and task design, learner data awareness, ethical judgment, and workplace-oriented task alignment. Sustainable AI integration also depends on institutional support, clear policies, reliable infrastructure, professional development, and ethical governance regarding privacy, authorship, bias, academic integrity, and human oversight. Theoretically, the study extends the perspectives on technology integration, technology acceptance, digital competence, and AI literacy by positioning AI integration as a relational, context-sensitive pedagogical process. Practically, AI should be treated as a supervised pedagogical resource that supports vocational EFL learning, not as a replacement for teacher expertise or learner agency. Future research may refine this framework through classroom observation, student perspectives, longitudinal studies, and comparisons across vocational fields or institutional contexts.

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### CONFLICTS OF INTEREST

The authors declare that no conflicts of interest are associated with this study. All aspects of the research were conducted with the utmost integrity and transparency.

### DATA AVAILABILITY

The datasets utilized and analyzed during this research are available from the corresponding author upon reasonable request.

### ETHICAL STATEMENTS

The authors confirm that the study complied with all applicable local laws, ethical standards, and institutional guidelines, including obtaining approval from relevant ethics committees.

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## REFERENCES

- [1] W. Holmes, M. Bialik, and C. Fadel, *Artificial intelligence in education: promises and implications for teaching and learning*. Boston, Massachusetts, United States: Center for Curriculum Redesign, 2019. [Online]. Available: <https://curriculumredesign.org/wp-content/uploads/AIED-Book-Excerpt-CCR.pdf>
- [2] O. Zawacki-Richter, V. I. Marín, M. Bond, and F. Gouverneur, "Systematic review of research on artificial intelligence applications in higher education – where are the educators?," *Int. J. Educ. Technol. High. Educ.*, vol. 16, no. 1, p. 39, 2019, <https://doi.org/10.1186/s41239-019-0171-0>
- [3] F. Albedah, "Artificial Intelligence in Language Education: A Systematic Review of Multilingual Applications, Large Language Models, and Emerging Challenges," *Lang. Teach. Res. Q.*, vol. 49, pp. 247–268, 2025, <https://doi.org/10.32038/ltrq.2025.49.13>
- [4] S. Zeng and C. Della, "A Systematic Review of Professional Communication Skills in English for Specific Purposes in Vocational Education within the New Media Era," *Eurasian J. Educ. Res.*, vol. 2024, no. 114, pp. 226–249, 2024, <https://doi.org/10.14689/ejer.2024.114.013>
- [5] Q. U. Ain and M. K. S. Azam, "Artificial Intelligence in Language Education: A Review of Emerging Trends and Implications," *Pakistan Lang. Humanit. Rev.*, vol. 9, no. IV, pp. 150–166, 2025, [https://doi.org/10.47205/plhr.2025\(9-iv\)14](https://doi.org/10.47205/plhr.2025(9-iv)14)
- [6] D. R. E. Cotton, P. A. Cotton, and J. R. Shipway, "Chatting and cheating: Ensuring academic integrity in the era of ChatGPT," *Innov. Educ. Teach. Int.*, vol. 61, no. 2, pp. 228–239, 2024, <https://doi.org/10.1080/14703297.2023.2190148>
- [7] E. Kasneci et al., "ChatGPT for good? On opportunities and challenges of large language models for education," *Learn. Individ. Differ.*, vol. 103, p. 102274, 2023, <https://doi.org/10.1016/j.lindif.2023.102274>
- [8] C. Wang, B. Zou, Y. Du, and Z. Wang, "The impact of different conversational generative AI chatbots on EFL learners: An analysis of willingness to communicate, foreign language speaking anxiety, and self-perceived communicative competence," *System*, vol. 127, p. 103533, 2024, <https://doi.org/10.1016/j.system.2024.103533>
- [9] M. Airaj, "Ethical artificial intelligence for teaching-learning in higher education," *Educ. Inf. Technol.*, vol. 29, no. 13, pp. 17145–17167, 2024, <https://doi.org/10.1007/s10639-024-12545-x>
- [10] W. Holmes and F. Miao, *Guidance for generative AI in education and research*. Unesco Publishing, 2023.
- [11] W. Holmes and I. Tuomi, "State of the art and practice in AI in education," *Eur. J. Educ.*, vol. 57, no. 4, pp. 542–570, 2022, <https://doi.org/10.1111/ejed.12533>
- [12] R. Luckin, W. Holmes, M. Griffiths, and L. B. Forcier, *Intelligence Unleashed. An argument for AI in Education*. London, United Kingdom: Pearson & UCL Knowledge Lab., 2016. [Online]. Available: <https://static.googleusercontent.com/media/edu.google.com/en//pdfs/Intelligence-Unleashed-Publication.pdf>
- [13] P. Mishra and M. J. Koehler, "Technological pedagogical content knowledge: A framework for teacher knowledge," *Teach. Coll. Rec.*, vol. 108, no. 6, pp. 1017–1054, 2006, <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- [14] UNESCO, *Reimagining our futures together: A new social contract for education*. Paris: UNESCO, 2025. <https://doi.org/10.1163/9789004738058>
- [15] China Daily, "More pilot cities to fall under vocational education roadmap," State Council of the People's Republic of China, 2023. [https://english.www.gov.cn/policies/policywatch/202306/14/content\\_WS64891202c6d0868f4e8dcd47.html](https://english.www.gov.cn/policies/policywatch/202306/14/content_WS64891202c6d0868f4e8dcd47.html)
- [16] China Daily, "Vocational education reform made major national goal," State Council of the People's Republic of China, 2023. [https://english.www.gov.cn/policies/policywatch/202301/18/content\\_WS63c76385c6d0a757729e5c5a.html](https://english.www.gov.cn/policies/policywatch/202301/18/content_WS63c76385c6d0a757729e5c5a.html)
- [17] M. Cukurova and F. Miao, *AI competency framework for teachers*. UNESCO Publishing, 2024. <https://doi.org/10.54675/zjte2084>
- [18] L. Kohnke, B. L. Moorhouse, and D. Zou, "ChatGPT for Language Teaching and Learning," *RELC J.*, vol. 54, no. 2, pp. 537–550, 2023, <https://doi.org/10.1177/00336882231162868>
- [19] C. Redecker, *European framework for the digital competence of educators: DigCompEdu*. 2017.
- [20] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Q. Manag. Inf. Syst.*, vol. 13, no. 3, pp. 319–339, 1989, <https://doi.org/10.2307/249008>
- [21] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Q. Manag. Inf. Syst.*, vol. 27, no. 3, pp. 425–478, 2003, <https://doi.org/10.2307/30036540>
- [22] D. T. K. Ng, J. K. L. Leung, S. K. W. Chu, and M. S. Qiao, "Conceptualizing AI literacy: An exploratory review," *Comput. Educ. Artif. Intell.*, vol. 2, p. 100041, 2021, <https://doi.org/10.1016/j.caeai.2021.100041>
- [23] A. Daud, A. F. Aulia, Z. Harfal, O. Nabilla, and H. S. Ali, "Integrating artificial intelligence into English language teaching: A systematic review," *Eur. J. Educ. Res.*, vol. 14, no. 2, pp. 677–691, 2025, <https://doi.org/10.12973/eujer.14.2.677>
- [24] Y. Li, X. Zhou, H. B. Yin, and T. K. F. Chiu, "Design language learning with artificial intelligence (AI) chatbots based on activity theory from a systematic review," *Smart Learn. Environ.*, vol. 12, no. 1, p. 24, 2025, <https://doi.org/10.1186/s40561-025-00379-0>
- [25] J. Du and B. K. Daniel, "Transforming language education: A systematic review of AI-powered chatbots for English as a foreign language speaking practice," *Comput. Educ. Artif. Intell.*, vol. 6, p. 100230, 2024, <https://doi.org/10.1016/j.caeai.2024.100230>
- [26] J. W. Creswell and C. N. Poth, *Qualitative inquiry and research design: Choosing among five approaches*, 5th ed. California: SAGE Publications, 2024.
- [27] J. A. Maxwell, *Qualitative research design: An interactive approach: An interactive approach*. sage, 2013.
- [28] E. J. Tisdell, S. B. Merriam, and H. L. Stuckey-Peyrot, *Qualitative research: A guide to design and implementation*. John Wiley & Sons, 2025.

- [29] S. M. Ravitch and M. Riggan, *Reason & rigor: How conceptual frameworks guide research*. Sage publications, 2016.
- [30] L. Varpio, E. Paradis, S. Uijtdehaage, and M. Young, "The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework," *Acad. Med.*, vol. 95, no. 7, pp. 989–994, 2020, <https://doi.org/10.1097/ACM.0000000000003075>
- [31] V. Braun and V. Clarke, "Thematic analysis: A practical guide," 2022.
- [32] L. S. Nowell, J. M. Norris, D. E. White, and N. J. Moules, "Thematic Analysis: Striving to Meet the Trustworthiness Criteria," *Int. J. Qual. Methods*, vol. 16, no. 1, pp. 1–13, 2017, <https://doi.org/10.1177/1609406917733847>
- [33] J. A. Maxwell, "Using numbers in qualitative research," *Qual. Inq.*, vol. 16, no. 6, pp. 475–482, 2010.
- [34] M. Sandelowski, "Real qualitative researchers do not count: The use of numbers in qualitative research," *Res. Nurs. Health*, vol. 24, no. 3, pp. 230–240, 2001. <https://doi.org/10.1002/nur.1025>
- [35] B. C. O'Brien, I. B. Harris, T. J. Beckman, D. A. Reed, and D. A. Cook, "Standards for reporting qualitative research: A synthesis of recommendations," *Acad. Med.*, vol. 89, no. 9, pp. 1245–1251, 2014, <https://doi.org/10.1097/ACM.0000000000000388>
- [36] A. Tong, P. Sainsbury, and J. Craig, "Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups," *Int. J. Qual. Heal. Care*, vol. 19, no. 6, pp. 349–357, 2007, <https://doi.org/10.1093/intqhc/mzm042>
- [37] M. Q. Patton, *Qualitative research & evaluation methods: Integrating theory and practice*, 4th ed. Thousand Oaks, CA, 2015.
- [38] L. A. Palinkas, S. M. Horwitz, C. A. Green, J. P. Wisdom, N. Duan, and K. Hoagwood, "Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research," *Adm. Policy Ment. Heal. Ment. Heal. Serv. Res.*, vol. 42, no. 5, pp. 533–544, 2015, <https://doi.org/10.1007/s10488-013-0528-y>
- [39] K. Malterud, V. D. Siersma, and A. D. Guassora, "Sample Size in Qualitative Interview Studies: Guided by Information Power," *Qual. Health Res.*, vol. 26, no. 13, pp. 1753–1760, 2016, <https://doi.org/10.1177/1049732315617444>
- [40] V. Braun, V. Clarke, E. Boulton, L. Davey, and C. McEvoy, "The online survey as a qualitative research tool," *Int. J. Soc. Res. Methodol.*, vol. 24, no. 6, pp. 641–654, 2021, <https://doi.org/10.1080/13645579.2020.1805550>
- [41] V. Braun and V. Clarke, "Reflecting on reflexive thematic analysis," *Qual. Res. Sport. Exerc. Heal.*, vol. 11, no. 4, pp. 589–597, 2019, <https://doi.org/10.1080/2159676X.2019.1628806>
- [42] R. A. Croker, "An introduction to qualitative research," *Qual. Res. Appl. Linguist. A Pract. Introd.*, pp. 3–24, 2009, <https://doi.org/10.1057/9780230239517>
- [43] S. Kvale and S. Brinkmann, *Interviews: Learning the craft of qualitative research interviewing*. sage, 2009.
- [44] S. Brinkmann, "Unstructured and Semi-Structured Interviewing," *Oxford Handb. Qual. Res.*, vol. 277, pp. 276–299, 2014, <https://doi.org/10.1093/oxfordhb/9780199811755.013.030>
- [45] Y. S. Lincoln and E. G. Guba, *Naturalistic inquiry*. sage, 1985.
- [46] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, 2006, <https://doi.org/10.1191/1478088706qp0630a>
- [47] L. Finlay, "Negotiating the swamp: The opportunity and challenge of reflexivity in research practice," *Qual. Res.*, vol. 2, no. 2, pp. 209–230, 2002, <https://doi.org/10.1177/146879410200200205>
- [48] R. Berger, "Now I see it, now I don't: researcher's position and reflexivity in qualitative research," *Qual. Res.*, vol. 15, no. 2, pp. 219–234, 2015, <https://doi.org/10.1177/1468794112468475>
- [49] S. J. Tracy, "Qualitative quality: Eight a"big-tent" criteria for excellent qualitative research," *Qual. Inq.*, vol. 16, no. 10, pp. 837–851, 2010, <https://doi.org/10.1177/1077800410383121>
- [50] M. Ramazanoglu and T. Akin, "AI readiness scale for teachers: Development and validation," *Educ. Inf. Technol.*, vol. 30, no. 6, pp. 6869–6897, 2025, <https://doi.org/10.1007/s10639-024-13087-y>
- [51] A. R. Rahimi and A. Sevilla-Pavón, "The role of ChatGPT readiness in shaping language teachers' language teaching innovation and meeting accountability: A bisymmetric approach," *Comput. Educ. Artif. Intell.*, vol. 7, p. 100258, 2024, <https://doi.org/10.1016/j.caeai.2024.100258>
- [52] M. Zhu and C. Wang, "A systematic review of research on AI in language education: Current status and future implications," *Lang. Learn. Technol.*, vol. 29, no. 1, pp. 1–29, 2025, <https://doi.org/10.64152/10125/73606>
- [53] L. Zheng and Y. Yang, "Research perspectives and trends in Artificial Intelligence-enhanced language education: A review," *Heliyon*, vol. 10, no. 19, 2024, <https://doi.org/10.1016/j.heliyon.2024.e38617>
- [54] S. Lee, H. Choe, D. Zou, and J. Jeon, "Generative AI (GenAI) in the language classroom: A systematic review," *Interact. Learn. Environ.*, vol. 34, no. 1, pp. 335–359, 2025, <https://doi.org/10.1080/10494820.2025.2498537>
- [55] B. Li, Y. L. Tan, C. Wang, and V. Lowell, "Two years of innovation: A systematic review of empirical generative AI research in language learning and teaching," *Comput. Educ. Artif. Intell.*, vol. 9, p. 100445, 2025, <https://doi.org/10.1016/j.caeai.2025.100445>
- [56] W. Liu, "Language teacher AI literacy: insights from collaborations with ChatGPT," *J. China Comput. Lang. Learn.*, vol. 5, no. 2, pp. 287–316, 2025, <https://doi.org/10.1515/jccall-2024-0030>
- [57] A. Yusuf, N. Pervin, and M. Román-González, "Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives," *Int. J. Educ. Technol. High. Educ.*, vol. 21, no. 1, p. 21, 2024, <https://doi.org/10.1186/s41239-024-00453-6>
- [58] C. K. Y. Chan, "A comprehensive AI policy education framework for university teaching and learning," *Int. J. Educ. Technol. High. Educ.*, vol. 20, no. 1, p. 38, 2023, <https://doi.org/10.1186/s41239-023-00408-3>
- [59] I. M. García-López and L. Trujillo-Liñán, "Correction: Ethical and regulatory challenges of Generative AI in education: a systematic review," in *Frontiers in Education*, 2025, vol. 10, p. 1565938. <https://doi.org/10.3389/feduc.2025.1681252>
- [60] K. Bittle and O. El-Gayar, "Generative AI and Academic Integrity in Higher Education: A Systematic Review and

- Research Agenda,” *Inf.*, vol. 16, no. 4, p. 296, 2025, <https://doi.org/10.3390/info16040296>
- [61] S. R. Hill and A. Tombs, “The effect of accent of service employee on customer service evaluation,” *Manag. Serv. Qual.*, vol. 21, no. 6, pp. 649–666, 2011, <https://doi.org/10.1108/09604521111185637>
- [62] W. Huang, K. F. Hew, and L. K. Fryer, “Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning,” *J. Comput. Assist. Learn.*, vol. 38, no. 1, pp. 237–257, 2022, <https://doi.org/10.1111/jcal.12610>
- [63] A. Şahin Kızıl, B. Klimova, M. Pikhart, and A. Parmaxi, “A Systematic Review of the Recent Research on the Usefulness of Chatbots for Language Education,” *J. Comput. Assist. Learn.*, vol. 41, no. 2, p. e70001, 2025, <https://doi.org/10.1111/jcal.70001>
- [64] R. Godwin-Jones, “Distributed agency in second language learning and teaching through generative AI,” *Lang. Learn. Technol.*, vol. 28, no. 2, pp. 5–31, 2024, <https://doi.org/10.64152/10125/73570>

## SUPPLEMENTARY MATERIAL

**Table S1.** Interview Guide for Exploring AI Readiness in Vocational EFL Teaching

No.	Focus Area	Interview Question
1	Digital teaching experience	Please describe your experience with digital tools in vocational EFL teaching.
2	Meaning of AI-assisted teaching	What does AI-assisted language teaching mean in your instructional context?
3	Teacher readiness	How ready do you feel to use AI tools for vocational EFL instruction?
4	Training needs	What training would help you use AI tools more effectively?
5	Institutional barriers	What institutional barriers affect AI integration in your classroom?
6	Ethical concerns	What ethical concerns do you associate with AI-supported language teaching?
7	Workplace-oriented activities	Which AI-supported activities could support workplace-oriented English communication?
8	Evaluation and supervision	How should teachers evaluate or supervise AI-generated feedback?

**Table S2.** Open-Ended Survey Questions on AI Integration in Vocational EFL Teaching

No.	Focus Area	Open-Ended Survey Question
1	Current digital and AI tool use	Describe your current use of digital or AI-supported tools in teaching English.
2	Perceived benefits	Explain the main benefits you associate with AI in vocational EFL teaching.
3	Institutional barriers	Explain the main barriers that prevent wider AI use in your institution.
4	AI-supported learning activities	Describe the types of AI-supported activities that could help vocational learners.
5	Ethical and academic concerns	What concerns do you have about learner data, privacy, bias, or academic integrity?
6	Professional development needs	What professional development would you need before using AI more confidently?
7	Workplace communication alignment	How should AI tools be aligned with workplace communication outcomes?

**Table S3.** Coding Tree

Core category	Examples of initial codes	Final theme
Teacher capability	AI feedback uncertainty; training need; digital confidence; analytics difficulty; feedback validation	Teacher pedagogical capability and readiness
Institutional conditions	unstable internet; limited devices; no license; lack of technical support; policy absence	Institutional and ethical barriers
Curriculum and tools	writing feedback; chatbot role-play; pronunciation support; workplace vocabulary; technical reports	Instructional applicability of AI tools
Ethical governance	privacy concern; bias; authorship; overreliance; human oversight	Cross-cutting ethical governance dimension

Note. The coding tree summarizes how initial codes were grouped into categories and then refined into final themes.

During early coding, several responses appeared to indicate “low AI readiness.” On re-reading the transcripts, this interpretation was revised because some participants were not rejecting AI itself. Instead, they were expressing uncertainty about how to judge AI-generated feedback, how to protect learner data, and how to align AI output with vocational communication tasks. This memo led to a refinement of the first theme from “limited readiness” to “teacher pedagogical capability and readiness.” The change helped avoid deficit framing and emphasized the professional judgment required for responsible AI integration.

**Table S4.** Sample coded excerpts linking participant accounts, codes, and themes.

Participant code	Excerpt	Code	Theme
T4	I can use online teaching platforms, but I am not sure how to judge whether AI feedback is suitable for my students' workplace tasks.	Feedback validation; vocational task alignment	Teacher pedagogical capability and readiness
S9	AI is useful, but teachers need training on when to accept its suggestions and when to correct them.	AI-focused training need; evaluative judgment	Teacher pedagogical capability and readiness
T7	Sometimes we want to use online tools, but the internet connection is not stable enough for classroom activities.	Infrastructure constraint	Institutional and ethical barriers
S14	There is no official policy telling us which AI tools are acceptable or how student data should be protected.	Policy gap; data privacy	Institutional and ethical barriers
S18	Chatbots can help students practice customer conversations, but the teacher must design the situation and check the response.	Chatbot simulation; teacher supervision	Instructional applicability of AI tools

Note. Excerpts are anonymized and selected to illustrate the connection between participant language, coding, and theme development.

**Table S5.** Participant characteristics and data source matrix.

Participant code	Data type	Institution type	Years of teaching	Experience category	Vocational field	Uses digital tools	AI familiarity level	Interview/survey mode	Duration/response type
P01	Interview	Technical Training Institute	11	Mid-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30–40 minutes
P02	Interview	Technical Training Institute	5	Mid-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30–40 minutes
P03	Interview	Vocational College	13	Mid-career	Vocational EFL	Yes	Basic	Face-to-face or video conference	30–40 minutes
P04	Interview	Vocational College	1	Early-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30–40 minutes
P05	Interview	Vocational College	11	Mid-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30–40 minutes
P06	Interview	Technical Training Institute	11	Mid-career	Vocational EFL	Yes	Basic	Face-to-face or video conference	30–40 minutes
P07	Interview	Technical Training Institute	2	Early-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30–40 minutes
P08	Interview	Technical Training Institute	12	Mid-career	Vocational EFL	Yes	Basic	Face-to-face or video conference	30–40 minutes
P09	Interview	Technical Training Institute	9	Mid-career	Vocational EFL	Yes	Basic	Face-to-face or video conference	30–40 minutes
P10	Interview	Technical Training Institute	1	Early-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30–40 minutes
P11	Interview	Vocational College	4	Early-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30–40 minutes
P12	Interview	Vocational College	2	Early-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30–40 minutes

Participant code	Data type	Institution type	Years of teaching	Experience category	Vocational field	Uses digital tools	AI familiarity level	Interview/ survey mode	Duration/ response type
P13	Interview	Vocational College	12	Mid-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30-40 minutes
P14	Interview	Vocational College	19	Senior	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30-40 minutes
P15	Interview	Technical Training Institute	7	Mid-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30-40 minutes
P16	Interview	Vocational College	13	Mid-career	Vocational EFL	Yes	Moderate	Face-to-face or video conference	30-40 minutes
P17	Interview	Vocational College	6	Mid-career	Vocational EFL	Yes	Advanced	Face-to-face or video conference	30-40 minutes
P18	Interview	Technical Training Institute	11	Mid-career	Vocational EFL	Yes	Basic	Face-to-face or video conference	30-40 minutes
P19	Open-ended survey	Technical Training Institute	3	Early-career	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P20	Open-ended survey	Vocational College	12	Mid-career	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P21	Open-ended survey	Technical Training Institute	4	Early-career	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P22	Open-ended survey	Vocational College	4	Early-career	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P23	Open-ended survey	Vocational College	5	Mid-career	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P24	Open-ended survey	Technical Training Institute	19	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P25	Open-ended survey	Technical Training Institute	16	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P26	Open-ended survey	Technical Training Institute	10	Mid-career	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P27	Open-ended survey	Vocational College	17	Senior	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P28	Open-ended survey	Technical Training Institute	8	Mid-career	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P29	Open-ended survey	Technical Training Institute	16	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P30	Open-ended survey	Technical Training Institute	13	Mid-career	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P31	Open-ended survey	Vocational College	18	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response

Participant code	Data type	Institution type	Years of teaching	Experience category	Vocational field	Uses digital tools	AI familiarity level	Interview/survey mode	Duration/response type
P32	Open-ended survey	Vocational College	18	Senior	Vocational EFL	Yes	Advanced	Online questionnaire	Written response
P33	Open-ended survey	Vocational College	8	Mid-career	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P34	Open-ended survey	Vocational College	5	Mid-career	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P35	Open-ended survey	Vocational College	7	Mid-career	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P36	Open-ended survey	Technical Training Institute	1	Early-career	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P37	Open-ended survey	Vocational College	10	Mid-career	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P38	Open-ended survey	Technical Training Institute	19	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P39	Open-ended survey	Technical Training Institute	7	Mid-career	Vocational EFL	Yes	Basic	Online questionnaire	Written response
P40	Open-ended survey	Technical Training Institute	20	Senior	Vocational EFL	Yes	Moderate	Online questionnaire	Written response
P41	Open-ended survey	Technical Training Institute	18	Senior	Vocational EFL	Yes	Basic	Online questionnaire	Written response

Note. Senior (>15 years); Mid-career (5–15 years); Early-career (<5 years)