
RESEARCH ARTICLE

AI Literacy Among Chinese Vocational EFL Learners: A Qualitative Exploration of Motivation, Technology Acceptance, and Goal Orientation

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ABSTRACT

The rapid integration of artificial intelligence (AI) into higher education has heightened the need for students to develop AI literacy as a core competence for both academic performance and future employability. Drawing on Expectancy-Value Theory, the Technology Acceptance Model (TAM), and Goal Orientation Theory, this qualitative case study explores the factors influencing AI literacy among English as Foreign Language (EFL) learners at a vocational college in Guangdong, China. Data were collected through semi-structured interviews with 10 participants for in-depth analysis. Using NVivo 14, thematic analysis revealed three overarching themes: (1) motivation (attainment value and intrinsic interest), (2) mastery goal orientation, and (3) technology acceptance (perceived usefulness and perceived ease of use). Findings indicate that high task value and intrinsic interest strongly enhance AI literacy, mastery goal orientation promotes deeper engagement with AI tools, and perceived usefulness is the strongest predictor of sustained adoption, while perceived ease of use primarily affects initial acceptance. The study provides a conceptual model for EFL learners' AI Literacy to offer practical implications for designing AI-integrated EFL curricula in vocational contexts.

KEYWORDS

AI literacy; vocational education; EFL learning; learner motivation; technology acceptance; goal orientation

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1. Introduction

1.1 Research Background

In an era characterised by the globalisation of industries and professional information engagements, the combination of English as Foreign Language (EFL) learning with technology has become a predominant component in educational setting. In particular, the rapid emergence of artificial intelligence (AI) technology has significantly presented an unprecedented opportunity to enhance EFL learning, and educators are seeking for technological innovation. The integration of AI technology into EFL learning has provided possibilities for second language learners (Adolfina et al., 2023). AI is considered as one of the drivers of the 4.0 industrial revolution and researchers has showed and AI has the ability to create a personalized atmosphere in which learners use their perceptions to concurrently exercise English skills depending on their level of English, vocational needs, or interests (Tira, 2021). In 2024, the Ministry of Education of China issued the "Artificial Intelligence Leading the Digital Innovation and Development of Higher Education" explicitly calls for widespread integration of AI into teaching and learning practices. For vocational college students, who must acquire both professional skills and English proficiency for globally oriented careers, the ability to understand, critically evaluate, and ethically use AI tools has become a critical competency (Long & Magerko, 2020; Wang, 2023). The application of AI technology to improve the key competences of EFL learners and help education reform is the main issue that the Chinese researchers need to solve (Zhao & Cai, 2021).

1.2 Problem Statement

EFL learners' AI literacy is critical for learning and working in the increasingly complex and unpredictably societal challenges. Students are required to improve themselves to meet growing digital competence brought by artificial intelligence in the future workplace (Suleiman et al., 2020). Language learning powered by AI improve EFL students' learning independence, autonomy and different language skills as they can access to various materials (Arini et al., 2022; Li & Wang, 2023; Rusmiyanto et al., 2023). Despite the recognized benefits of AI-powered tools, such as chatbots, automated writing evaluation, speech recognition for EFL learning (Wafa et al., 2024; Zhai & Wibowo, 2023), vocational students in China often exhibit low AI literacy due to limited digital infrastructure, insufficient teacher training, and varying motivational profiles (Li & Wang, 2023). Few empirical studies have explored how psychological factors, namely motivation, goal orientation, and technology acceptance influence the development of AI literacy specifically among vocational EFL learners. The EFL learners in the Chinese vocational colleges are characterized by their unique blend of technical expertise and English proficiency and they possess sincere and candid aspiration to succeed but still show incompetence in using AI technology. Despite the effectiveness of competence in using AI technology has been emphasized, universities have not yet developed a systematic approach to explore and map the AI literacy of the Chinese vocational EFL students due to infrastructure. The gap between the AI-oriented market requirement and EFL learners' AI literacy for EFL learning has been the main agenda in the Chinese vocational education system.

1.3 Research Objective and Research Question

This study aims to examine the relationships among learners' motivation (task value and interest), technology adoption factors (perceived usefulness and ease of use), goal orientation, and AI literacy among Chinese vocational EFL learners. It aims to address the research question: How do learner motivation, goal orientation, and technology acceptance factors influence vocational EFL learners' AI literacy?

1.4 Theoretical Framework

How EFL learners perceive AI technology and their willingness to adopt AI technology for English learning are related to different factors. Chiu et al. (2023) revealed that intrinsic motivation and competence to learn with the chatbot depended on both teacher support and student expertise, namely their self-regulated learning and digital literacy. Students' positive attitudes and goals toward AI-based mobile learning increased their learning opportunities and improved the success of AI-based technology implementation (Arini et al., 2022). Motivation is the dimensions of EFL learners' adoption toward AI-driven learning environment (Adolfina et al., 2023). Miftah et al. (2023) indicates that perceived ease of use and usefulness significantly affect artificial intelligence technology adoption.

To integrate the theoretical framework, a comprehensive Expectancy-value Theory (Eccles et al., 1983) offers a holistic lens. EVT is a psychological theory that explains how individuals' motivations and behaviors are determined by their expectancy of success and the value they attach to that success, and it provides explanation for individuals' achievement-related behaviors (Eccles et al., 2002). Expectancy includes self-efficacy, or an individual's belief in their ability to perform a task successfully, and outcome expectations. Value encompasses intrinsic value, or the enjoyment and interest in the task itself while utility value refers to the task's usefulness for future goals, attainment value, or the personal importance of doing well on the task and cost, which involves the perceived negative aspects of engaging in the task, such as effort, time, and emotional costs (Eccles et al., 1983). Research has proved that the higher levels of expectancy a person has, the more interests that person shows in the process, and the more important and useful a person perceives the target, the more she/he will contribute to a higher acceptance of the task (Bai et al., 2021). This study includes the following value belief from the motivational perspective: attainment value (perceived importance of AI technology for EFL learning), intrinsic value (interest in using AI technology for EFL learning).

Miftah et al. (2023) proposed that the integration of AI technology into educational field provided chance for learners to map and improve their competence and achievement to meet the future career requirements that benefit from learners' AI technology adoption. Learners' attitude or acceptance may affect their behavioral intention to use AI technology. To examine the effect of AI technology adoption on EFL learners' AI literacy in the Chinese vocational setting, the Technology Acceptance Model, proposed by Davis (1989), is used as the theoretical framework for understanding the adoption and use of technology. TAM explains how users come to accept and use a technology. It suggests that two main factors influence users' decisions to accept and use technology: Perceived Usefulness (PU), the degree to which a person believes that using a particular system would enhance their job performance, and Perceived Ease of Use (PEOU) refers to the degree to which a person believes that using a particular system would be free of effort. Damerji & Salimi (2021) provided evidence that perceived usefulness of digital learning helps students in higher education to complete various tasks.

The Goal orientation theory is another adopted theory that examines how individuals' goals influence their motivation, behavior, and achievement, particularly in learning and performance contexts (Dweck & Leggett, 1988). The theory categorizes goals into mastery goals and performance goals. Mastery goals focus on learning and skill development, and performance goals plays emphasis on demonstrating competence and outperforming others (Ames & Archer, 1988). Cromley & Kunze (2021)'s research has shown that goal orientation could serve as a predictor of learners' attitude towards technology adoption. Thus, in this study,

two goal orientation constructs in relation to EFL learners' AI literacy-mastery goal orientation toward AI literacy and performance goal orientation toward AI literacy will be included.

2. Literature Review

2.1 AI in Education and EFL Learning

Artificial intelligence has rapidly penetrated educational practice, reshaping teaching, learning, assessment, and administration. Recent synthesis studies show that AI can enhance instructional quality, support personalized learning, and improve the precision of learning analytics (Chiu et al., 2023; Jiang, 2022). The integration of technology has fundamentally transformed traditional teaching methods into more engaging, student-centered, and personalized learning experiences, with artificial intelligence (AI) emerging as a particularly powerful force in English as a Foreign Language (EFL) education. Recent studies highlight how AI enhances learners' cognition, self-efficacy, and motivation while enabling higher education institutions to build intelligent campuses and modernize pedagogy (Jia & Tu, 2024; Chiu et al., 2023). In the specific domain of EFL, AI-driven tools such as Automated Essay Scorers, Neural Machine Translation, Intelligent Tutoring Systems, chatbots, voice-recognition systems, and dialogue platforms provide individualized instruction, immersive practice environments, instant feedback, and authentic language exposure, significantly improving reading, writing, listening, speaking, pronunciation, and translation skills (Jiang, 2022; Tira, 2021; Wafa et al., 2024; Sharma et al., 2024; Zhai & Wibowo, 2023; Huang, 2024; Li & Wang, 2023). These advancements not only increase learner engagement and practical competence but also allow instruction to be tailored to individual proficiency levels, vocational needs, and interests.

2.2 Definitions of AI Literacy

In the context of vocational education, AI literacy extends beyond mere technical proficiency; it includes the ability to interpret AI-generated information, recognize ethical implications, and leverage AI tools for professional and communicative purposes. Whether EFL learners can utilize AI technology to acquire language knowledge and language skills is affected by multiple factors, and one of which is their AI literacy. On a technical level, AI literacy is developed based on digital competence. Zhao et al. (2021) indicated that most university students and teachers have a basic level of digital competence, and the institutions higher education are encouraged to create relevant learning strategies and use appropriate tools to focus on the development students and teachers' digital competence. Therefore, to better understand the influential factors of Chinese vocational EFL learners' AI literacy, it's crucial to understand the nature of AI literacy. After reviewing literature, there are several definitions of AI literacy as listed.

Definition	Author
a set of competencies that enables individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home, and in the workplace.	Long & Magerko, 2020)
describes the competence of individuals in using AI technology, and refers to the ability to properly identify, use, and evaluate AI-related products under the premise of ethical standards.	(Wang, 2023)
refers to the elements that the workforce needs to harness AI and form a synergistic relationship with the technology.	(Kong et al., 2024)
an individual's ability to clearly explain how AI technologies work and impact society, as well as to use them in an ethical and responsible manner and to effectively communicate and collaborate with them in any setting. It focuses on knowing (i.e. knowledge and skills).	Chiu et al., 2024)

Table 1 : The definitions of AI literacy

3. Methodology

3.1 Research Design

To address the research question, A qualitative single-case study design was adopted to gain rich, contextualized insights (Yin, 2018). The case comprised EFL learners at a vocational college in Guangdong, China. A qualitative approach was employed aiming to explore the influential factors related to EFL learners' AI literacy, hence, to improve their learning proficiency, the participants were selected from a Chinese vocational school setting. To address the research objectives, a case study was carried out. The participants of this study were Chinese students (aged 19 and 20) studying English at a vocational school in China and were a balanced mixture of male and female learners. Purposive sampling technique was adopted to select participants, and they were all willing to participate in a lengthy interview, permit audio and/or video recording, and allow the research data to be published in a confidential manner before the interview. An in-depth interview was carried out, combining open-ended questions to gain insights into EFL learners' experience and perceptions to assess the relationship between several factors and their AI literacy before the beginning of the instructional treatment and observations. 10 participants were finally selected, and all the participants have been learning formal English for at least 7-8 years. An interview protocol was developed as followed. Before the interview began, the interviewees were informed that the purpose of this interview is to understand their experiences and perspectives regarding their

AI literacy and their use of AI technology in EFL learning. The interview length would be about 20 minutes to half an hour, and their responses were kept confidential and used for this research purposes only. They were also informed that if there was any question they were concerned, they can stop the interview at any time. The interview started with simple questions concerning the participants' basic information such as their names, majors, the years that they have learned English and their English proficiency. Participant 1-5 was currently majoring in Business English and have been learned English for over 10 years and have obtained certificate of CET-4 and CET-6. Their proficiency enabled them to understand most written and spoken English materials and for daily communication. Participant 6-10 also majored in Business English, accepting formal English learning for 11 years and have both obtained a certificate of CET-4. Moreover, participant 8 was worried about her speaking English proficiency, for her comfort, the interview with her was conducted in Chinese and translated into English by the researcher.

3.2 Data Collection and Analysis

Given the nature of the research topic, employing a qualitative research design offers a robust framework for investigating the interplay of influential factors of EFL learners' AI literacy in the Chinese vocational schools. In the process of data collection, the interview protocol was carefully design based on rich literature review and verified by 5 well-experienced educators in a university to achieve triangle verification, allowing for a triangulation of findings. The interviews were conducted using both face-to-face interviews with audio recording and online interviews with audio calls and recording. The open-ended questions were modified by two colleagues at the education frontier and a pilot test was conducted to ensure the participants can fully understand the questions. Using a qualitative design illustrates that the researcher can obtain precious perceptions from their actual sense of opinions and get more insides from the interviewees.

Due to the sensitivity of the information collected during the interviews, all participants' names were replaced by "Participant 01" to protect their privacy. Additionally, to ensure confidentiality, the names of the participants' respective schools were also withheld as a security measure. Before the interviews, permissions from each participant were attained and an explanation of the study's purpose and informed consent were provided to the participants. Each participant's interview responses were recorded using two different technical devices to prevent data loss. The final collection of interview data relied on audio-to-text transcription using mobile recording software. The raw data was backed up using three different technical tools, including mobile phones, computers, and cloud storage. The NVivo 14 for MAC was used to analyze data sources and assist the to identify themes within participants' perceptions. A holistic analysis structure was used to analyze the data. This involved handling one interview at a time. The first reading of each interview focused on obtaining an overall understanding and the second reading involved taking memos or notes to help organize the researcher's thoughts. After thorough reading of the transcript and the data it the NVivo 14 for MAC, qualitative data was subjected to thematic analysis, extracting patterns and themes that illuminate the subjective experiences of participants to provide a comprehensive understanding.

3.3 Trustworthiness and Ethical Considerations

Credibility was enhanced through member checking and peer debriefing. After the researcher translated the audio text, the transcriptions were show to the participants to ensure the researcher had made the transcriptions correctly. Ethical approval was obtained from the college, informed consent was secured, and anonymity was protected through pseudonyms.

4. Results

This research followed a systematic six-step thematic analysis process proposed by Naeem et al. (2023) to enhance the trustworthiness and reliability. According to this systematical thematic analysis, these steps include transcript creation and data familiarization; keyword identification; code selection; theme development; conceptualization through the interpretation of keywords, codes, and themes; and, finally, the development of a conceptual model, serving as a road map to enhance rigor of the research process and the depth of research findings(Naeem et al., 2023). Overall, the thematic analysis revealed that Chinese vocational EFL learners' engagement with AI-supported English learning is shaped by a dynamic interplay of motivation, technology acceptance, goal orientation, and emerging AI literacy. Learners who view AI as important for their academic and future professional development, and who express genuine interest in exploring AI tools, are more likely to adopt AI actively. Their continued use is further strengthened when they perceive AI as useful, reliable, and easy to operate. At the same time, mastery-oriented learners tend to engage with AI more deeply—experimenting with features, valuing feedback, and using AI to refine their skills—while performance-driven learners often use AI more superficially for task completion. Together, these factors contribute to varying levels of AI literacy, ranging from basic functional use to more critical and reflective understanding of AI's capabilities and limitations. Ultimately, the findings highlighted that meaningful development of AI literacy depends not only on access to technology but also on learners' motivational profiles, cognitive goals, and perceptions of AI's value in their language-learning journeys.

Transcript creation and data familiarization

The transcript was finished by the researcher and the researcher has gone through the transcript content thoroughly and carefully. With the help of the NVivo 14, 41 quotes were identified in total to discern initial themes.

Keyword identification

In order to perceive the participants' attitude and their interpretation, a close examination of the data was carried out and patterns and elements were identified from the 41 quotes as followed: "fascination with AI capabilities", "curiosity and passion", "essential for English learning projects", "help learn more efficiently and effectively", "fluent communication", "become proficient in English for practical use", "personalized learning plans", "AI's powerful abilities to solve problems", "flexibility and convenience", "simplicity and user-friendly".

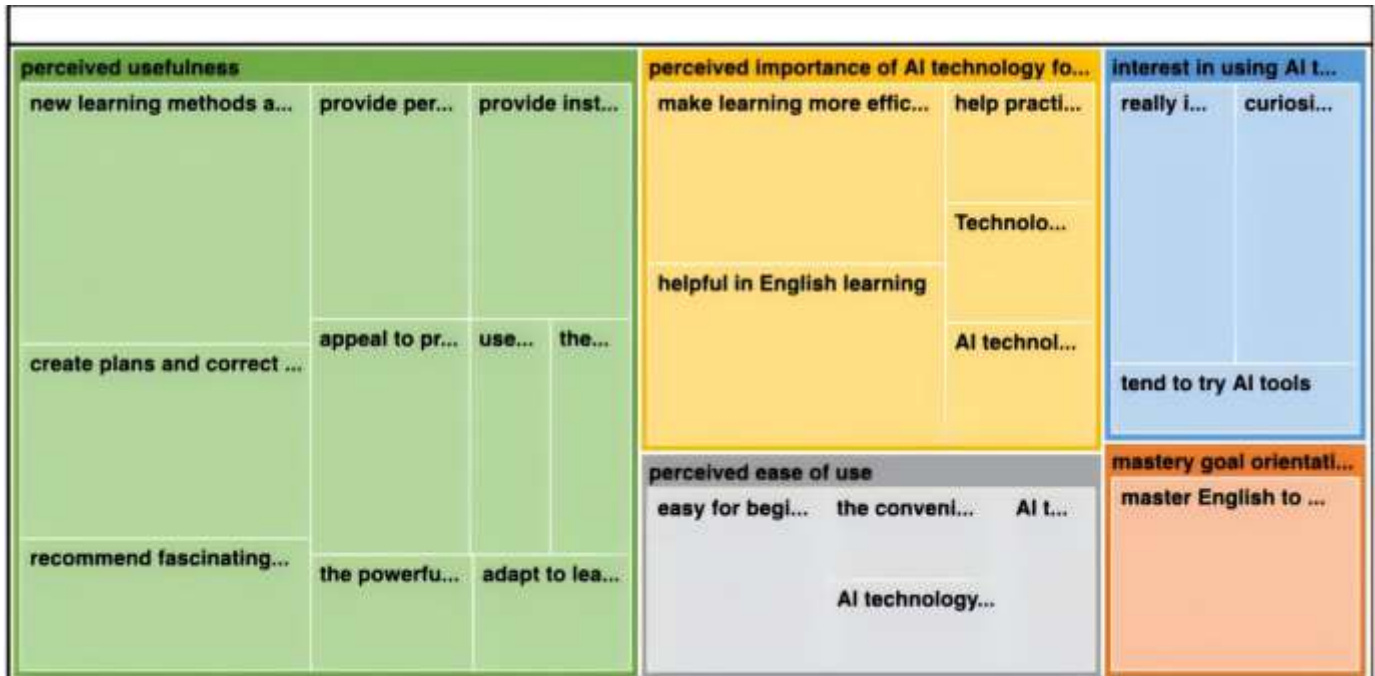


Figure 2: keywords distribution

Coding

Coding refers to the process of assigning a short phrase or a word to data, it summarizes the essential information of the participants' perception. According to Saldana (2016), coding represents the specific and essential attribute of the data. After evaluating the characteristics of the above keywords, the codes were summarized as followed: "interest in using AI technology for English learning", "perceived importance of technology for English learning", "mastery goal orientation", "perceived usefulness", and "perceived ease of use".

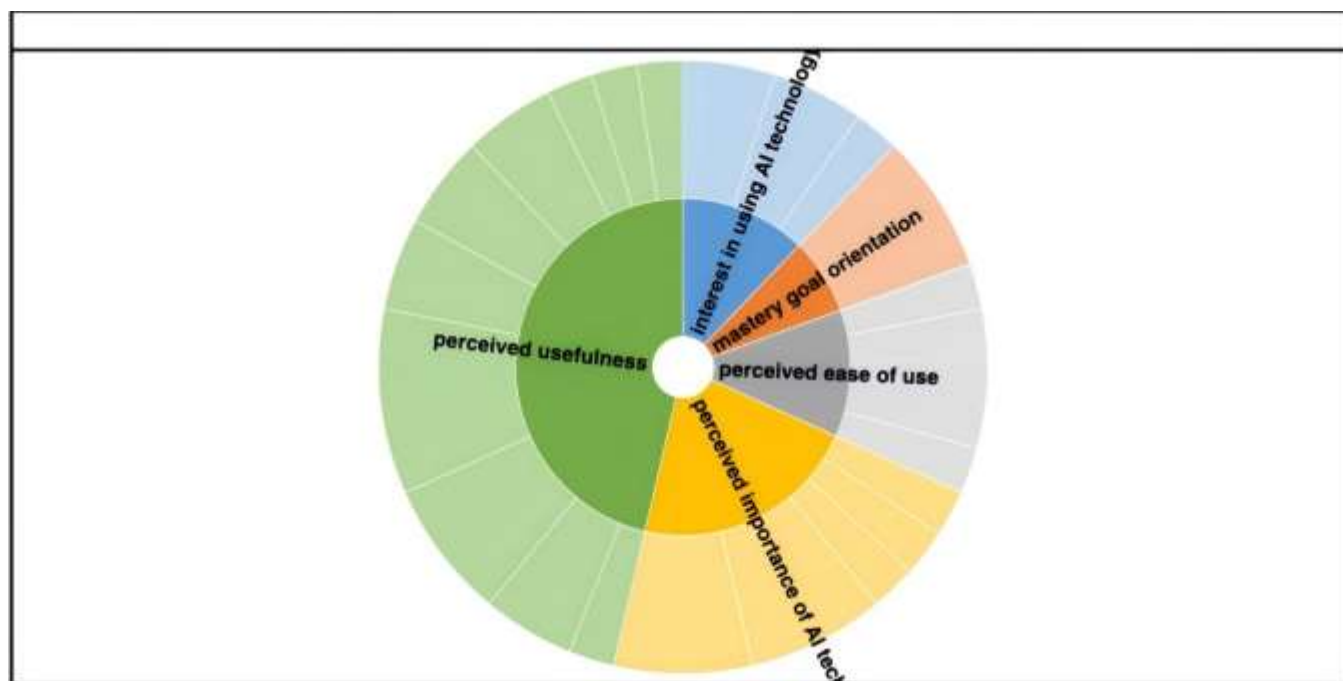


Figure 3: codes proportion

Theme development

Theme 1: motivation

In terms of motivation, a comprehensive Expectancy-value Theory proposed by Eccles et al. (1983) explains how individuals' motivations and behaviors are determined by their expectancy of success and the value they attach to that success, and it provides explanation for individuals' achievement-related behaviors, and one concept, namely attainment value, was defined as the importance of a given task. Research has proved that the higher levels of expectancy a person has, the more interests that person shows in the process, and the more important and useful a person perceives the target, the more she/he will contribute to a higher acceptance of the task (Bai et al., 2021). Therefore, when the participants perceived the importance of AI technology for EFL learning, their motivation to use AI technology increased. All the participants agreed that technology is essential for English learning, and participant 1 mentioned that the internet has revolutionized the way they learn English, and the important AI-based technology has stimulated motivation.

The more interest students have in the subject, the more enjoyment students will get from performing. Intrinsic interest, as a valuable motivational factor, serves as predictor to learners' competence in adopting technology for learning. All the participants attach great importance to the interest for enhancing AI literacy. A quotation from participant 1: "I think I am quite interested in using AI technology to learn English, it's fascinating how it can recommend relevant learning materials based on my preferences and proficiency, making the learning process more efficient and enjoyable." Participant 2 believed that once a person develops a strong interest in something, they will actively seek knowledge, explore, and practice. And participant 3 also admitted that interest plays a significant role and people are more inclined to invest time and effort in tools that spark their curiosity and passion.

Theme 2: goal orientation

According to Dweck & Leggett (1988), the goal orientation theory examines how individuals' goals influence their motivation, behavior, and achievement, particularly in learning and performance contexts. The theory categorizes goals into mastery goals and performance goals. Mastery goals focus on learning and skill development, and performance goals plays emphasis on demonstrating competence and outperforming others (Ames & Archer, 1988). Cromley & Kunze (2021)'s research has shown that goal orientation could serve as a predictor of learners' attitude towards technology adoption. When the participants were asked about the goals to learn English, they all shown preference to master the language skills for career advancement, mainly on developing communicative skill. I focus more on mastering the English language. As participant 1 said: "I aim to master English and to use it to communicate with other people fluently. But ultimately, I want to have a deeper understanding of this language." and participant 3 described: "In many industries, people with strong English proficiency are more likely to be promoted and reused, especially in situations involving external communication, such as accompanying translators or cross-border projects." And due to the personalized feedback and learning recommendations provided by AI technology, participants were likely to use AI technology for achieving their mastery goals over than performing well in exams or outperforming others, for instance, participant 1 mentioned that the powerful features of AI technology help him achieve my language learning goals more efficiently and effectively. Their attitude indicated that mastery goals rather than performing goals effect their AI literacy.

Theme 3: AI technology adoption

Learners' attitude or acceptance to some extent affect their behavioral intention to use AI technology. Miftah et al. (2023) expressed that learner's AI technology adoption improves their competence and achievement. The Technology Acceptance Model, proposed by Davis (1989), provides framework for understanding the adoption and use of technology and explains how users come to accept and use a technology. It suggests that two main factors influence users' decisions to accept and use technology: Perceived Usefulness (PU), the degree to which a person believes that using a particular system would enhance their performance, and Perceived Ease of Use (PEOU) the degree to which a person believes that using a particular system would be free of effort. Damerji & Salimi (2021) provided evidence that perceived usefulness of digital learning helps students in higher education to complete various tasks. Participant 1 found AI tools valuable for providing learning feedback and helping in skill development. Participant 2 mentioned AI's powerful analytical ability and problem-solving capacity while participant 2 acknowledged AI's usefulness in increasing learning efficiency, interest, and motivation. Their all highly valued the usefulness of AI technology and expressed a positive effect to AI literacy.

However, they also had concern about the ease of use associated with AI technology, as participant 1 described AI technology should be user-friendly and technology-based learning should be convenient and flexible, making it easy for beginners to use. He also noted: "Simplicity is essential. Users should be able to quickly understand and efficiently use these tools."

Perceived usefulness and ease of use of AI tools are both significantly for AI technology adoption. Tools that are useful and easy to use promote more frequent and effective usage, contributing to higher AI literacy.

Conceptualization through interpretation of keywords, codes, and themes

By reviewing the quotations, keywords, codes and themes above, there are 9 related quotations concerning the perceived importance of AI technology for English learning, 5 related to interest, 3 related to mastery goals, 5 related to perceived ease of use and 19 to perceived usefulness. In terms of the relationship between EFL learners' motivation, technology adoption, goal orientation, and their AI literacy, the contributing factors are shown in the figures as below. Motivational factors like perceived importance of AI technology and the learners' interest in using it significantly influence their AI literacy. High perceived importance and interest lead to better engagement with AI tools, enhancing literacy. Learners with mastery goals use AI tools for deep understanding and language skill development, positively related to the improvement of their AI literacy. AI tools that are useful and easy to use significantly raise learners' adoptive willingness and promote more frequent and effective usage, contributing to higher AI literacy. Therefore, EFL learners' AI literacy is conceptualized as the competency developed through the interplay of motivation, goal orientation, and adoption of AI technology.

Development of Conceptual Model

By interpreting the data content and combing with the existing and relative theories, a conceptual model was developed, shown as figure 4.

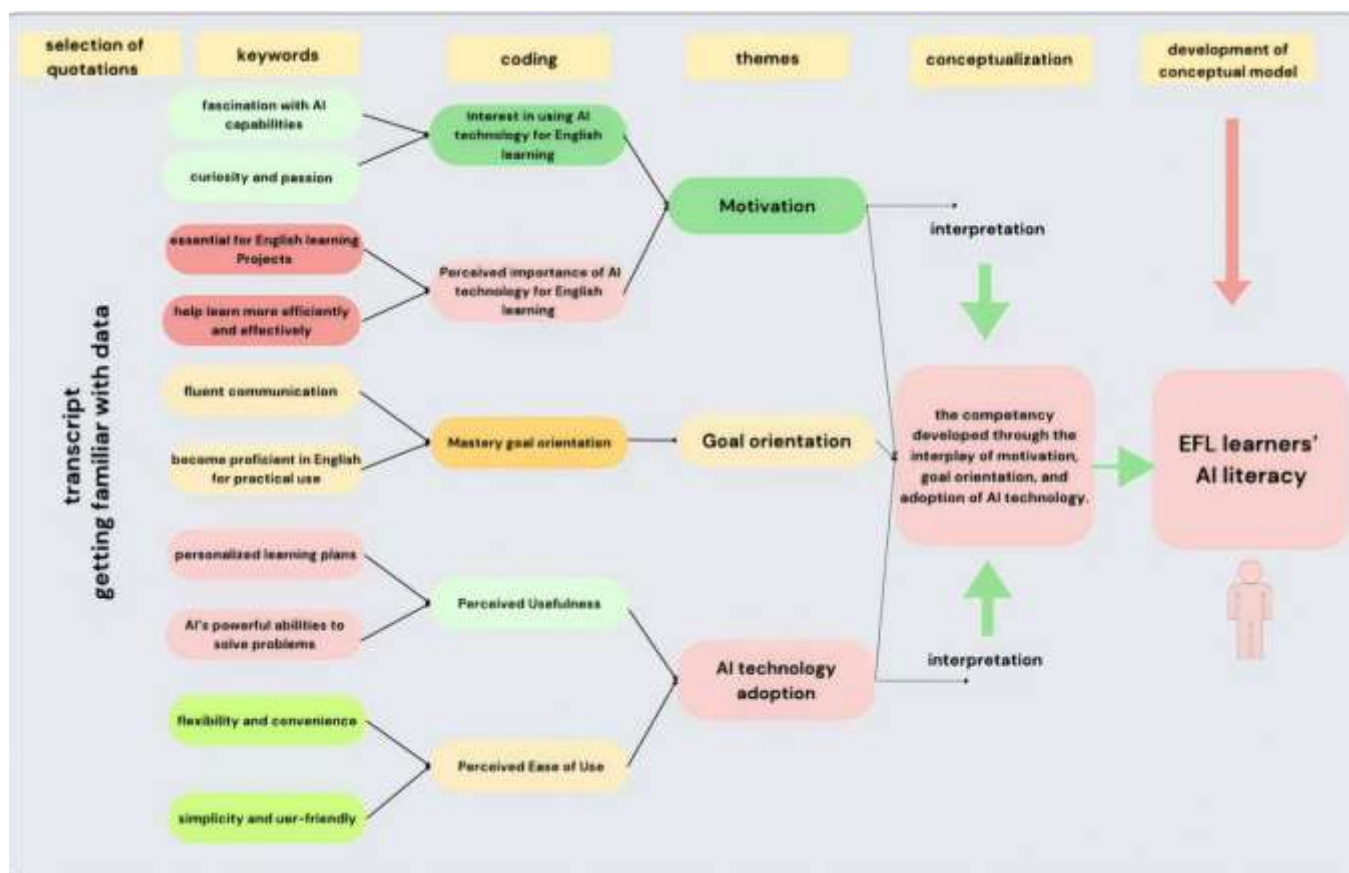


Figure 4: conceptual model

Based on the thematic analysis, this model demonstrates the relationships between motivation, technology adoption, goal orientation, and EFL learners' AI literacy, highlighting how each element contributes to EFL learners' engagement and proficiency with AI technology in the context of EFL learning.

5. Conclusion

This study conducted a thematic analysis of three in-depth interviews with EFL learners to investigate how learner motivation, AI technology adoption, goal orientation, and AI literacy interact within the context of AI-assisted English learning. The findings collectively indicate that learners who perceive AI technologies as valuable and easy to use, who show genuine interest in AI-supported learning, and who adopt a mastery-oriented mindset are more likely to engage actively with AI tools. This engagement not only enhances their confidence and willingness to experiment with AI applications but also leads to the gradual development of more sophisticated AI literacy skills.

Furthermore, the study suggests that AI literacy is not an isolated competence—it develops through the interplay of motivational drivers, cognitive goals, and learners' perceived affordances of technology. When learners value AI as a meaningful resource for improving their language outcomes, they demonstrate higher persistence, more autonomous learning behaviors, and a greater readiness to integrate AI tools into their daily learning routines. In contrast, learners driven by performance goals alone show fluctuating engagement, indicating that mastery-oriented goals may be more conducive to sustained and meaningful AI tool use. For educators designing AI-based instructional input, these findings highlight the need to adopt a learner-centered approach. Effective integration should go beyond simply providing access to AI tools; it should intentionally cultivate positive motivation, strengthen learners' perceived usefulness of AI, scaffold ease of use, and foster mastery-oriented learning environments. Teaching practices that encourage exploration, reduce fear of technological failure, and connect AI tasks with authentic EFL learning outcomes can significantly enhance both acceptance of AI technology and the development of AI literacy.

Overall, this study underscores that successful AI-enhanced EFL learning depends not only on technological availability but also on psychological, pedagogical, and motivational conditions. Future research should involve larger samples and longitudinal designs to further explore how these factors evolve over time and how instructional frameworks can better align with learners' digital habits, affective needs, and language learning goals.

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