INTERACTION: Jurnal Pendidikan Bahasa Vol. 13, No. 1; Maret 2026
P-ISSN: 2406-9558; E-ISSN: 2406-9566

Critical Thinking in AI-Assisted EFL Learning: A Systematic Literature Review

Sylvia
sylvia89@ecampus.ut.ac.id
Universitas Terbuka

ABSTRACT

The rapid advancement of Artificial Intelligence (AI) has transformed educational practices and created new opportunities for fostering critical thinking in English as a Foreign Language (EFL) learning. As critical thinking is increasingly recognized as a key competency in twenty-first-century education, understanding the role of AI in supporting higher-order thinking skills has become an important area of research. However, existing studies remain fragmented across different educational contexts, language skills, and AI applications. Therefore, this study aimed to systematically review recent empirical research on the role of AI in fostering critical thinking in EFL learning. This study employed a qualitative Systematic Literature Review (SLR) design. Relevant studies were collected from major academic databases, including Google Scholar, Scopus-indexed journals, ScienceDirect, Taylor & Francis, SpringerLink, Wiley Online Library, and ERIC. Following predetermined inclusion and exclusion criteria, six peer-reviewed studies published between 2024 and 2026 were selected and analyzed using qualitative content analysis. The analysis focused on four themes: geographical distribution of studies, language skills investigated, critical thinking dimensions addressed, and the roles of AI in fostering critical thinking. The findings revealed that research on AI-assisted critical thinking is concentrated primarily in China, Oman, and Türkiye, with writing and reading being the most frequently investigated language skills. The studies demonstrated that AI supports various dimensions of critical thinking, particularly analysis, evaluation, inference, interpretation, and self-regulation. Furthermore, AI functions as a writing assistant, cognitive and dialogic partner, feedback provider, and pedagogical scaffold. However, critical thinking development depends not merely on AI accessibility but on ethical, reflective, and pedagogically guided implementation. The review concludes that AI has substantial potential to enhance critical thinking in EFL learning when supported by structured scaffolding, metacognitive guidance, and meaningful learner engagement.

Keywords: Artificial Intelligence; Critical Thinking; AI-Assisted Learning, Generative AI

INTRODUCTION

Critical thinking has become one of the most essential competencies in twenty-first-century education and is widely recognized as a fundamental skill for academic success, problem-solving, decision-making, and lifelong learning (Altinyelken,

2021). In the context of English as a Foreign Language (EFL) education, critical thinking extends beyond language acquisition by enabling learners to analyze information, evaluate arguments, make reasoned judgments, and construct meaningful interpretations of texts and ideas. As English increasingly serves as a global language for communication, education, and professional development, EFL learners are expected not only to develop linguistic competence but also to engage critically with diverse sources of information in an increasingly digitalized world (Siemund, 2023). Consequently, fostering critical thinking has become a major objective of contemporary EFL instruction.

Recent advancements in Artificial Intelligence (AI) have significantly transformed educational practices, creating new opportunities for language learning and teaching. AI-powered technologies, including ChatGPT, Grammarly, Duolingo, QuillBot, DeepSeek, and other generative AI applications, have become increasingly prevalent in educational settings due to their ability to provide personalized feedback, adaptive learning support, automated evaluation, and interactive learning experiences (Yogi et al., 2024). These technologies enable learners to receive immediate assistance in various language-learning activities, including reading, writing, vocabulary development, grammar correction, and idea generation. More importantly, AI has the potential to function as a cognitive partner that supports learners in higher-order thinking processes such as analysis, evaluation, reflection, and argumentation (Sammy et al., 2026). As a result, AI-assisted learning has attracted growing attention among researchers seeking to understand its impact on learners' cognitive development, particularly critical thinking.

The increasing integration of AI into EFL learning has generated both optimism and concern. On the one hand, recent studies suggest that AI-supported learning environments can enhance learners' motivation, engagement, self-directed learning, autonomy, metacognitive awareness, and critical thinking skills (Dehankar et al., 2025). AI tools provide opportunities for learners to receive personalized guidance, explore multiple perspectives, refine their arguments, and engage in reflective learning processes. Research has also demonstrated that AI-assisted writing and reading activities can promote deeper cognitive engagement by encouraging learners to evaluate information, question assumptions, compare viewpoints, and justify their reasoning (Hatcher et al., 2025). Furthermore, AI technologies can support blended and distributed learning environments by offering adaptive feedback and individualized scaffolding that may not always be available in traditional classrooms.

On the other hand, the rapid adoption of AI technologies has raised important pedagogical and ethical concerns. Several studies have reported that learners frequently use AI tools for surface-level tasks such as translation, grammar correction, summarization, and answer generation rather than engaging in deeper analytical or evaluative thinking (Vrbová et al., 2025). Excessive reliance on AI-generated content may reduce opportunities for independent reasoning, critical

reflection, and problem-solving. Additionally, concerns related to academic integrity, plagiarism, algorithmic bias, misinformation, privacy, and overdependence on AI continue to challenge educators and institutions. These concerns highlight the need for careful pedagogical design to ensure that AI serves as a tool for cognitive enhancement rather than a substitute for human thinking.

Although a growing body of research has investigated the relationship between AI and critical thinking in EFL contexts, the findings remain fragmented across different educational settings, learner populations, language skills, and AI applications. Some studies emphasize the positive effects of AI on critical thinking, learner autonomy, and self-regulated learning, while others reveal persistent gaps between AI accessibility and meaningful cognitive engagement. Moreover, existing research varies considerably in its theoretical perspectives, methodological approaches, and conceptualizations of critical thinking, making it difficult to draw comprehensive conclusions regarding the role of AI in fostering higher-order thinking skills among EFL learners.

Given the rapid expansion of AI technologies in education and the increasing emphasis on critical thinking as a key learning outcome, a systematic synthesis of existing evidence is necessary. Understanding how AI contributes to critical thinking development, the conditions under which it is most effective, and the challenges associated with its implementation is crucial for informing future educational practice and research. Therefore, this systematic literature review aims to critically examine and synthesize recent empirical studies on critical thinking in AI-assisted EFL learning. Specifically, the review seeks to identify the roles of AI in promoting critical thinking, explore the pedagogical mechanisms through which AI supports cognitive development, examine challenges and limitations associated with AI integration, and highlight directions for future research. By consolidating current knowledge in this field, this review provides valuable insights for educators, researchers, curriculum developers, and policymakers seeking to leverage AI technologies to foster meaningful critical thinking development in EFL education.

METHOD

Design and Sample

This study employed a qualitative Systematic Literature Review (SLR) design to investigate the role of Artificial Intelligence (AI) in fostering critical thinking in English as a Foreign Language (EFL) learning. The SLR design was selected because it allows the researcher to systematically identify, evaluate, analyze, and synthesize relevant empirical studies in a transparent and replicable manner. Through this approach, the study aimed to provide an organized overview of the educational contexts, language skills, critical thinking dimensions, AI applications, and pedagogical roles of AI reported in previous research. The sources of data in this study were peer-reviewed empirical journal articles published between 2024 and 2026. The articles were obtained from reputable academic databases, including

Google Scholar, Scopus-indexed journals, ScienceDirect, Taylor & Francis, SpringerLink, Wiley Online Library, and ERIC. The publication period was limited to 2024–2026 in order to capture recent developments in AI-assisted EFL learning, especially after the rapid growth of generative AI tools such as ChatGPT.

The sample of this study consisted of six empirical studies that met the predetermined inclusion criteria. The selected studies focused on the role of Artificial Intelligence in EFL or ESL learning contexts and addressed critical thinking development, critical thinking dimensions, or higher-order thinking skills. The studies also involved AI-supported tools, platforms, or applications such as ChatGPT, Duolingo, generative AI, or other AI-based technologies. Only studies written in English and published in peer-reviewed journals were included in the review. Studies were excluded if they did not focus on EFL or ESL learning contexts, discussed AI applications without addressing critical thinking or cognitive development, or were conference abstracts, book reviews, editorials, dissertations, unpublished theses, or non-peer-reviewed publications. Studies that lacked sufficient methodological or empirical information were also excluded. In addition, studies focusing only on the technical development of AI without clear educational implications were not included in the final sample.

Instruments and Procedures

The main instrument used in this study was a literature review protocol. This protocol guided the researcher in identifying, selecting, screening, and analyzing relevant studies. It consisted of search keywords, database sources, inclusion and exclusion criteria, and thematic categories for analysis. The use of a review protocol helped ensure that the selection and analysis processes were conducted systematically and consistently. The search process was conducted using several keywords and keyword combinations related to AI, critical thinking, and EFL learning. The keywords included “artificial intelligence and critical thinking in EFL,” “AI-supported critical thinking,” “ChatGPT and critical thinking,” “AI-assisted writing and critical thinking,” “AI-supported reading and critical thinking,” “critical thinking in AI-assisted EFL learning,” and “AI literacy and critical thinking.” These keywords were used to locate studies that were relevant to the focus of the review.

The data collection procedure was carried out in several stages. First, the researcher searched for relevant articles in the selected academic databases using the predetermined keywords. Second, duplicate records were removed to avoid repeated analysis of the same study. Third, the titles and abstracts of the articles were screened to determine their relevance to the objectives of the review. Fourth, the full texts of potentially relevant articles were examined carefully based on the inclusion and exclusion criteria. After this screening process, six relevant studies were selected for detailed analysis. To ensure the trustworthiness of the study, the researcher applied transparent and systematic procedures throughout the selection and analysis process. Only peer-reviewed empirical studies that met the inclusion

criteria were selected. The researcher also documented the screening and analytical procedures to support transparency and replicability. In addition, the findings from the selected studies were compared to identify similarities, differences, converging patterns, and diverging patterns, thereby reducing researcher bias.

Data Analysis

The data were analyzed using qualitative content analysis. The researcher systematically reviewed and synthesized the findings of the six selected studies to identify recurring themes, patterns, similarities, and differences regarding the role of AI in fostering critical thinking in EFL learning. This method was appropriate because the study aimed to interpret and organize findings from previous studies rather than measure statistical relationships. The analysis focused on several thematic categories. These included the geographical distribution of studies, language skills investigated in AI-assisted EFL learning, critical thinking dimensions addressed in AI-assisted EFL learning, and the roles of AI in fostering critical thinking in AI-assisted EFL learning. Each selected study was examined based on these categories in order to identify how AI contributed to students' critical thinking development in different EFL contexts. The findings were then organized into thematic sections and presented descriptively through tables and narrative discussion. The use of tables helped summarize important information from the selected studies, while the narrative discussion provided deeper explanation of the patterns and trends found in the review. Through this analytical process, the study was able to present a comprehensive understanding of current trends, pedagogical implications, and research gaps in AI-assisted critical thinking development within EFL education.

RESULT AND DISCUSSION

The reviewed studies collectively demonstrate that Artificial Intelligence (AI) has emerged as a powerful pedagogical tool for fostering critical thinking in EFL contexts by enhancing learners' self-directed learning, motivation, autonomy, writing performance, AI literacy, and cognitive engagement; however, the findings consistently emphasize that the successful development of critical thinking depends not merely on access to AI technologies but on their ethical, reflective, and pedagogically guided integration through structured cognitive scaffolding, metacognitive support, and meaningful learner interaction.

Table 1. Research Result

Article Title (Author)	Research Focus
Three-wave cross-lagged model on the correlations between critical thinking skills, self-directed learning competency and AI-assisted writing (Xiaolei & Teng, 2024)	This study aimed to investigate the longitudinal relationships among critical thinking skills, self-directed learning competency, and AI-assisted writing among EFL learners. Specifically, it sought to examine how

	critical thinking skills and self-directed learning competency influence AI-assisted writing performance over time, as well as to explore the moderating role of self-directed learning in strengthening the relationship between critical thinking and AI-assisted writing across different learning contexts.
Exploring Omani EFL Student Teachers' Perceptions on Fostering Critical Thinking Through Ethical Use of AI (Al-Saadi et al., 2025)	The study aimed to explore Omani EFL student teachers' perceptions of AI ethics and examine the opportunities, challenges, and implications of integrating artificial intelligence into language education.
Uncurtaining windows of motivation, enjoyment, critical thinking, and autonomy in AI-integrated education: Duolingo Vs. ChatGPT (Xu & Liu, 2025)	The study aimed to examine the effects of Duolingo and ChatGPT on EFL learners' motivation, enjoyment, critical thinking, and learner autonomy in comparison with traditional instruction.
AI as a Pedagogical Scaffold: Enhancing English as a Foreign Language Argumentative Writing and Critical Thinking in a Distributed Learning Environment (Sağ & Kip-Kayabaş, 2026)	The study aimed to investigate the effects of Generative Artificial Intelligence (GenAI) tools on EFL students' argumentative writing performance and critical thinking development, as well as to explore their perceptions of GenAI-supported writing processes and its role in language learning.
Development and Validation of a Needs Analysis Guide for Designing an AI-Enhanced Blended Reading Module to Foster Critical Thinking (Yang et al., 2026)	This study aimed to develop and validate a semi-structured interview guide for assessing EFL learners' critical thinking development and AI literacy in blended reading contexts, and the findings demonstrated strong content validity supported by both quantitative indices and expert qualitative feedback, leading to the conclusion that the instrument is valid, reliable, and practically applicable, while also highlighting the need for further testing across broader populations and contexts to enhance its generalizability and future use in

	examining AI-supported critical thinking processes.
Aligning AI affordances with critical thinking skills in Chinese EFL: a discrepancy-based needs analysis for an AI-integrated blended reading module (Yang & Dong, 2026)	This study aimed to examine EFL learners' critical thinking in AI-supported blended reading, and the findings revealed a clear gap between surface-level practices and learners' expectations for deeper cognitive engagement, concluding that AI must be systematically integrated as a cognitive scaffold to effectively enhance higher-order thinking skills.

The article titled "Three-wave cross-lagged model on the correlations between critical thinking skills, self-directed learning competency and AI-assisted writing " by Xiaolei and Teng (2024) investigated the longitudinal relationships among critical thinking skills, self-directed learning competency, and AI-assisted writing among EFL learners across different learning modes. Using a three-wave cross-lagged model, the study examined how these variables influenced one another over time and explored the moderating role of self-directed learning in the relationship between critical thinking and AI-assisted writing. The findings revealed significant positive associations among the three constructs, demonstrating that critical thinking skills positively predicted AI-assisted writing performance, while self-directed learning competency enhanced both critical thinking development and AI-assisted writing outcomes.

Furthermore, self-directed learning was found to moderate the relationship between critical thinking skills and AI-assisted writing during the initial phase of the study, indicating that learners with stronger self-directed learning abilities were better able to utilize critical thinking skills when engaging with AI-supported writing tasks. However, this moderating effect was not sustained in later phases. Overall, the study concluded that critical thinking skills and self-directed learning competency play pivotal roles in maximizing the effectiveness of AI-assisted writing. These findings suggest that AI tools alone do not automatically improve learners' critical thinking; rather, students must actively engage in critical analysis, independent learning, and reflective decision-making when using AI applications. Therefore, the study recommends that educators integrate AI-assisted writing tools with explicit instruction in critical thinking and self-directed learning strategies, encourage learners to critically evaluate AI-generated outputs, and foster responsible and ethical AI use. Future research should further examine additional factors, such as self-efficacy, technological competence, and writing performance, as well as extend investigations to different educational and linguistic contexts to provide a more comprehensive understanding of AI-assisted language learning.

The study entitled "Exploring Omani EFL Student Teachers' Perceptions on Fostering Critical Thinking Through Ethical Use of AI*"* by (Al-Saadi et al., 2025)

scrutinized to investigate Omani EFL student teachers' perceptions of AI ethics in education, focusing on issues related to academic integrity, privacy, bias, critical thinking, social and emotional well-being, and the ethical integration of AI tools in language learning. The findings revealed that participants generally held positive attitudes toward AI while simultaneously expressing significant concerns regarding plagiarism, academic dishonesty, data privacy, algorithmic bias, and excessive dependence on AI technologies. Student teachers strongly agreed that AI should enhance rather than replace human interaction, emphasized the importance of critically evaluating AI-generated content, and recognized the need to balance AI-assisted learning with traditional teaching approaches.

Furthermore, participants acknowledged that AI can support brainstorming, creativity, and learning efficiency; however, overreliance on AI may hinder critical thinking, independent problem-solving, and academic integrity. The study concluded that the ethical and effective integration of AI in EFL education requires a balanced approach that promotes responsible AI use, preserves human engagement, and fosters critical thinking and digital literacy. Consequently, the study recommends the incorporation of AI ethics courses and modules into teacher education programs, the implementation of awareness campaigns and professional development initiatives, the establishment of clear institutional policies regarding AI use, and the provision of continuous training to help educators and students critically, ethically, and effectively utilize AI technologies in educational settings.

Research conducted by J. Xu and Liu (2025) aimed to examine the effects of two AI-driven language learning platforms, Duolingo and ChatGPT, on English as a Foreign Language (EFL) learners' motivation, enjoyment, critical thinking, and learner autonomy compared to traditional instruction. The findings revealed that both experimental groups significantly outperformed the control group across all four post-test measures, indicating that AI-integrated learning environments substantially enhance affective, cognitive, and metacognitive learning outcomes. However, no statistically significant differences were found between the Duolingo and ChatGPT groups, suggesting that both platforms are equally effective in fostering motivation, enjoyment, critical thinking, and autonomy despite their different instructional designs. The study concluded that AI-powered tools, regardless of their specific form, have transformative potential in language education by providing personalized, engaging, and interactive learning experiences that promote deeper cognitive engagement and self-regulated learning. Therefore, it is recommended that EFL educators integrate AI tools such as Duolingo and ChatGPT into instructional practices to complement traditional teaching, while also designing pedagogical tasks that explicitly develop critical thinking and learner autonomy. Furthermore, learners should be guided to use AI responsibly and reflectively to avoid overreliance, and material developers are encouraged to design AI-enhanced resources that balance skill development with higher-order thinking. Future research should explore a wider range of AI tools, different proficiency levels, specific language skills, and diverse educational contexts to strengthen the generalizability of findings and deepen understanding of

AI's role in language learning.
Research conducted by Sağ and Kip-Kayabaş (2026) aimed to investigate the effects of Generative Artificial Intelligence (GenAI) tools on first-year English Language Teaching (ELT) students' argumentative writing performance and critical thinking development, as well as to explore learners' perceptions of GenAI-supported writing processes and its role in language learning. The findings revealed that GenAI was widely perceived as a facilitative, supportive, and pedagogically valuable tool that enhanced writing quality through immediate feedback, idea generation, vocabulary enrichment, and structural guidance, while also fostering self-paced learning and learner autonomy. Participants reported improved academic writing performance in terms of grammar accuracy, lexical range, organization, and idea development, alongside increased confidence, reduced writing anxiety, and greater engagement in the writing process.

Moreover, GenAI contributed to the development of critical thinking by encouraging learners to evaluate AI-generated responses, refine prompts, and engage in reflective and argumentative reasoning. The study concluded that GenAI functions as an effective pedagogical scaffold that not only improves writing proficiency but also promotes cognitive engagement, critical thinking, and self-regulated learning when integrated within a structured, teacher-guided learning environment. Therefore, it is recommended that EFL educators incorporate GenAI tools into writing instruction as complementary scaffolding resources, while ensuring explicit guidance on ethical use, prompt literacy, and critical evaluation of AI outputs. Additionally, learners should be trained to use GenAI reflectively to avoid overreliance, and curriculum designers are encouraged to develop blended learning models that integrate GenAI to support personalized, interactive, and cognitively stimulating language learning experiences. Future research should further explore long-term effects of GenAI on different language skills, learner proficiency levels, and cross-cultural educational contexts to enhance the generalizability of findings.

Yang et al., (2026) aimed to develop and validate a semi-structured interview guide designed to examine English as a Foreign Language (EFL) learners' critical thinking development and AI literacy within blended reading contexts, ensuring its content validity, clarity, and practical usability through expert review and pilot testing. The findings revealed that the instrument demonstrated strong content validity, as evidenced by high scores across all quantitative indices (I-CVI, S-CVI/Ave, S-CVI/UA, and k*), all of which exceeded established methodological thresholds for relevance, clarity, and simplicity, while qualitative expert feedback further refined item wording, scope, and neutrality. The pilot study also indicated that EFL learners could meaningfully engage with the instrument, suggesting its practical usability, although broader generalization remains limited due to the small sample size. Overall, the study concluded that the interview guide is a valid, reliable, and contextually relevant tool for identifying learners' reading competencies, critical thinking needs, and perceptions of AI integration, while also providing a theoretically grounded framework for exploring the relationship

between AI literacy and critical thinking in EFL contexts. Therefore, it is recommended that the instrument be further tested across larger and more diverse populations and adapted to different cultural and educational contexts to enhance its generalizability, while future research should employ the guide to investigate deeper interactions between AI-assisted learning and critical thinking development, particularly in relation to cognitive processes such as analysis, evaluation, and inference.

Previous research conducted by Yang and Dong (2026) investigated EFL learners' critical thinking development and reading practices in AI-supported blended learning environments. The study examined learners' reading behaviors, use of AI tools, metacognitive regulation, and needs for cognitive scaffolding. The findings showed that learners' reading practices were still dominated by surface-level activities, such as understanding vocabulary, identifying main ideas, and answering task-based questions. There was limited evidence of higher-order critical thinking skills, including analysis, evaluation, inference, and self-regulation. Although learners had wide access to AI tools and used them frequently, their use of AI was mostly practical and language-focused. They relied on AI for translation, grammar correction, summarization, and outline generation rather than for evaluative reasoning, argumentative comparison, or reflective questioning.

The study also revealed that learners expected more structured support to help them develop critical thinking in academic reading. They needed explicit modeling of critical thinking strategies, step-by-step analytical guidance, visual representations of argument structures, and interactive learning environments that promoted dialogue, peer discussion, and reflection. Learners also viewed AI as a potential cognitive partner, not only as a tool for completing tasks. They expected AI to provide dialogic prompts, personalized feedback on the quality of their reasoning, and progress-tracking support for self-regulated learning. Therefore, Yang and Dong (2026) concluded that there was a clear gap between learners' access to AI tools and the effective pedagogical use of AI for developing higher-order thinking. The study recommended that AI should be integrated as a structured cognitive scaffold that supports analysis, evaluation, inference, and self-regulation, together with teacher guidance, explicit strategy instruction, and collaborative learning practices.

Geographical Distribution of Studies

The geographical distribution of the reviewed studies indicates that research on AI-assisted critical thinking in EFL learning is predominantly concentrated in Asian and Middle Eastern contexts. Among the six selected studies, three were conducted in China (Xiaolei & Teng, 2024; Yang et al., 2026; Yang & Dong, 2026), one in Oman (Al-Saadi et al., 2025), one in Türkiye (Sağ & Kip-Kayabaş, 2026), and one in China involving AI-integrated platforms such as Duolingo and ChatGPT (Xu & Liu, 2025). This distribution demonstrates that China has emerged as the most active research context, contributing half of the studies included in this review.

Chinese studies primarily focused on the relationship between AI-assisted learning and critical thinking development, particularly in writing and reading contexts, as well as learners' cognitive, metacognitive, and AI literacy needs. In contrast, the Omani study emphasized ethical concerns surrounding AI integration, including academic integrity, privacy, bias, and responsible AI use, highlighting the importance of ethical awareness in fostering critical thinking. Meanwhile, the Turkish study explored the pedagogical role of Generative AI in enhancing argumentative writing and critical thinking, emphasizing AI as a cognitive scaffold within distributed learning environments.

The concentration of studies in China, Oman, and Türkiye suggests that interest in AI-assisted critical thinking is growing rapidly in non-Western EFL contexts, where educational institutions are increasingly adopting AI technologies to support language learning. However, the geographical coverage remains relatively limited, as no studies were identified from regions such as Southeast Asia, Africa, Latin America, or Europe. Notably, despite the rapid expansion of AI technologies in education, there is still a lack of empirical evidence from Indonesia and other ASEAN countries. This imbalance indicates that the current body of literature may not fully represent the diverse cultural, technological, and educational realities of EFL learners worldwide. Therefore, future research should expand investigations into underrepresented regions to provide a more comprehensive understanding of how AI can support critical thinking development across different linguistic, cultural, and educational settings. Such broader geographical representation would enhance the generalizability of findings and contribute to the development of more context-sensitive AI-assisted pedagogical practices in EFL education.

Language Skills Investigated in AI-Assisted EFL Learning

The reviewed studies reveal that writing and reading are the primary language skills investigated in AI-assisted EFL learning, with a stronger emphasis on writing. Three studies specifically focused on writing skills, particularly AI-assisted writing and argumentative writing (Xiaolei & Teng, 2024; Sağ & Kip-Kayabaş, 2026), while two studies examined reading-related critical thinking development within AI-supported blended learning environments (Yang et al., 2026; Yang & Dong, 2026). Additionally, one study explored AI integration in language learning more broadly by examining learners' motivation, autonomy, enjoyment, and critical thinking through the use of Duolingo and ChatGPT rather than targeting a specific language skill (Xu & Liu, 2025). This distribution suggests that writing remains the most extensively researched skill in AI-assisted EFL contexts due to its close relationship with critical thinking, reasoning, argumentation, and self-reflection.

In writing-focused studies, AI tools were primarily utilized to support idea generation, content organization, grammar correction, vocabulary enhancement, and argumentative development. The findings consistently demonstrated that AI-assisted writing can improve learners' writing performance while simultaneously fostering higher-order cognitive processes such as analysis, evaluation, reflection,

and self-regulation. For example, Xiaolei and Teng (2024) found that critical thinking skills significantly predicted AI-assisted writing performance, while Sağ and Kip-Kayabaş (2026) reported that Generative AI enhanced students' argumentative writing and encouraged critical evaluation of AI-generated outputs. These findings suggest that writing activities provide a productive environment for integrating AI and critical thinking because learners are required to assess information, construct arguments, and make informed decisions throughout the writing process.

In contrast, reading-focused studies highlighted the potential of AI to support critical reading, analytical reasoning, and metacognitive awareness. Yang et al. (2026) developed a validated needs-analysis instrument to assess learners' critical thinking and AI literacy in blended reading contexts, while Yang and Dong (2026) identified a substantial gap between learners' current surface-level reading practices and their aspirations for deeper critical engagement. Their findings revealed that students frequently used AI for translation and summarization rather than for evaluating arguments, making inferences, or questioning textual assumptions. Consequently, both studies emphasized the need to integrate AI as a cognitive scaffold capable of promoting analysis, evaluation, inference, and self-regulation during reading activities.

Despite the growing body of research on writing and reading, the findings also reveal an important gap in the literature. None of the reviewed studies specifically investigated the role of AI in developing critical thinking through speaking or listening skills. This indicates that current research remains heavily concentrated on literacy-related skills, particularly writing, while oral communication skills have received considerably less attention. Therefore, future studies should explore how AI technologies can support critical thinking development in speaking and listening contexts, thereby providing a more comprehensive understanding of AI-assisted critical thinking across all language skills in EFL education.

Critical Thinking Dimensions Addressed in AI-Assisted EFL Learning

The reviewed studies indicate that AI-assisted EFL learning primarily supports the development of selected dimensions of critical thinking, particularly interpretation, analysis, evaluation, inference, and self-regulation as conceptualized in Facione's (1990) framework, although these dimensions are not equally represented across all studies. Among these, analysis and evaluation emerge as the most frequently addressed dimensions, especially in studies focusing on AI-assisted writing and argumentative writing tasks (Xiaolei & Teng, 2024; Sağ & Kip-Kayabaş, 2026), where learners are encouraged to examine ideas, assess arguments, and critique AI-generated outputs. These findings suggest that AI tools can facilitate learners' engagement with reasoning processes that require identifying relationships among ideas and judging the credibility or relevance of information.

The dimension of inference is also evident, particularly in studies involving AI-

supported reading and writing activities, where learners are prompted to draw conclusions, generate arguments, and compare multiple viewpoints (Yang & Dong, 2026; Sağ & Kip-Kayabaş, 2026). AI tools such as ChatGPT and GenAI systems are reported to support inferential thinking by providing alternative perspectives and prompting learners to justify their responses. However, the extent to which learners independently engage in inference remains limited, as many still rely on AI-generated outputs without deeply interrogating the reasoning behind them.

In contrast, interpretation and explanation are more implicitly addressed across studies, particularly in tasks involving summarization, comprehension, and content clarification (Xu & Liu, 2025; Yang et al., 2026). These dimensions are often developed through AI-assisted activities such as summarizing texts, explaining meanings, and organizing ideas, which primarily support lower-to-mid level cognitive processing. While these skills are essential, they do not consistently lead to deeper critical engagement unless combined with structured pedagogical scaffolding.

Among all dimensions, self-regulation appears to be the least developed yet most emphasized as a necessary component for effective AI-assisted learning. Several studies (Xiaolei & Teng, 2024; Yang & Dong, 2026) highlight that learners rarely monitor or evaluate their own thinking processes during AI use, despite recognizing its importance. This gap suggests that while AI tools can provide feedback and prompts, learners still require explicit metacognitive training to regulate their reasoning, evaluate AI outputs critically, and adjust their learning strategies independently.

Overall, the findings demonstrate that AI-assisted EFL learning supports multiple dimensions of critical thinking, but its impact is uneven and highly dependent on instructional design. Without structured guidance, AI tends to reinforce surface-level cognitive processes rather than systematically developing higher-order critical thinking skills. Therefore, the integration of AI in EFL contexts must be deliberately designed to balance all dimensions of critical thinking, particularly by strengthening self-regulation alongside analysis, evaluation, and inference.

Roles of AI in Fostering Critical Thinking in AI-Assisted EFL Learning

The reviewed studies consistently demonstrate that Artificial Intelligence (AI) plays multiple interconnected roles in fostering critical thinking in EFL learning contexts, ranging from a linguistic support tool to a cognitive scaffold that facilitates higher-order thinking processes. Across the literature, AI is primarily positioned in four major roles: as a writing assistant, a cognitive and dialogic partner, a feedback provider, and a pedagogical scaffold. However, the extent to which these roles contribute to critical thinking development largely depends on how AI is integrated within instructional design and learners' metacognitive engagement.

First, AI functions as a writing and language support assistant, particularly in

studies focusing on AI-assisted writing and GenAI tools (Xiaolei & Teng, 2024; Sağ & Kip-Kayabaş, 2026). In this role, AI supports learners by generating ideas, improving grammar accuracy, enhancing vocabulary, and organizing text structure. While these affordances improve writing performance, the studies emphasize that such support alone does not automatically lead to critical thinking development unless learners are encouraged to evaluate, refine, and critique AI-generated outputs.

Second, AI serves as a cognitive and dialogic partner that stimulates learners' reasoning processes through interaction and questioning. Studies such as Yang and Dong (2026) highlight that learners expect AI to function as a "thinking partner" that asks guiding questions, prompts justification of opinions, and encourages comparison of perspectives. This dialogic function is particularly important for fostering analysis, evaluation, and inference, as it shifts learners from passive recipients of information to active constructors of meaning. Third, AI operates as a feedback provider, offering immediate and adaptive responses to learners' outputs. In several studies (Sağ & Kip-Kayabaş, 2026; Xu & Liu, 2025), AI-generated feedback is reported to enhance learners' awareness of writing quality, reasoning structure, and language accuracy. However, the effectiveness of this role depends on whether feedback focuses only on correctness or extends to reasoning quality and argument strength. When feedback targets cognitive processes, AI becomes more effective in supporting critical thinking development.

Finally, AI acts as a pedagogical scaffold that supports structured learning and metacognitive development. Yang et al. (2026) and Yang & Dong (2026) emphasize that AI can guide learners through structured questioning, reflective prompts, and progressive task design that align with critical thinking dimensions. In this role, AI helps bridge the gap between learners' current surface-level practices and desired higher-order thinking skills by making cognitive processes more visible and structured. Overall, the findings indicate that AI has strong potential to foster critical thinking in EFL learning; however, its effectiveness is highly dependent on pedagogical mediation. Without structured guidance, AI tends to function primarily as a productivity tool, whereas with appropriate instructional design, it can evolve into a powerful scaffold for developing analysis, evaluation, inference, and self-regulation skills.

CONCLUSION

The findings of this systematic literature review indicate that Artificial Intelligence (AI) has a significant and multifaceted role in fostering critical thinking within EFL learning contexts. Across the reviewed studies, AI is consistently shown to enhance learners' cognitive engagement, self-directed learning, writing and reading performance, motivation, and learner autonomy. However, the development of critical thinking does not occur automatically through AI use; rather, it is highly dependent on how AI is pedagogically integrated through structured scaffolding, ethical guidance, and metacognitive support. In terms of geographical distribution,

the studies are predominantly situated in Asian and Middle Eastern contexts, with China emerging as the most dominant research setting. The research focus is largely concentrated on writing and reading skills, while speaking and listening remain underexplored. Regarding critical thinking dimensions, analysis, evaluation, inference, interpretation, and self-regulation are addressed unevenly, with analysis and evaluation being the most frequently developed, while self-regulation remains the least emphasized but most essential dimension. Furthermore, AI plays several key roles in supporting critical thinking, including as a writing assistant, cognitive and dialogic partner, feedback provider, and pedagogical scaffold. Among these roles, AI as a scaffold and dialogic partner is the most influential in promoting higher-order thinking skills, as it encourages learners to reflect, justify reasoning, and engage in deeper cognitive processing. Overall, the review confirms that AI has strong potential to support critical thinking development in EFL learning, but its effectiveness is determined by instructional design, learner engagement, and ethical integration.

REFERENCES

Al-Saadi, Z., Khalil, H., & Yousef, A. M. F. (2025). Exploring Omani EFL Student Teachers' Perceptions on Fostering Critical Thinking Through Ethical Use of AI. *Educational Process: International Journal*, *17*. https://doi.org/10.22521/edupij.2025.17.319

Altinyelken, H. K. (2021). Critical thinking and non-formal Islamic education: Perspectives from young Muslims in the Netherlands. *Contemporary Islam*, *15*(3), 267–285. https://doi.org/10.1007/s11562-021-00470-6

Dehankar, P., Chaturvedi, K., & Das, S. (2025). AI and Psychosocial Factors: Attitude, Perception, Anxiety, Learning, and Self-Regulation Skills. In *Mental Health Challenges in Academia: Stressors Faced by Students and Faculty* (pp. 307–322). IGI Global. https://doi.org/10.4018/979-8-3373-0928-6.ch014

Facione, P. A. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction—The Delphi report. Millbrae, CA: California Academic Press.

Hatcher, J. W., Davis, J., Dubuisson, B., & Russell, S. (2025). STUDENT ENGAGEMENT, DEVELOPING CRITICAL THINKING SKILLS AND THE USE OF AI. *Proceedings of the 22nd International Conference on Cognition and Exploratory Learning in the Digital Age, CELDA 2025*. https://doi.org/10.33965/celda2025_202509c061

Sağ, İ., & Kip-Kayabaş, B. (2026). AI as a Pedagogical Scaffold: Enhancing English as a Foreign Language Argumentative Writing and Critical Thinking in a Distributed Learning Environment. *International Review of Research in Open and Distributed Learning*, *27*(2), 83–108. https://doi.org/10.19173/irrodl.v27i2.9499

Sammy, F., Gopika Priya, P., Lakumarapu, S., Jebamalar, G. B., Vijay, J. A., Lokesh, P., & Dinesh, M. G. (2026). Transforming Education With Artificial Intelligence: Tools, Challenges, and Future Directions. In *Transforming*

Humanities and Social Sciences Through AI (pp. 465–485). IGI Global. https://doi.org/10.4018/979-8-3373-3436-3.ch017

Siemund, P. (2023). Multilingual Development: English in a Global Context. In *Multilingual Development: English in a Global Context*. Cambridge University Press. https://doi.org/10.1017/9781108915540

Vrbová, V., Frolík, D., & Rohlíková, L. (2025). Artificial Intelligence as a Key Element of the Personal Digital Environment of University Students. *EAI/Springer Innovations in Communication and Computing*, 285–294. https://doi.org/10.1007/978-3-031-81261-3_22

Xiaolei, S., & Teng, M. F. (2024). Three-wave cross-lagged model on the correlations between critical thinking skills, self-directed learning competency and AI-assisted writing. *Thinking Skills and Creativity*, *52*. https://doi.org/10.1016/j.tsc.2024.101524

Xu, J., & Liu, Q. (2025). Uncurtaining windows of motivation, enjoyment, critical thinking, and autonomy in AI-integrated education: Duolingo Vs. ChatGPT. *Learning and Motivation*, *89*. https://doi.org/10.1016/j.lmot.2025.102100

Yang, A., & Dong, L. (2026). Aligning AI affordances with critical thinking skills in Chinese EFL: a discrepancy-based needs analysis for an AI-integrated blended reading module. *Frontiers in Psychology*, *17*. https://doi.org/10.3389/fpsyg.2026.1811899

Yang, A., Sulaiman, N. A., & Yaccob, N. S. (2026). Development and Validation of a Needs Analysis Guide for Designing an AI-Enhanced Blended Reading Module to Foster Critical Thinking. *SAGE Open*, *16*(1). https://doi.org/10.1177/21582440261428909

Yogi, M. K., Chowdary, Y. R., & Santhoshi, C. P. R. S. (2024). Impact of Generative AI Models on Personalized Learning and Adaptive Systems. In *Empowering Digital Education with ChatGPT: From Theoretical to Practical Applications* (pp. 83–97). CRC Press. https://doi.org/10.1201/9781032716350-6