

Teacher Cognition and Practices Regarding Critical Thinking Integration in EFL Reading Classes: An AI-Augmented Perspective

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Abstract: The integration of critical thinking into English as a Foreign Language (EFL) reading instruction represents a profound pedagogical shift, requiring learners to move beyond literal comprehension toward deep textual analysis. Simultaneously, the rapid emergence of generative artificial intelligence provides novel avenues for scaffolding these advanced cognitive skills. However, the successful deployment of such technologies depends heavily on teacher cognition—specifically, how educators perceive, evaluate, and integrate AI tools to foster critical analysis rather than superficial reading. This paper explores the intersection of teacher beliefs, EFL reading practices, and AI-supported critical thinking paradigms. By proposing a structured methodological framework, we aim to align educators' pedagogical strategies with the capabilities of generative AI, ensuring that learners actively perform critical thinking rather than merely demonstrating it through AI-generated outputs.

Keywords: critical thinking, requiring learners, generative artificial intelligence, advanced cognitive skills, AI-generated outputs.

1. INTRODUCTION

The cultivation of critical thinking skills is increasingly recognized as a cornerstone of effective English as a Foreign Language (EFL) instruction, particularly within reading classes where learners must navigate complex arguments and cultural nuances. Traditionally, EFL reading comprehension has focused heavily on vocabulary acquisition and grammatical decoding. In recent years, however, educators have sought to elevate reading practices by teaching students to evaluate evidence, detect unreliable claims, and exercise independent judgment. The advent of generative artificial intelligence (GenAI) introduces unprecedented opportunities to augment these efforts, as large language models can provide instantaneous, adaptive responses tailored to the language proficiency of second language (L2) learners (Favero et al., 2024). Consequently, understanding teacher cognition—how teachers conceptualize critical thinking and their subsequent instructional practices using AI—has become an urgent priority in language education research.

Despite the theoretical enthusiasm for GenAI in language learning, significant gaps remain in how educators practically deploy these tools to enhance cognitive engagement. Current implementations of AI in educational settings frequently fall short for several reasons. First, traditional non-AI or basic digital approaches often fail to provide the instantaneous, adaptive scaffolding necessary to guide L2 learners through complex processes like argument reconstruction (Ryu et al., 2026). Second, existing AI integrations typically function as mere information retrieval systems that offer direct answers, which inadvertently undermines deep cognitive engagement by prioritizing "demonstrated" critical thinking over genuinely "performed" critical thinking (Mei & Weber, 2025). Because teachers' beliefs dictate classroom practices, an incomplete understanding of how to wield AI as a cognitive provocateur often results in superficial technology use that bypasses true analytical skill development.

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To address these pedagogical shortcomings, this paper investigates how teacher cognition can be aligned with advanced GenAI capabilities to restructure EFL reading environments. We introduce a systematic approach to utilizing AI not as an answer generator, but as a critical interlocutor. Specifically, our work makes the following contributions:

- We propose a novel pedagogical framework that operationalizes teacher cognition by structuring L2 reading tasks around AI-driven argument reconstruction and Socratic questioning.
- We outline a comprehensive evaluation methodology designed to systematically assess the impact of Socratic AI tools on the development of L2 readers' critical thinking subskills.

2. RELATED WORK

Defining and Quantifying Critical Thinking

The foundational step in teaching critical thinking is establishing a clear, operational definition that can be measured and assessed. Recent scholarship defines critical thinking fundamentally as the ability to use data and evidence to decide what to trust and what actions to take (Walsh et al., 2019). In the context of generative AI, researchers have introduced a crucial distinction between "demonstrated" critical thinking, where an AI produces an analytically sound output on behalf of the user, and "performed" critical thinking, where the human actively engages in the cognitive process (Mei & Weber, 2025). While previous efforts have successfully validated instruments to quantify these skills in STEM fields (Walsh et al., 2019), adapting these conceptualizations to EFL reading presents unique challenges. Our work builds upon this distinction, equipping EFL teachers with the cognitive framework needed to ensure their students are performing the analysis rather than outsourcing it.

AI as an Interlocutor and Provocateur

The concept of using language models as active participants in the critical thinking process has been explored across various academic domains. For instance, philosophers have engaged with language models, evaluating their potential to act as critical thinking tools in roles such as the Interlocutor, the Monitor, and the Respondent (Ye et al., 2024). However, these studies note that advanced users often find current models lacking due to an absence of initiative, curiosity, and a consistent sense of "selfhood" (Ye et al., 2024). To counteract this, researchers have designed domain-specific AI provocations that utilize productive friction to elicit human clarification and justification (Davier et al., 2026). Compared to these general and philosophical applications, our research specifically targets the L2 reading environment. We investigate how EFL teachers can intentionally prompt AI to act as a structured provocateur, mitigating the AI's lack of selfhood by defining strict pedagogical parameters for text analysis.

AI-Assisted Argumentation and Socratic Tutoring

Argument reconstruction—the process of extracting explicit and implicit premises and mapping their logical connections—is central to critical thinking (Ryu et al., 2026). AI models trained specifically on argument reconstruction have shown significant improvements in downstream reasoning tasks (Ryu et al., 2026). Furthermore, studies focusing on L2 learners have demonstrated that structured methodologies, such as integrating the Paul-Elder Critical Thinking Model with ChatGPT, can significantly enhance logical coherence and the use of evidence in argumentative contexts (Suh et al., 2025). Similarly, specialized Socratic chatbots have been developed to encourage students to explore various perspectives and engage in self-reflection rather than passively receiving direct answers (Favero et al., 2024). While these approaches exhibit immense potential, they have primarily been applied to argumentative writing or general tutoring. Our approach differentiates itself by migrating these Socratic and argument-reconstruction techniques directly into the receptive skill of EFL reading, guided heavily by teacher cognition and instructional intervention.

3. METHOD/APPROACH

The AI-Augmented Critical Reading Framework (ACRF)

To bridge the gap between teacher cognition and effective classroom practice, we propose the AI-Augmented Critical Reading Framework (ACRF). This methodology structures the integration of GenAI into EFL reading classes through a deliberate, phased pipeline. The framework relies on the premise that teachers must curate AI interactions to guarantee that students engage in performed critical thinking rather than relying on the AI for demonstrated outputs (Mei & Weber, 2025).

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The ACRF consists of three primary modules executed in sequence during a reading lesson:

1. **Pre-reading Provocation:** The teacher configures the AI to generate domain-specific provocations related to the text's theme (Davies et al., 2026). The AI asks students challenging, open-ended questions to activate their prior knowledge and establish productive friction before they encounter the target reading.
2. **Guided Argument Reconstruction:** During the reading phase, students use a specialized prompt engine to assist in identifying the core arguments. The AI is instructed to help learners extract explicit and implicit premises from the EFL text without summarizing the entire passage for them (Ryu et al., 2026).
3. **Socratic Dialogue and Reflection:** Post-reading, students engage with a Socratic chatbot module. Unlike standard chatbots that provide direct answers, this module is fine-tuned to pose thought-provoking questions, forcing students to defend their interpretations of the text and explore alternative viewpoints (Favero et al., 2024).

Design Rationale and Key Choices

The primary design choice in the ACRF is the strict limitation on the AI's ability to provide summative answers. By restricting the AI to the roles of provocateur and Socratic questioner, we align the tool with the pedagogical goal of intellectual autonomy. Teachers act as meta-facilitators, monitoring the AI-student dialogue rather than directly lecturing. Furthermore, integrating explicit argument reconstruction into the pipeline addresses the specific cognitive load challenges faced by L2 learners, helping them visualize logical structures that might otherwise be obscured by a language barrier (Ryu et al., 2026).

Evaluation Plan

To validate the efficacy of the ACRF, we propose a mixed-methods evaluation plan involving both quantitative benchmarks and qualitative teacher cognition analysis. We hypothesize an experimental setup involving control and experimental groups within university-level EFL reading courses. The control group will use unstructured access to ChatGPT, while the experimental group will be guided by the ACRF methodology (Suh et al., 2025). We will measure students' critical thinking development using a modified, closed-response assessment instrument adapted from existing inventories to suit language learning contexts (Walsh et al., 2019). Additionally, to evaluate the subskills of critical thinking manifested in students' post-reading reflections, we will employ an LLM-supported automated assessment rubric (Peczuh et al., 2025). Teacher cognition will be tracked longitudinally through pre- and post-intervention semi-structured interviews to assess how their pedagogical beliefs evolved after deploying the Socratic tools.

4. DISCUSSION

Practical Implications

The deployment of the ACRF carries profound practical implications for EFL education and teacher training programs. Teachers can no longer operate solely as language instructors; they must evolve into prompt engineers and dialogue facilitators. This shift requires comprehensive professional development to reshape teacher cognition regarding AI. Educators must learn to configure AI models to serve as effective interlocutors, establishing classroom environments where cognitive struggle and productive friction are valued over rapid task completion. Consequently, educational institutions must update their curricula to include guidelines on structuring generative AI interactions explicitly for cognitive augmentation.

Limitations and Failure Modes

Despite its pedagogical promise, the proposed framework faces several limitations and potential failure modes. First, language models inherently lack a true sense of selfhood, consistent memory, and genuine curiosity, which may frustrate advanced learners engaged in prolonged Socratic dialogues (Ye et al., 2024). Second, there is a high risk that L2 learners, facing dual cognitive loads of language processing and critical thinking, might find ways to bypass the Socratic constraints, reverting to using the AI for direct translation or summarization, thereby only achieving demonstrated critical thinking (Mei & Weber, 2025). Third, the successful implementation of this framework relies heavily on high levels of digital literacy among both teachers and students; in under-resourced EFL contexts, technical barriers and inadequate training could render the approach ineffective.

Ethical Considerations and Risks

Integrating AI so deeply into the cognitive development of L2 learners introduces substantial ethical risks. Overreliance on AI tutoring systems poses a threat to students' intellectual autonomy, potentially stunting their ability to engage in independent critical thought without algorithmic scaffolding (Favero et al., 2024). Additionally, AI models are trained on vast, unregulated datasets that contain inherent cultural biases. When L2 learners use these models to evaluate arguments or explore perspectives, they may be subtly indoctrinated by the cultural paradigms embedded in the AI, skewing their critical evaluation of global texts and compromising the objective nature of the reading class.

Future Work

To address these limitations and expand the current understanding of AI in language education, several avenues for future research are necessary. First, longitudinal studies are required to determine whether the critical thinking skills developed through Socratic AI interactions are retained and successfully transferred to unassisted reading and writing tasks over time. Second, future engineering efforts should focus on developing localized, domain-specific AI models that are trained exclusively on high-quality EFL pedagogical discourse and culturally balanced datasets. This would help mitigate cultural bias and provide a more reliable, consistent interlocutor for language learners.

5. CONCLUSION

The integration of critical thinking into EFL reading classes represents a necessary evolution in language education, demanding instructional approaches that transcend rote comprehension. Generative AI offers powerful mechanisms for supporting this shift, particularly through Socratic questioning and argument reconstruction. However, the success of these technological interventions is inextricably linked to teacher cognition. Educators must deliberately design and facilitate AI interactions that demand performed cognitive labor from their students. By adopting structured frameworks that limit AI to the role of a cognitive provocateur, teachers can harness the power of artificial intelligence to cultivate profound, independent critical thinking in second language learners. Ultimately, the careful alignment of pedagogical beliefs with AI capabilities will dictate whether these tools serve to augment human intellect or merely simulate it.

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