A Systematic Literature Review on Enhancing Critical Thinking Skills in EFL Reading

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Abstract

Critical thinking (CT) is crucial in teaching reading in English as a Foreign Language (EFL). Nonetheless, there remains a dearth of comprehensive research and insight into applying CT taxonomies, successful pedagogical practices, and teacher challenges in improving CT skills in EFL reading. This systematic literature review examines effective CT taxonomies, pedagogical strategies, and challenges in improving CT skills within EFL reading instruction. It synthesizes findings from 11 empirical studies published between 2014 and 2024, selected from Scopus and Web of Science databases using the PRISMA framework along with predefined inclusion and exclusion criteria. The findings reveal that Bloom's taxonomy is the predominant framework alongside three significant teaching approaches in cultivating CT skills: traditional, constructivist, and technology-enhanced. Traditional approaches typically rely on teacher-centred instruction, including grammar teaching, text analysis, and comprehension exercises, which prioritize factual recall rather than fostering deep analytical thinking. The constructivist approach includes project-based learning, survey-question-read-recite-review, question-answer-relationships, and the exposure-exploration-evaluation model. The technology-enhanced approach, including online classes, flipped classroom teaching, and asynchronous web-based collaboration, has effectively cultivated CT skills. Despite the increasing integration of CT-based instructional frameworks and strategies, challenges remain in educators' pedagogical competence, instructional methodologies, teaching resources, assessment instruments, and professional development. This study points out that it takes more research to create context-specific CT pedagogical models, enhance teacher training programs, and refine assessment frameworks to successfully integrate CT skills into EFL reading instruction.

Keywords: critical thinking skills, English as a Foreign Language reading, systematic literature review, critical thinking taxonomies, pedagogical strategies

1. Introduction

Critical thinking (CT) comprises distinct cognitive abilities that form individuals' core characteristics of rationality and creativity (X. Liu & Yuan, 2018), allowing them to address challenges using the most effective cognitive strategies in various contexts (Elder & Paul, 2020). In the past two decades, CT has gained significant focus on English as a Foreign Language (EFL) education in university settings (H. Zhang & Yuan, 2024). According to Ibrahim et al. (2016), Wang (2012) and Wilson (2016) reading is not only the most prevalent method of information retrieval but also an essential ability in colleges and universities and the primary focus in EFL curricula. In language education research, reading has garnered substantial scholarly attention; however, studies specifically addressing the development of CT skills in EFL reading are relatively fewer than those concentrated on writing (Mok, 2009; H. Zhang & Yuan, 2024). Reading is regarded as a psycholinguistic exchange between the reader and the text, in which the reader actively constructs meaning by drawing on prior knowledge, linguistic cues, and contextual information (Day et al., 1998; Goodman, 2014; Harris & Sipay, 1990). Building on this perspective, Chen (2016) posited that CT and reading are closely connected - reading is essential for fostering CT, whereas reflective thinking is a fundamental aspect of critical reading. Some teachers have successfully enhanced students' CT abilities in EFL reading through the application of diverse CT taxonomies and models (Cope & Kalantzis, 2005; Durrant & Green, 2000; Freebody & Luke, 1990; Kuo, 2009; Lin, 2010; Luke & Freebody, 2003). Nonetheless, challenges remain in enhancing students' CT skills in EFL reading, particularly the ambiguous comprehension of CT taxonomies (Bu, 2022; Q. Song, 2020; Tang, 2016; Zhou et al., 2015) and a lack of varied pedagogical approaches, strategies, and appropriate instructional models that effectively develop CT abilities (Ruan, 2012; W. Zhang, 2020). Despite the recognised importance of CT in EFL education, students have continued to experience difficulties in cultivating these skills during reading instruction. Although numerous CT models have been proposed to improve analytical and evaluative skills, their efficacy in EFL situations is still limited. Moreover, teachers encounter difficulties in incorporating these approaches into reading instruction due to challenges in language competency, cultural differences, and insufficient pedagogical training. This study examines how CT models can enhance students' CT in EFL reading and identify the barriers to their effective implementation.

This review assesses the methodologies utilised in previous research to enhance CT skills in EFL reading. Research conducted by Yuan et al. (2022) examined 25 EFL publications published from 2010 to 2020, exploring teachers' comprehension of and engagement with CT and summarising the key strategies they employed for CT instruction in daily practice. Yin et al. (2023) studied 23 empirical studies published from 2013 to 2022, examining models, practices, and evaluations of CT instruction. These evaluations encompass comprehensive contexts of language acquisition and EFL writing by focussing on teachers' opinions of engagement and the application of CT in writing instruction. These studies, however, did not examine EFL reading instruction in promoting CT. They failed to emphasise the importance of EFL reading classes in cultivating students' CT abilities. EFL researchers can utilise a systematic literature review (SLR) to identify and assess studies directly relevant to EFL contexts, ensuring that the findings are applicable and suitable for EFL classrooms. The systematic literature review can elucidate the development of CT skills in EFL by synthesising pertinent studies (Shaffril et al., 2018). This article aims to address the following research questions:

1. Which CT models are employed to improve students' CT abilities in EFL reading?
2. What pedagogical strategies are utilised to enhance students' CT skills in EFL reading instruction?
3. What challenges exist in improving students' CT skills in EFL reading?

2. Literature Review

This section examines current scholarly work to identify key themes, theoretical frameworks, methodologies, and CT and EFL reading gaps. It consolidates findings from prior studies to offer a comprehensive review of the concept, investigation, and use of CT and reading in multiple contexts.

2.1 Critical Thinking (CT)

CT has been defined in multiple ways by various researchers (Dewey, 1986; Ennis, 1987; Facione, 1990; Glaser, 1942; Kennedy et al., 1991; Paul & Elder, 2019; Wisdom & Leavitt, 2015). Despite varying scholarly perspectives on CT, it has historically included formulating views and judgements on matters through thorough investigation and reasoning, indicating an engaged cognitive process. The Delphi Research conducted by Peter Facione in 1990 significantly contributes to the comprehension of CT, defining it as consisting of cognitive skills and affective dispositions. It defines CT as a thoughtful, self-regulatory process of judgement encompassing interpretation, analysis, assessment, reasoning, and explanation, all based on factors such as evidence, concepts, methods, standards, or context.

Hashemi and Ghanizadeh (2012) proposed a symbiotic relationship between CT skills and dispositions, highlighting their frequent interaction and mutual reinforcement in individual learning experiences and societal practices. Many educators (Elder & Paul, 2020; Hosseini et al., 2012; Perkins, 2008; Schafersman, 1991) have emphasised the need to incorporate CT skills into curricula, recognising that a primary goal of education is to teach students CT (Idol & Jones, 2013). This study emphasises CT skills over dispositions.

2.2 EFL Reading

Reading is one of the four fundamental English language skills that learners must acquire, and it is predominantly applied by English learners in academic settings (Dörnyei, 2019; Muslem et al., 2017). It offers a multifaceted approach to developing the ability to reflect on and deeply understand the meaning of texts (Lumbantobing & Pardede, 2020). While certain researchers (Yin et al., 2023) propose that reading can be quantified directly and objectively via multiple-choice assessments, it is, in reality, a complex process of meaning construction through the ongoing interaction among the reader, the text, and the reading context, leading to in the assimilation of knowledge, experience, or information (R. C. Anderson & Pearson, 1984; Paris, 1987). According to Hosseini et al. (2012) reading is intricately associated with CT. Velayati et al. (2017) further asserted that reading is a cognitive endeavour that activates readers' cognitive processes to interact with the text and attain comprehension.

2.3 CT and EFL Reading

Yapp et al. (2023) characterised reading comprehension as a multifaceted process in which readers interact with texts to derive meaning and understanding. EFL learners experience challenges in reading that limit their capacity to derive meaning from written texts due to insufficient CT skills, thereby restricting their access to knowledge, experiences, and information (Chen, 2016). Comprehension is attained by readers' cognitive processes that facilitate the interpretation of textual meaning (Kintsch, 1988). Demiröz (2011) observed that reading is fundamentally psychological and linguistic. Consequently, reading encompasses language acquisition and is intricately linked to CT skills. Thus, CT and EFL reading are interconnected skills (Chen, 2016) that should be taught simultaneously in EFL programs (J. Zhang & Lin, 2018).

Numerous language practitioners and researchers have highlighted the importance of developing CT skills in reading courses (Vered, 2016; Xia & Zhang, 2024; H. Zhang & Yuan, 2024). Stoller and Nguyen (2020) emphasised that EFL reading courses require content knowledge and CT skills, which can improve reading proficiency in EFL environments. Evidence indicated insufficient CT skills adversely affected EFL learners' reading performance, resulting in outcomes below anticipated standards (Al Roomy, 2022). Although numerous research has investigated CT education in writing classrooms (A Sharadgah et al., 2020; Mah et al., 2021; Susilo et al., 2021), there has been a lack of emphasis on improving CT and reading skills via reading (Marzban & Barati, 2016; Moghadam et al., 2023).

3. Methodology

This section outlines the methodology for obtaining articles that improve students' CT skills in EFL reading classrooms. The reviewers

utilised PRISMA, incorporating Web of Science (WoS) and Scopus materials to perform the systematic literature review.

3.1 PRISMA

The review subscribed to the PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Liberati et al., 2009), commonly employed for evaluating studies in the educational and linguistic domains. Sierra-Correa and Cantera Kintz (2015) identified three significant advantages of employing PRISMA: 1) it articulates clear research questions that facilitate systematic investigation, 2) it delineates inclusion and exclusion criteria, and 3) it endeavours to analyse extensive databases of scientific literature within a specified timeframe. The PRISMA statement facilitates a thorough examination of terminology concerning how educators augment students' CT skills in EFL reading and the effectiveness of these initiatives in enhancing students' CT skills.

3.2 Resources

This review relied on WoS and Scopus electronic databases to locate relevant studies and ensure the inclusion of high-quality articles. WoS is a robust database comprising over 33,000 journals across various disciplines, including education, interdisciplinary social sciences, and language learning. Managed by Clarivate Analytics, WoS ranks journals using three metrics: the number of papers, total citations, and citations per paper. Scopus, in addition, includes more than 22,800 journals from publishers worldwide. It covers various subjects, including social sciences, higher education, and CT pedagogy.

3.3 Eligibility and Exclusion Criteria

Several inclusion and exclusion criteria were identified, as depicted in Table 1. First, regarding literature type, this study selected only peer-reviewed journal articles containing empirical data. Review articles, reports, books, book chapters, conference proceedings, and other forms of non-journal literature were excluded. Second, the review focused solely on articles written in English to avoid any potential misunderstandings or misinterpretations in the analysis. Third, the time frame for the selected articles was from early 2014 to 2024, providing a comprehensive ten-year span to observe relevant trends and developments. Additionally, only open-access articles were included, while those not available through open access were excluded to ensure accessibility for broader readers. The review specifically targeted studies on cultivating CT in an EFL reading class. Studies related to other areas of English language teaching, such as speaking, listening, or writing, were excluded. Finally, the review concentrated on studies conducted in higher education settings, excluding those outside this context.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Literature Type	Peer-reviewed journal articles	Reviewed journal articles, reports, books and book chapters, conference proceedings
Language	English	Non-English
Timeline	Between 2014 – 2024	< 2024
Open Access	Articles Open Access	Not open access
Topic	Sources related to cultivating CT in an EFL reading class	Sources associated with other EFL areas such as speaking, listening, or writing, but not reading
Setting	Higher education	Non-higher education

3.4 Systematic Review Process

The systematic review process covered four stages: identification, screening, eligibility assessment, and review. The review process was conducted in August 2024. The first stage, i.e. identification, involves determining the keywords for the search process. Keywords related to CT and EFL reading were utilized (see Table 2). During this phase, 12 duplicate articles in the WoS and Scopus databases were removed.

Table 2. The Searching Strings Used for the Systematic Review Process

Electronic databases	Keywords used
WoS	TS=(("critical thinking" OR "CT" OR "thinking skills" OR "critical literacy") AND ("reading") AND ("English as a foreign language" OR "second language" OR "EFL" OR "ESL")) (2014-2024)
Scopus	TITLE-ABS-KEY (("critical thinking" OR "CT" OR "thinking skills" OR "critical literacy") AND ("reading") AND ("English as a foreign language" OR "second language" OR "EFL" OR "ESL")) (2014-2024)

The second stage is screening. In this phase, 277 of 295 articles that met the review criteria were eliminated. The third stage of eligibility assessment identified the full texts based on the identified criteria. After careful examination, seven articles which did not focus on reading and empirical studies were excluded. The final stage of the review resulted in a total of 11 articles for the subsequent qualitative analysis, as shown in Figure 1.

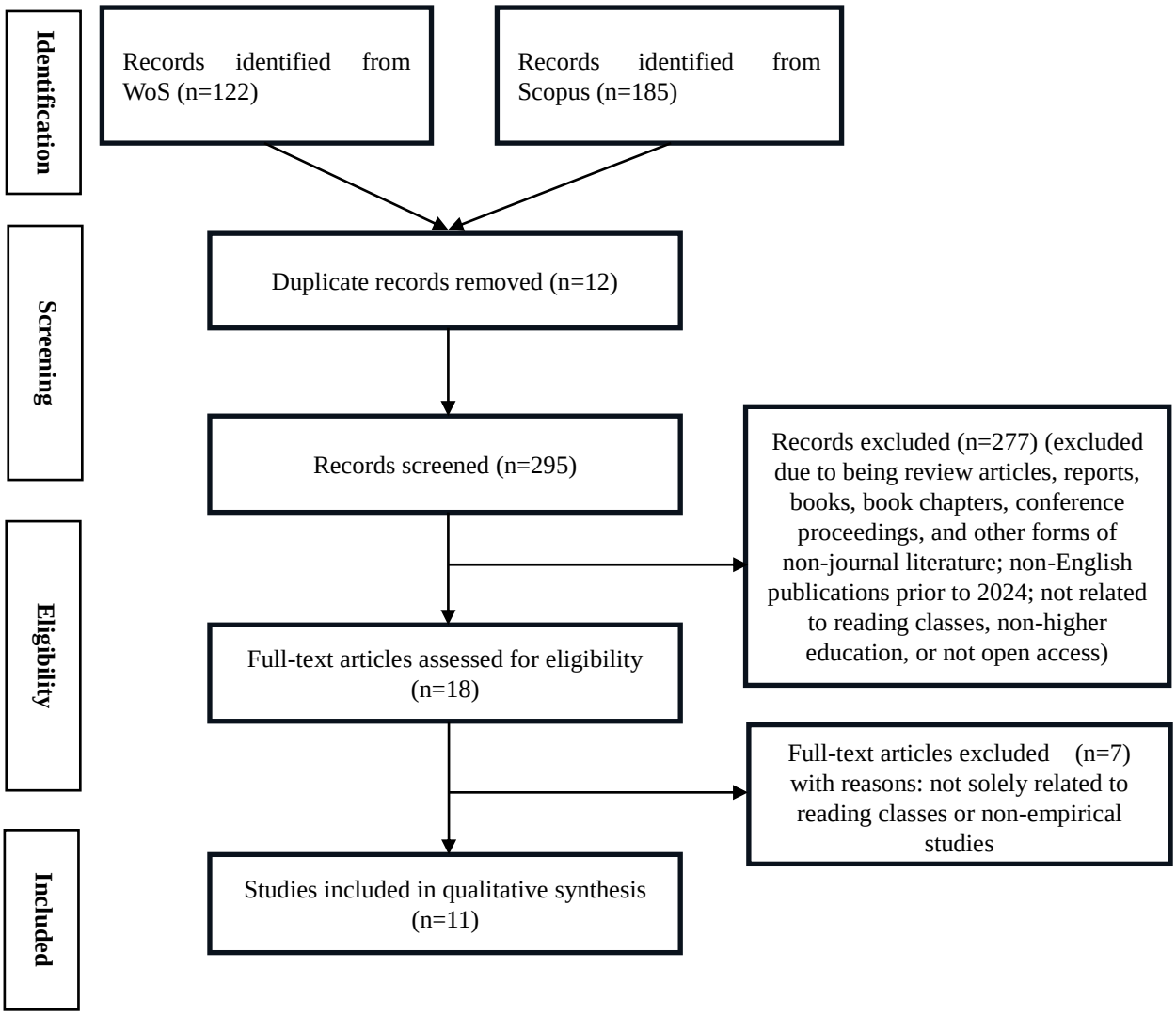

Figure 1. PRISMA Flow Diagram (Adapted from Liberati et al., 2009)

3.5 Data Abstraction and Analysis

To address the posed research questions, the remaining 11 articles were analysed. Tables 3a and 3b categorize these studies according to the CT taxonomies employed, pedagogical strategies adopted, and challenges identified in enhancing CT. The CT taxonomies identified in the reviewed studies - Facione's taxonomy, Bloom's taxonomy, Paul and Elder's framework, Lewison et al.'s critical literacy model, and Luke and Freebody's four resources framework - are widely recognized in CT research. These frameworks provide structured approaches to fostering CT skills in EFL reading instruction, emphasizing analysis, evaluation, and metacognition (see 4.2 for further discussions on the taxonomies).

Regarding pedagogical methods, the reviewed studies adopt various instructional strategies categorized into traditional, constructivist, and technology-enhanced pedagogy. Traditional pedagogy consists of teacher-centred methods, such as Traditional Teaching (TT). Constructivist pedagogy emphasizes student-centred learning and inquiry, incorporating Project-Based Learning (PBL), Survey-Question-Read-Recite-Review (SQ3R), Question-Answer-Relationships (QAR), and the Exposure-Exploration-Evaluation (3Es) model. Technology-enhanced pedagogy integrates digital tools, including Online Classes (OC), Flipped Classroom Teaching (FCT), and Asynchronous Web-Based Collaboration (AWC), to foster interactive and autonomous learning experiences (see 4.3 for further discussions on the pedagogical methods).

The challenges in enhancing CT are categorized into pedagogical knowledge, traditional teaching practices, language texts, CT skills assessment, and CT awareness and training. These challenges highlight teachers' struggles with adapting pedagogical strategies, constraints of the traditional instructional method, limitations in selecting and using language texts to support CT skills development, the lack of comprehensive assessment tools for measuring CT skills, and insufficient professional development opportunities for teachers to enhance their CT pedagogy (see 4.4 for further discussions on the challenges).

Table 3a. CT Taxonomies and Pedagogical Methods

Article No.	Author(s) & Year	CT Taxonomy/Framework					Pedagogical Methods								
		Facione	Paul & Elder	Bloom	Lewison et al.	Luke & Freebody	Traditional Pedagogy	Constructivist Pedagogy				Technology-enhanced pedagogy			
							TT	PBL	SQ3R	QAR	3Es	NM	OC	AWC	FCT
1	Zhou et al. (2015)	√					√								
2	Zhang & Lin (2018)	√						√							
3	Setyaningsih (2019)					√			√						
4	Yulian (2021)		√	√			√								√
5	Wang (2022)			√				√					√		
6	Aziz & Rawian (2022)			√								√			
7	Hastuti et al. (2022)			√									√		
8	Adunyarittigun (2022)				√							√			
9	Mohammadi et al. (2022)			√			√			√				√	
10	Moghadam et al. (2023)			√			√				√				
11	Arifin et al. (2023)				√							√			

TT=Traditional Teaching; PBL=Project-Based Learning; SQ3R=Survey-Question-Read-Recite-Review; QAR= Question-Answer-Relationship; 3Es= Exposure-Exploration-Evaluation; NM= Not Mentioned; OC=Online Class; AWC= Asynchronous Web-based Collaborative; FCT= Flipped Classroom Teaching

Table 3b. Challenges in Enhancing CT

Article No.	Author(s) & Year	Challenges in Enhancing CT				
		Pedagogical Knowledge	Traditional Teaching Practices	Language Texts	CT Skills Assessments	CT Awareness & Training
1	Zhou et al. (2015)		√			√
2	Zhang & Lin (2018)					
3	Setyaningsih (2019)			√		√
4	Yulian (2021)		√			
5	Wang (2022)					
6	Aziz & Rawian (2022)					√
7	Hastuti et al. (2022)	√		√		√
8	Adunyarittigun (2022)			√		
9	Mohammadi et al. (2022)	√	√	√	√	√
10	Moghadam et al. (2023)	√	√	√	√	√
11	Arifin et al. (2023)		√	√	√	√

4. Results and Discussion

The review is divided into four sections: data extraction, CT taxonomies, pedagogical methods, and challenges in enhancing CT.

4.1 Data Extraction

The overview of the data extraction is presented in Table 4 below. The 11 articles cover different EFL reading contexts in Mainland China (n=3), Indonesia (n=4), Iran (n=2), Thailand (n=1), and Pakistan (n=1). Thus, they provide a broad overview of enhancing CT skills in EFL reading in multiple contexts and EFL environments.

A further analysis of the research methods revealed that mixed methods were the most commonly used approach (n=5), followed by qualitative research (n=4) and quantitative experimental research (n=2). Studies employing mixed methods typically combined questionnaires, tests, interviews, and observations, integrating quantitative and qualitative data collection techniques. These studies utilized statistical techniques, including t-tests, ANOVA, and Wilcoxon for quantitative data analysis, whereas qualitative findings were analysed through thematic analysis, interactive models, or software such as MAXQDA.

Qualitative research (n=4) primarily collected data through interviews, observations, and documents to explore perspectives, instructional practices, and contextual factors related to CT skills in EFL reading. Three studies analysed the data using thematic analysis, while one employed an interactive model. Nonetheless, two of the qualitative studies did not specify their data analysis methods. Quantitative experimental studies (n=2) assessed the effectiveness of instructional interventions using pre-tests and post-tests, with data analysed via t-tests.

Apart from one qualitative study that employed convenience sampling (n=1), the remaining qualitative and quasi-experimental quantitative studies used purposive sampling, selecting participants based on specific characteristics such as teaching experience, expertise in CT instruction, or participation in EFL reading courses. While this sampling technique facilitated an in-depth exploration of CT pedagogy, it may have limited the generalizability of the findings. Three mixed-methods studies adopted random sampling to enhance representativeness and reduce selection bias, thereby improving external validity. Additionally, some mixed-methods studies combined purposive and random sampling to balance specificity with broader applicability. The predominant use of purposive sampling (n=8) highlights the research focus on obtaining rich, context-specific insights rather than drawing broad, population-wide conclusions. The limited use of convenience sampling (n=1), although practical because of participant accessibility, may introduce sampling bias and limit the transferability of findings to broader contexts.

In summary, it is noteworthy that studies on enhancing EFL reading with CT skills predominantly employed mixed methods and qualitative empirical research, with relatively fewer quantitative studies. Future research could diversify methodologies by integrating the strengths of both quantitative and qualitative tools, supported by CT taxonomies or instructional models, to enhance and assess students' CT skills.

Table 4. An Overview of Study Characteristics

Article No.	Author(s) & Year	Contextual settings	Research methods	Sampling	Data collection	Data analysis
1	Zhou et al. (2015)	Mainland China	Mixed method	Random	Questionnaire & interview	T-test (quantitative) & qualitative analysis not specified
2	Zhang & Lin (2018)	Mainland China	Mixed method	Random	Questionnaire, interview & test	T-test (quantitative) & qualitative analysis not specified
3	Setyaningsih (2019)	Indonesia	Mixed method	Purposive	Questionnaire，interview, test, observation & document	Wilcoxon (quantitative) & interactive model (qualitative)
4	Yulian (2021)	Indonesia	Quantitative quasi-experimental	Purposive	Questionnaire，test & observation	T-test
5	Wang (2022)	Mainland China	Qualitative	Purposive	Document	Not specified
6	Aziz & Rawian (2022)	Pakistan	Mixed method	Random & purposive	Questionnaire, interview & test	T-test (quantitative) & thematic analysis (qualitative)
7	Hastuti et al. (2022)	Indonesia	Qualitative	Convenience	Interview, observation, document	Thematic analysis
8	Adunyarittigun (2022)	Thailand	Qualitative	Purposive	interview, observation & document	Thematic analysis
9	Mohammadi et al. (2022)	Iran	Mixed method	Purposive	Questionnaire，interview & document	ANOVA (quantitative) & MAXQDA (qualitative)
10	Moghadam et al. (2023)	Iran	Quantitative quasi-experimental	Purposive	Questionnaire & test	T-test
11	Arifin et al. (2023)	Indonesia	Qualitative	Purposive	Questionnaire, observation & document	Not specified
Total		Mainland China (n=3) Indonesia (n=4) Iran (n=2) Thailand (n=1) Pakistan (n=1)	Mixed methods (n=5) Quantitative experimental (n=2) Qualitative (n=4)	Random (n=3) Purposive (n=8) Convenience (n=1)	Questionnaire (n=8) Interview (n=7) Test (n=5) Observation (n=5) Document (n=6)	T-test, ANOVA, Wilcoxon (n = 7) Thematic analysis, interactive model, MAXQDA (n = 5) Not specified (n=2)

n= number of reviewed studies

4.2 CT Taxonomy

This section aims to answer RQ1 below:

Which CT models are employed to improve students' CT abilities in EFL reading?

Different types of CT taxonomies were utilized across all 11 reviewed studies. The majority of these studies employed Bloom's taxonomy to assess and enhance students' CT skills in EFL reading instruction (Aziz & Rawian, 2022; Hastuti et al., 2022; Moghadam et al., 2023; Mohammadi et al., 2022; S. Wang, 2022; Yulian, 2021).

Researchers selected Bloom's taxonomy in six studies (Aziz & Rawian, 2022; Hastuti et al., 2022; Moghadam et al., 2023; Mohammadi et al., 2022; S. Wang, 2022; Yulian, 2021) because its cognitive process dimensions provide a structured framework for CT skills (Yulian,

2021). The current version is Anderson and Krathwohl's 2001 revision, which emphasizes remembering, understanding, applying, analysing, evaluating, and creating. These dimensions can be further refined in reading comprehension activities, beginning with identifying and recalling information, organizing, evaluating, generating, and synthesizing ideas (L. W. Anderson & Krathwohl, 2001). In article 4 (Yulian, 2021), in addition to utilizing Bloom's taxonomy (L. W. Anderson & Krathwohl, 2001), researchers adopted Paul and Elder's (2019) CT assessment standards, which include accuracy, clarity, precision, depth, relevance, and logic. Paul and Elder's taxonomy enabled pre- and post-intervention assessments of students' CT skills. In contrast, Bloom's taxonomy provided insights into students' classroom performance, offering a comprehensive understanding of the target phenomenon. This combined approach helped researchers effectively identify and address challenges in enhancing CT skills in EFL reading instruction while ensuring the reliability of the studies' data.

On the other hand, articles 1 and 2 (J. Zhang & Lin, 2018; Zhou et al., 2015) employed Facione's CT taxonomy (1990), using a pre-and post-test design to compare students' CT skills in EFL reading instruction across six dimensions: interpretation, analysis, evaluation, inference, explanation, and self-regulation. While assessment is essential, it primarily identifies issues rather than provides solutions. Additionally, combining pre- and post-tests with quantitative analysis provided only a general overview of students' progress in CT skills, overlooking the contextual nuances necessary for a deeper understanding of their developmental process. Furthermore, Facione's assessment instruments pose a financial burden for educators and researchers, as they require online purchases and come with participant restrictions for each evaluation.

Two additional studies, articles 8 and 11 (Adunyarittigun, 2022; Arifin et al., 2023), adapted Lewison et al.' four-dimensional critical literacy model (2002), which includes disrupting the commonplace, interrogating multiple viewpoints, focusing on sociopolitical issues, and taking action and promoting social justice. In these studies, the model was applied in various ways, serving as a teaching model, procedural guide, and analytical tool. However, in EFL reading instruction, the application of the four-dimensional critical literacy model is relatively limited, as the reading materials must align with sociopolitical issues to achieve the goal of promoting social justice through action (Lewison et al., 2015). Given the broad range of topics in EFL reading instruction, using this taxonomy to enhance students' CT skills could significantly increase teachers' workload due to its limited adaptability to diverse reading content.

A particularly distinctive study, article 3 (Setyaningsih, 2019) adapted Luke and Freebody's (Freebody & Luke, 1990; Luke & Freebody, 1999) Four Resources Framework, which positions students in EFL reading classrooms as code breakers, text participants, text users, and text analysts. However, the framework needs to be integrated with appropriate instructional methods to structure lessons that effectively enhance CT skills in teaching (Jun-min, 2014; Setyaningsih, 2019).

4.3 Pedagogical Methods

This section aims to answer RQ2 below:

What pedagogical strategies are utilised to enhance students' critical thinking skills in EFL reading instruction?

All 11 studies employed teaching strategies to enhance students' CT skills, grounded in different CT taxonomies or frameworks. The instructional methods can be categorized into eight types: Traditional Teaching (TT), Project-Based Learning (PBL), Survey-Question-Read-Recite-Review (SQ3R), Question-Answer-Relationship (QAR), Exposure-Exploration-Evaluation (3Es), Online Classes (OC), Asynchronous Web-Based Collaborative (AWC), and Flipped Classroom Teaching (FCT). These instructional strategies were further grouped into three pedagogical methods: traditional pedagogy (TT), constructivist pedagogy (PBL, SQ3R, QAR, 3Es), and technology-enhanced pedagogy (OC, AWC, FCT).

4.3.1 Traditional Pedagogy

Traditional pedagogy, as reflected in articles 1, 4, 9, and 10 (Moghadam et al., 2023; Mohammadi et al., 2022; Yulian, 2021; Zhou et al., 2015), predominantly relies on teacher-centred methods, including rote memorization, text reading, grammar instruction, and comprehension exercises. These studies found that such approaches often hinder the development of CT skills by prioritizing factual recall over analytical engagement. Zhou et al. (2015) observed that TT focuses on language acquisition rather than fostering higher-order thinking. However, Articles 4, 9 and 10 (Moghadam et al., 2023; Mohammadi et al., 2022; Yulian, 2021) explored hybrid approaches, integrating interventions such as FCT, AWC, QAR and 3Es within traditional settings. These interventions demonstrate the potential to enhance CT skills by encouraging active engagement and student-centred learning. Yulian (2021) showed that students excelled in CT performance after being taught using the flipped classroom method. Similarly, Mohammadi et al. (2022) implemented AWC and QAR methods in EFL reading classrooms, finding both effective in enhancing CT skills. AWC provided students additional time to analyse and reflect on texts (Haavind, 2006; Land et al., 2007). QAR increased learners' engagement, comprehension, and CT skills through explicit instruction supporting reading and higher-order thinking. Notably, AWC was more effective than QAR and TT in advancing CT skills and reading comprehension. Moghadam et al. (2023) found that implementing the 3Es method in EFL reading instruction led to a positive shift in classroom climate while enhancing students' CT skills and reading comprehension. The study also affirmed that critical thinkers do not merely read a string of words on a page but approach reading comprehension as a process requiring deep reflection and active engagement with the text to progressively construct meaning (Din, 2020; Y. Liu, 2017).

4.3.2 Constructivist Pedagogy

Constructivist pedagogy fosters an active learning environment by emphasizing student participation, exploration, and problem-solving (W. Zhang, 2017). Articles 2, 3, 5, 6, 8 and 11 (Adunyarittigun, 2022; Arifin et al., 2023; Aziz & Rawian, 2022; Setyaningsih, 2019; S. Wang, 2022; J. Zhang & Lin, 2018) applied various constructivist strategies, such as PBL, SQ3R, and the direct application of cognitive taxonomies as teaching models in EFL reading instruction to assess and enhance students' CT skills.

Articles 2 and 5 (S. Wang, 2022; J. Zhang & Lin, 2018) focused on improving students' CT skills through PBL. Notably, due to the pandemic, Wang (2022) implemented PBL intervention through an online mode, showcasing the adaptability and integration of these methods in unique circumstances. Compared to traditional teaching methods, Zhang and Lin (2018) showed that PBL significantly improves students' CT skills and enhances second language acquisition. This method enables students to develop their abilities while independently constructing new knowledge. As an effective intervention, PBL cultivates CT skills and strengthens reading, collaboration, and self-exploration abilities (S. Wang, 2022). However, despite its advantages, implementing PBL presents challenges for both students and teachers. Students often struggle during project exploration, including topic initiation, group work organization, and critical engagement with classroom tasks, particularly when they lack experience in autonomous learning (Nguyen & Tham, 2022; W. Zhang, 2017) (Nguyen & Duong, 2022). These difficulties impose significant demands on teacher guidance and scaffolding (Gopang et al., 2023; X. Song et al., 2024). Without sufficient teacher support, the effectiveness of PBL can be compromised. Furthermore, PBL is time-consuming and requires teachers to prepare extensively and possess advanced classroom management skills (Hutchinson, 1991; W. Zhang, 2017)

Article 3 (Setyaningsih, 2019) exclusively examined the effectiveness of the SQ3R strategy in fostering students' CT skills in EFL reading courses. Pre- and post-test results indicated significant improvements in students' CT skills following the intervention. Classroom observations and student artefacts revealed varying levels of engagement among students with differing baseline CT skills. Notably, after implementing SQ3R, students across different baseline levels displayed similar patterns of CT engagement. The findings indicate that SQ3R aligns with Freebody and Luke's (1990) and Luke and Freebody's (1999) Four Resources framework within EFL reading contexts. However, further research is needed to explore the integration of additional CT taxonomies into this method and to examine their potential for enhancing students' CT skills more comprehensively.

Articles 6, 8 and 11 (Adunyarittigun, 2022; Arifin et al., 2023; Aziz & Rawian, 2022) did not propose specific instructional interventions but instead directly employed cognitive taxonomies as teaching models in EFL reading instruction to explore the level of students' CT skills. Aziz and Rawian (2022) explicitly applied higher-order thinking skills from Bloom's taxonomy in EFL reading classrooms, demonstrating that evaluating higher-order thinking skills-rather than relying solely on traditional reading assessments-significantly enhanced students' reading performance. A t-test analysis revealed a gender disparity in higher-order cognitive levels, with female learners outperforming their male counterparts. The study further highlighted a strong correlation between students' higher-order thinking skills and reading performance. Similarly, Adunyarittigun (2022) and Arifin et al. (2023) employed the cognitive taxonomy proposed by Lewison et al. (2002) as both an analytical tool and a teaching model to cultivate CT skills in EFL reading instruction. Their findings demonstrated that this taxonomy was particularly effective in cultivating CT skills when applied to socio-political reading texts. However, as previously noted, the Lewison et al. (2002) taxonomy is limited in its application to broader reading content, rendering it less universally adaptable than Bloom's taxonomy.

4.3.3 Technology-enhanced Pedagogy

Technology-enhanced pedagogy integrates digital tools and online platforms to create interactive and collaborative learning experiences. Articles 4, 5, 7 and 9 (Hastuti et al., 2022; Mohammadi et al., 2022; S. Wang, 2022; Yulian, 2021) examined the impact of OC, FCT, and AWC on improving CT skills. For instance, as discussed in 4.3.1, Yulian (2021) found that students' CT performance improved after instruction through FCT, which allowed them to engage with reading materials prior to class and use classroom time for analysis, reflection, and application. This shift promoted higher-order thinking by creating more opportunities for in-depth engagement and peer interaction. Similarly, Mohammadi et al. (2022) reported that AWC provided students with additional time to process texts and formulate critical responses, leading to deeper engagement with reading materials and improved reflective thinking. In contrast, Hastuti et al. (2022) investigated the integration of CT instruction in OC. Their study revealed a slight enhancement in students' CT skills, mainly focusing on lower-order thinking. The finding was attributed to several factors, including teachers' limited competence in CT instruction, students' lack of motivation, confidence, and understanding, and external constraints such as unstable internet connectivity, which disrupted teaching activities and student participation.

These results from the reviewed studies highlight that while technology-enhanced strategies such as FCT, AWC, and OC can facilitate CT skills development, their effectiveness varies depending on the instructional design and context. Whereas FCT and AWC can promote higher-order thinking when thoughtfully implemented, the impact of OC may be constrained by factors such as teacher readiness, students' language proficiency, levels of student engagement, and infrastructural limitations.

4.4 Challenges in Enhancing CT

This section aims to answer RQ3 below:

What challenges exist in improving students' CT skills in EFL reading?

From the reviewed studies, most research highlights the challenges in enhancing students' CT in EFL reading instruction (Adunyarittigun, 2022; Arifin et al., 2023; Aziz & Rawian,2022; Hastuti et al., 2022; Moghadam et al., 2023; Mohammadi et al., 2022; Setyaningsih, 2019; Yulian, 2021; Zhou et al., 2015). These challenges are categorized into five areas: limited pedagogical knowledge, heavy focus on traditional teaching practices, high dependency on language texts, deficiency in CT skills assessments, and lack of CT awareness and training.

4.4.1 Limited Pedagogical Knowledge

Moghadam et al. (2023) and Mohammadi et al. (2022) highlighted that many teachers lack the understanding and ability to apply CT frameworks in EFL reading classrooms. Teachers often have limited knowledge of cognitive taxonomies, such as Bloom's taxonomy or other cognitive models, which are essential for developing CT skills. Without these structured frameworks, teachers struggle to design activities that promote analytical, evaluative, and reflective thinking in students. This knowledge gap hinders their ability to create learning experiences that engage students in critical interactions with texts. These findings are consistent with Hastuti et al. (2022), who emphasized that insufficient teacher knowledge of CT is a significant barrier to its integration into the classroom. As Gustine (2018) noted, teachers need the requisite skills and strategies to effectively develop students' CT abilities.

4.4.2 Heavy Focus on Traditional Teaching Practices

A strong reliance on traditional teaching methods significantly hinders the integration of CT skills into EFL reading instruction. Articles 1, 4, 9, and 10 (Moghadam et al., 2023; Mohammadi et al., 2022; Yulian, 2021; Zhou et al., 2015) highlighted that conventional teaching methods prioritize rote learning, grammatical accuracy, and essential reading comprehension-practices that conflict with approaches designed to enhance CT skills. Traditional methods focus on passive learning, where students memorize information and concentrate on language mechanics, whereas CT skills require active engagement, analysis, and content evaluation.

Articles 9, 10, and 11 (Arifin et al., 2023; Moghadam et al., 2023; Mohammadi et al., 2022) further revealed that EFL teaching objectives often reinforce this reliance on traditional teaching methods. Many curricula remain heavily centred on linguistic proficiency (e.g., grammar and vocabulary) at the expense of higher-order thinking skills such as analysing, evaluating, and creating. Moreover, overemphasising exams further compounds this issue, as standardized test preparation encourages surface-level engagement rather than deeper cognitive processing (Zhou et al., 2015). Zhou et al. (2015) argued that test-oriented instruction often leads students to prioritize memorization and multiple-choice exercises over strategies that promote inquiry, analysis, and critical evaluation.

This heavy focus on traditional teaching practices creates challenges for teachers seeking to enhance CT skills in EFL reading classrooms. Integrating CT skills into reading instruction remains challenging without pedagogical shifts, curriculum adjustments, and the adoption of cognitively engaging instructional strategies.

4.4.3 High Dependency on Language Texts

Articles 3, 7, 8, 9, 10 and 11 (Adunyarittigun, 2022; Arifin et al., 2023; Hastuti et al., 2022; Moghadam et al., 2023; Mohammadi et al., 2022; Setyaningsih, 2019) identified an overreliance on traditional language-focused texts as an obstacle for teachers in enhancing CT skills in EFL reading classrooms. Mohammadi et al. (2022) noted that commonly used reading materials are primarily designed to build fundamental language skills, such as vocabulary acquisition and grammatical accuracy, rather than to promote cognitive engagement. These texts emphasize surface-level comprehension, leaving little room for activities encouraging deeper analytical thinking, such as critical questioning, evaluation, and synthesis.

The issue is further compounded by a lack of diversity and complexity in text selection. Many EFL reading materials are limited in genre and thematic variety, with teachers often relying on standardized, formulaic texts that fail to challenge students cognitively or connect with their real-world experiences (Moghadam et al., 2023; Arifin et al., 2023; Adunyarittigun, 2022; Setyaningsih, 2019). This restricted exposure to diverse perspectives and thought-provoking content limits students' opportunities to develop higher-order thinking skills.

In addition, the scarcity of digital resources further reinforces the reliance on conventional language texts, posing a significant obstacle to enhancing CT skills. Mohammadi et al. (2022) highlighted the effectiveness of web-based collaborative technologies in promoting CT skills; however, the technical resources required for these tools are often unavailable in resource-limited classrooms, creating significant challenges for teachers. Similarly, Hastuti et al. (2022) emphasized that teachers must consider accessibility, affordability, and interactivity when selecting digital resources for EFL reading classrooms. Therefore, the underutilization of digital resources may limit opportunities to engage students in dynamic, reflective, and critical reading practices, ultimately sustaining the dominance of conventional, language-focused texts in EFL classrooms.

4.4.4 Deficiency in CT Skills Assessments

Articles 9, 10 and 11 (Arifin et al., 2023; Moghadam et al., 2023; Mohammadi et al., 2022) identified the lack of precise, standardized assessment tools as a significant challenge for teachers in effectively measuring students' development in CT skills and reading comprehension. Although Mohammadi et al. (2022) proposed a framework for assessing CT skills, no widely accepted or systematically implemented approach for measuring these skills in EFL contexts remains, leaving educators without clear guidelines for tracking students' progress (Moghadam et al., 2023). Additionally, teachers face the challenge of balancing assessments that address CT skills and language proficiency. Traditional assessment methods - such as multiple-choice tests, grammar exercises, and end-of-term exams - typically focus on surface-level understanding, including language accuracy, fact recall, or identifying main ideas, rather than fostering

deeper, higher-order cognitive skills associated with CT skills (Arifin et al., 2023). Therefore, efforts to cultivate CT skills in EFL reading classrooms remain fragmented and inconsistent without appropriate assessment tools.

4.4.5 Lack of CT Awareness and Training

Studies revealed that a barrier to integrating CT skills into EFL reading instruction is teachers' limited awareness of its significance and implementation (Arifin et al., 2023; Aziz & Rawian, 2022; Hastuti et al., 2022; Setyaningsih, 2019; Zhou et al., 2015). Teachers lack a clear understanding of how CT skills contribute to language learning and fail to recognize their potential for development through reading tasks (Arifin et al., 2023). As a result, instructional priorities remain focused on linguistic accuracy (e.g., grammar and vocabulary) and basic comprehension, often at the expense of cultivating higher-order thinking skills. This leads to the misconception that CT is an optional or supplemental skill rather than an integral part of language competence.

In addition, articles 3, 6 and 7 (Aziz & Rawian, 2022; Hastuti et al., 2022; Setyaningsih, 2019) revealed that teachers often overlook the diversity in students' language proficiency levels. While Setyaningsih (2019) confirmed that students, regardless of their proficiency levels, can engage in CT skills when provided with appropriate support, Aziz and Rawian (2022) found that individual differences in abilities are still disregarded. They pointed out that some teachers associate CT skills with advanced English proficiency, leading them to avoid designing CT skills activities for students with lower language skills. This misconception denies learners opportunities to practice CT skills early in their learning journey. However, challenges such as time constraints and large class sizes make it difficult for teachers to design EFL reading lessons that cater to the diverse needs of students with varying abilities (Hastuti et al., 2022). Additionally, studies by Zhou et al. (2015) and Aziz and Rawian (2022) highlighted a tendency among teachers to overlook contextual factors, such as gender differences, that influence students' approaches to CT skills. This one-size-fits-all method fails to meet the diverse needs of learners.

Mohammadi et al. (2022) revealed that English teachers often lack sufficient training in teaching CT. The authors highlighted that teacher education programs typically focus on language teaching techniques while inadequately addressing the pedagogical methods needed to foster CT skills. This training gap leaves teachers without clear frameworks or strategies to integrate CT skills into their instructional practices (Moghadam et al., 2023). As a result, without necessary professional development support and resources, teachers may resist incorporating CT instruction into their teaching due to unfamiliarity with new methods, adherence to standardized curricula, or reliance on traditional teaching methods.

5. Future Direction

Future research directions for enhancing CT skills in EFL reading instruction could be summarized into six aspects based on this systematic literature review: methods, CT taxonomies, teaching materials, technology, CT skills assessment, and teacher training and professional development.

5.1 Methods

The dominance of mixed-method and qualitative research in the current field underscores the need to further investigate the interplay between different methodologies. Future studies could incorporate more experimental designs and longitudinal research to track and evaluate the long-term impacts of CT interventions on EFL students' reading abilities, language proficiency, and cognitive development. Additionally, teaching methods such as FCT, PBL, SQ3R, and AWC have been proven effective in enhancing students' CT skills in EFL reading classrooms. Future research could conduct more systematic investigations into these methods or explore alternative methods such as Task-based language teaching (TBLT) (Ellis, 2003) or the Production-Oriented approach (POA) (Wen, 2018) to identify which strategies are most effective in fostering CT skills.

5.2 CT Taxonomies

While Bloom's taxonomy is widely used in the reviewed studies, there remains an opportunity to explore the effectiveness of alternative or complementary CT models. Future research could examine the practical application of various taxonomies in EFL reading instruction, such as Paul and Elder's standards for CT (2019), Facione's taxonomy (1990), Lewison et al.'s critical literacy framework (2002) or Luke and Freebody's four resources framework (Freebody & Luke, 1990; Luke & Freebody, 1999). Studies should also investigate how learners can apply these taxonomies to meet their needs at different proficiency levels.

5.3 Teaching Materials

Future research should focus on designing, developing, and evaluating teaching materials that foster CT in EFL reading classrooms. Existing materials are often heavily focused on vocabulary building and grammatical accuracy, with limited content that encourages deeper analytical engagement. To better support the development of CT skills, instructional materials should move beyond basic reading comprehension exercises and include tasks that prompt students to question assumptions, analyze arguments, synthesize information from multiple sources, and evaluate diverse perspectives. These materials should include authentic, thematically rich, and cognitively demanding content that develops language proficiency while promoting reflective and independent thinking. Moreover, well-designed resources should be adaptable to varying language proficiency levels, ensuring that students across a range of abilities can participate in meaningful critical engagement. Future research may explore the effects of enriched materials on the development of CT and language learning outcomes, along with their influence on student motivation and classroom interaction.

5.4 Technology in CT Instruction

As digital tools play an increasingly important role in education, future research should explore how technology can support the development of CT skills in EFL reading instruction. Studies could assess the effectiveness of online collaboration tools, digital platforms, and artificial intelligence in promoting higher-order thinking skills. These methods may be particularly applicable in blended learning environments, flipped classrooms, and fully online contexts, especially in resource-limited settings, where traditional instructional support is constrained. Moreover, the impact of technology-enhanced instruction may vary depending on students' language proficiency levels. For instance, students with higher proficiency are likely to engage more effectively in autonomous, reflective tasks supported by digital tools, whereas those with lower proficiency may need more structured guidance and scaffolded support. Future research should investigate the adaptation of instructional strategies and tool selection to accommodate varying proficiency levels, thereby ensuring equitable access to opportunities for developing CT skills.

5.5 CT Skills Assessment

The impact of assessment on students' CT skills development remains underexplored. Many existing tools prioritize superficial comprehension, grammatical accuracy, or fact recall, offering limited insight into students' ability to engage in higher-order thinking processes such as analysis, evaluation, and synthesis. Future research could focus on creating, validating, and implementing assessment tools that effectively measure higher-order cognitive skills in EFL contexts. Beyond tool development, studies could investigate the impact of formative, summative, and peer-based assessments on students' engagement, metacognitive awareness, and CT performance. Such investigations could provide valuable guidance for teachers seeking to integrate CT-focused assessment into reading instruction while also maintaining alignment with language proficiency standards and curriculum objectives.

5.6 Teacher Training and Professional Development

Teachers' pedagogical knowledge, awareness, and training are crucial for successfully integrating CT into EFL reading instruction. However, many teachers continue to face challenges such as limited awareness of CT pedagogy, a lack of practical training, and contextual barriers including time constraints, insufficient institutional support, and rigid curricular expectations. Future studies should focus on designing and evaluating professional development programs to improve teachers' understanding and application of CT taxonomies and instructional strategies. These programs should be context-sensitive, practical, and sustainable, enabling teachers to embed CT skill development into their existing reading curricula. Longitudinal research on the impact of sustained teacher training on both instructional quality and student learning outcomes would yield valuable insights for curriculum developers and education policymakers, thereby supporting the effective integration of CT in EFL reading classrooms.

6. Conclusion

In conclusion, exploring CT models reveals their potential to significantly enhance students' CT skills within EFL reading while underscoring the inherent challenges in implementing such models effectively. The reviewed studies highlight the utilization of diverse CT taxonomies, with a prominent emphasis on Bloom's taxonomy, for assessing and fostering students' CT abilities in EFL reading instruction. Other cognitive frameworks include Facione's taxonomy, Paul and Elder's CT assessment standards, Lewison et al.'s critical literacy model, and Luke and Freebody's CT framework. These models offer structured approaches to fostering higher-order thinking skills in reading comprehension. However, findings indicate that their application in EFL reading remains limited due to contextual differences, varying proficiency levels, and the need for further adaptation in diverse learning environments.

Various pedagogical strategies, including traditional, constructivist, and technology-enhanced approaches, have been employed to cultivate students' CT skills, each with advantages and limitations. From a practical perspective, this review highlights the effectiveness of teaching strategies such as FCT, PBL, AWC, QAR, SQ3R, 3Es and online collaborative learning in enhancing CT skills. Implementing CT models in EFL reading instruction is challenging, as identified in the reviewed studies. Despite their potential, several persistent challenges hinder effective implementation, including insufficient teacher training, limited instructional resources, and inadequate assessment tools. These challenges suggest a need for more targeted professional development, the development of adaptable teaching materials, and the creation of comprehensive CT skills assessment frameworks. Addressing these issues is crucial to fully integrating CT skills into EFL reading instruction, strengthening students' ability to engage critically with texts and apply higher-order thinking skills in real-world contexts.

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Authors' contributions

Xing Liu was responsible for the study design, systematic literature screening, data analysis, drafting, and revising of the manuscript. Professor Dr. Marlia Puteh conducted the quality assessment of the included articles, provided critical revisions, and gave intellectual guidance throughout the development of the paper. Both authors read and approved the final manuscript.

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