Development and Validation of a Reading−Writing Module to Enhance Students' Critical Thinking and EFL Writing

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Abstract

This study reports the development and content validation of a reading–writing module for Chinese EFL undergraduates. The module integrates Paul–Elder critical thinking framework into a POA instructional process. Guided by the ADDIE model, a needs analysis was conducted with university English instructors, and a CT-POA module was then designed and developed. Content validity was examined using the Content Validity Index (CVI) by four experts rated on a 4-point scale. All items achieved item-level CVI (I-CVI) of 1.00, and the scale-level CVI (S-CVI/Ave) was 1.00, indicating unanimous expert agreement on relevance and clarity. The findings suggest positive content validity and alignment with instructional objectives in the Chinese college EFL context. It can be concluded the content validity of the module meets the threshold of the CVI and can be used to test the causal effects on students' critical thinking and writing performance.

Keywords: critical thinking, EFL writing skills, Production-Oriented Approach, tertiary students, education

1. Introduction

Since the reform and opening-up policy, China's foreign language education system has undergone continuous reform and steady development (Gil, 2016; Rao, 2013). In 2001, the Ministry of Education mandated English as a compulsory subject from the third grade in all primary schools (Ministry of Education, 2001), embedding English firmly into the basic education system. English now stands as a core subject across all educational stages ((Yu & Wong, 2024; Zeng, Nair, & Wider, 2022), reflecting China's strategic aim to enhance national English proficiency and cultivate globally competent talents.

However, concerns persist regarding the practical effectiveness of English instruction (Cai, 2017; Wen, 2017). Employers report dissatisfaction with graduates' workplace communication skills (Chu, 2017), and Chinese scholars often face challenges in academic English writing, leading to high rejection rates from international journals (Wang, 2012). These issues reveal a gap between current English teaching and real-world language demands.

One of the most prominent skill gaps for many Chinese EFL learners lies in English writing (Wang, 2012; Jiang,2022). Among various language skills, English writing is a critical skill in both academic and professional contexts, enabling clear, logical, and persuasive communication, which is essential for academic success, international publication, and workplace communication (Hyland, 2022; M. Li, 2021; Condon & Kelly-Riley, 2004). Reflecting this importance, The Future of Jobs Report 2025 (World Economic Forum, 2025) identifies effective written communication as a key workforce competency.

Yet, dominant instructional approaches in China remain text-centred and input-driven, resulting in limited opportunities for authentic language production (Wen, 2024). Moreover, insufficient emphasis on critical thinking (CT) skills further hampers students' reasoning abilities in writing (L. Li, 2016; Wen & Liu, 2006), with many learners even lack a clear understanding of CT itself (Pu, 2022).

"Academic writing, at its core, serves as a transparent manifestation of a writer's reasoning process, guiding the reader from a question to a well-articulated answer" (Vallis, 2010, p20). This concept is echoed by Barnet, Bedau, and O'Hara (2023), who assert that writing is the externalization of thought. In this light, CT plays a pivotal role in the writing process (Akbari, Seifoori, &Ahour, 2018; Susilo, Mufanti, & Fitriani, 2021), as it empowers writers to assess the logical coherence of arguments, evaluate the validity of evidence, and identify potential biases in viewpoints, thereby improving the overall quality of writing (Chaffee, 2008). Empirical studies support a positive link between CT and EFL writing proficiency (Pei, Zhang, Zhang, Liu, 2017; Pu, 2022), highlighting the pedagogical need to integrate CT development into English writing curricula in China.

In response to these challenges, the Production-Oriented Approach (POA) has emerged as a promising pedagogical model in the Chinese EFL context. POA emphasizes output-driven, task-based learning and promotes student engagement through real-world language use, with CT competence identified as one of its six core competencies (Wen, 2024). Despite its theoretical potential, empirical research on POA's impact on CT and writing remains limited in scope and methodological rigor (Lei & Mokhtar, 2023; Liu, 2021; L. L. Zhang, 2017). Existing

studies often focus on CT dispositions rather than measurable CT skills (Shi, Kotchasit, & Nilnopkoon, 2024; Lei & Mokhtar, 2023) and tend to employ immersion-based approaches without systematically infusing CT components into POA's three instructional phases.

To address these gaps, this study aims to develop and validate a CT-POA module that systematically embeds CT components into the POA framework to enhance Chinese EFL undergraduates' CT and writing skills within a reading–writing curriculum. Specifically, it seeks to identify the challenges teachers face in fostering these skills and to assess the content validity of the developed module. The objectives of this study are to:

RO1. determine the challenges faced by teachers in fostering CT and writing among Chinese EFL undergraduate students.

RO2. determine the content validity of the CT-POA module.

Aligned with the above-mentioned objectives, this research aims to address the following questions:

RQ1. What are the challenges faced by teachers in fostering CT and writing among Chinese EFL undergraduate students?

RQ2. What is the validity of the CT- POA module?

2. Theoretical Foundations of the CT-POA Module

This study is grounded in two complementary frameworks: the Paul-Elder Critical Thinking Framework and the Production-Oriented Approach (POA). The former offers a structured lens for fostering critical thinking, while the latter provides an instructional model that bridges language learning and use. Together, they form the theoretical basis for the CT-POA module developed in this research.

2.1 Paul-Elder CT Framework

The Paul-Elder CT Framework (Paul & Elder, 2020), developed by Richard Paul and Linda Elder, offers a comprehensive and systematic approach for understanding and cultivating CT. As one of the most influential models in the field, it has been widely applied in in various educational settings, particularly to enhance students' reasoning and judgment skills (Dong, 2017; Gao, Samuel, & Asmawi, 2016; Ralston & Bays, 2015).

As shown in Figure 1, this model comprises three interrelated components: elements of reasoning, intellectual standards, and intellectual traits (Paul & Elder, 2020).
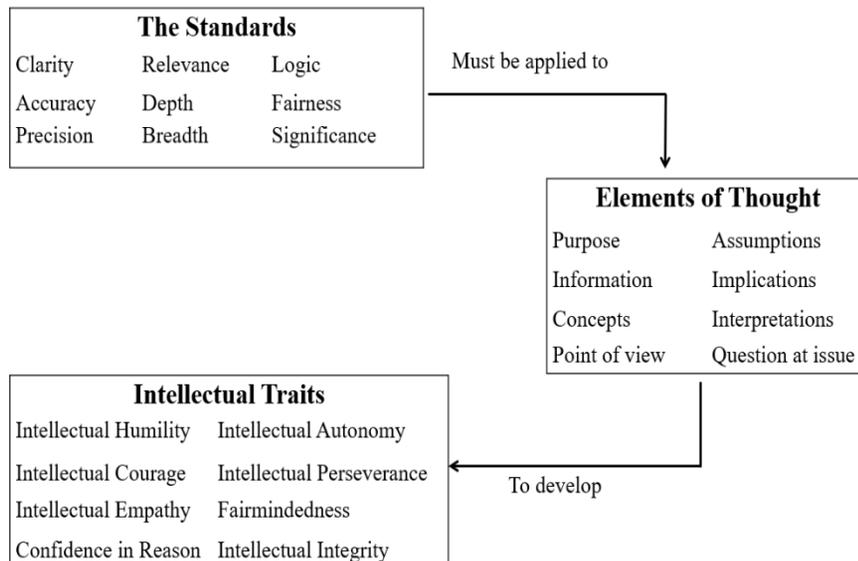

Figure 1. The Paul-Elder CT Model [Adopted from Paul & Elder, 2020, p. 12]

(a) Elements of Reasoning

These represent the core components underlying all thinking processes, including purpose, question, information, concepts, assumptions, inferences, point of view, and implications. According to Paul and Elder (2020), effective reasoning requires consciously identifying and analyzing these elements, which constitute the essential logic of academic disciplines. Understanding these elements enables learners to systematically analyze and improve their reasoning.

(b) Intellectual Standards

Paul and Elder (2020) propose nine key standards to evaluate the quality of reasoning: clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness. These standards guide individuals to assess and refine their thinking, helping them overcome personal biases and arrive at rational, well-informed judgments.

(c) Intellectual Traits

Through consistent application of these intellectual standards, learners gradually develop intellectual traits such as intellectual humility, courage, empathy, integrity, perseverance, and fair-mindedness. These traits characterize a strong critical thinker and influence how individuals engage with diverse perspectives and complex problems.

The Paul-Elder framework (2020) serves as both a micro-level tool for analyzing thinking processes and a macro-level guide for cultivating intellectual character. Its flexibility and clarity make it highly applicable in designing instructional strategies that foster deeper learning and critical engagement, especially in EFL reading and writing contexts (Moseley et al., 2005).

2.2 Production-Oriented Approach (POA)

The Production-Oriented Approach (POA), proposed by Wen (2024) from Beijing Foreign Studies University of China, is an innovative EFL teaching model tailored for the Chinese educational context. It aims to address a major challenge in Chinese EFL classrooms: the "separation between learning and using language" (Wen, 2018, p2), which is a common issue in traditional text-centered instruction. To tackle this problem, POA integrates key principles from Western second language acquisition theories—specifically, Krashen's Input Hypothesis (1985), Swain's Output Hypothesis (1985), Long's Interaction Hypothesis (1983), and Schmidt's noticing hypothesis (1990)—into a unified framework. Furthermore, it draws upon core features of traditional Chinese education, such as the teacher's directive role, systematic input, and structured learning processes. These elements are synthesized into a coherent system operationalized through three phases: Motivating, Enabling, and Assessing, as illustrated in Figure 2 (Wen, 2024).

The Motivating Phase activates learners' interest through authentic tasks and helps identify learning gaps. During the Enabling Phase, teachers offer targeted scaffolding related to language, content, and structure to facilitate students' completion of productive tasks. The Assessing Phase includes both immediate and delayed evaluations, featuring a distinctive Teacher-Student Collaborative Assessment (TSCA). This collaborative evaluation promotes learner reflection, deepens understanding, and fosters CT.
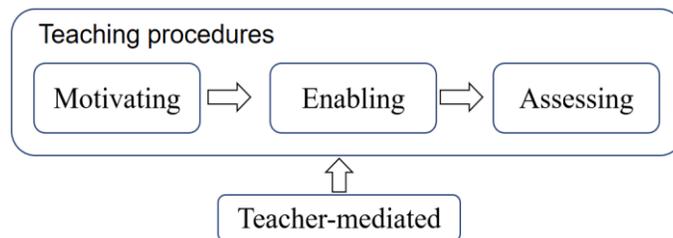

Figure 2. POA teaching procedures [Adopted from Wen, 2017, p. 95]

By emphasizing output-driven learning, real-world application, and collaborative assessment, the POA provides a structured, systematic approach that can effectively enhance students' CT and writing abilities.

Studies on POA have predominantly explored its application across different educational levels (high school, college, and graduate) and course types, with a particular emphasis on writing skills. Empirical evidence has shown that POA can significantly improve learners' language production ability, engagement, and autonomy (Sun, Ismail, & Aziz, 2024).

However, most existing research centers on general language proficiency and writing enhancement, with limited investigation into how POA can systematically foster higher-order thinking, especially CT, within integrated reading–writing classrooms. In particular, few studies operationalize CT as measurable skills or embed CT explicitly across POA's three instructional phases, leaving a practical and methodological gap that the present study seeks to address with a CT-POA module.

3. Materials and Methods

3.1 Research Design and Procedures

This study formed part of a larger project conducted in five phases based on the ADDIE (Allen, 2006) instructional design model: Phase I – Needs Analysis; Phases II & III – Design and Development of a CT-POA Reading and Writing Module; and Phases IV & V – Implementation and Evaluation. This paper reports Phases I–III.

Phase Iinvolved the collection of qualitative data from university English instructors through semi-structured interviews. The aim was to determine the necessity and feasibility of integrating the CT-POA model into reading and writing instruction. The interviews aimed to explore teachers' perceptions of students' difficulties in reading and writing, the challenges associated with fostering CT in EFL instruction, and their pedagogical recommendations. The findings of this phase were synthesized to identify priority instructional needs and to inform the formulation of core learning objectives for the module.

In Phase II, findings from the needs analysis were systematically translated into learning objectives, content scope, instructional activities, and assessment methods, aligning the Paul–Elder CT framework with the Production-Oriented Approach (POA) across its three phases (Motivating, Enabling, Assessing). Objectives were structured with Bloom's taxonomy to ensure cognitive progression and constructive alignment.

Phase III centered on the development and refinement of the instructional materials. The design blueprint was translated into tangible

resources (teacher's guide, learner materials, activity tasks, and peer assessment tools). An expert review was conducted to assess content relevance, clarity, pedagogical alignment, and usability through the Content Validity Index (CVI). Feedback informed iterative revisions prior to implementation.

Ethical approval for this study was obtained from the UCSI University Institutional Ethics Committee (Reference Code: IEC-2024-FOSSLA-0135). All participants provided informed consent and could withdraw at any time without penalty.

3.2 Participants

Five English teachers currently teaching from two universities in China participated in the needs analysis phase. The study focused on teachers as participants because they are experienced insiders in the EFL context, capable of providing detailed insights into students' reading and writing challenges and pedagogical strategies (Long, 2005). While learners' perspectives are valuable, pre-experience learners may provide inconsistent or unreliable information about their language needs (Beatty & Chan, 1984; Long, 2005). The sample size was determined based on the principle of data saturation, ensuring that additional interviews would yield little or no new information (Creswell & Guetterman, 2019; Patton ,2015). Inclusion criteria were: (a) currently teaching English at a university level, (b) over ten years of teaching experience, (c) held MA or PhD degrees in Applied Linguistics or TESOL, and (d) willingness to participate.

In Phase III (Content Validity Assessment), four experts were invited, including three specialists in English education and one in educational psychology. The English education experts each had more than 10 years of experience and publications in EFL pedagogy or curriculum design, and the educational psychology expert had over10 years of experience in education and educational theory.

3.3 Sampling Procedures

Participants for both the needs analysis and the content validity assessment were recruited through convenience sampling (Creswell & Guetterman, 2019). For the needs analysis phase, all interviews were conducted in Chinese via WeChat, which allows voice messages to be transcribed into text, thereby facilitating efficient data collection. The content validity assessment was conducted remotely via email and WeChat to accommodate the experts' schedules and locations.

3.4 Research Instruments and Data Analysis

This paper reports the needs analysis and the validation of the CT-POA Module. Data were collected using two instruments for these purposes: a semi-structured interview protocol for the needs analysis and an expert validation form for the evaluation of the module.

3.4.1 Semi-Structured Interview Protocol

A semi-structured interview protocol was developed to conduct the needs analysis and obtain in-depth qualitative insights into teachers' perceptions of students' challenges in reading and writing, as well as their views on integrating CT into English language instruction. Each interview lasted approximately 10–15 minutes. The protocol comprised six open-ended questions, which were grouped into four broader thematic categories. Table 1 shows how each question aligns with its respective theme, which served as a framework for both data collection and later analysis.

Table 1. Research Questions and Themes in the Interview Protocol

Item	Theme
Item 1: What difficulties do students typically encounter during the writing process?	Students' challenges in writing
Item 2: Do you believe that CT is important in English classes, especially in students' reading and writing? Why?	Importance and role of CT
Item 3: Have you ever fostered CT in your English courses?	Challenges in teaching CT & writing
Item 4: What are the biggest challenges you face when teaching CT and writing?	
Item 5: If a module were developed to assist in teaching CT and writing, what should it include?	Pedagogical solutions & suggestions
Item 6: Could you offer suggestions for enhancing the CT and writing skills of Chinese EFL undergraduate students?	

The interviews were conducted in Chinese. The transcripts were translated into English by the researcher and manually coded with NVIVO 14 software. A thematic analysis was then carried out to identify recurring themes and patterns.

3.4.2 Expert Validation Form

At the final stage of the development phase, an expert validation form, adapted from Mohamad Tarmizi (2022) and Lim and Lee (2007), was used to conduct an evaluation of the module. This instrument assessed the appropriateness of the module's objectives, the accuracy and relevance of its content, the effectiveness of its learning activities, and its overall usability. Items were rated on a 4-point Likert scale (1 = not relevant, 4 = highly relevant), with additional space provided for qualitative comments. Feedback obtained from these instruments was used to refine and improve the module before its implementation in subsequent phases of the project.

The data obtained from the expert validation form were analysed using the Content Validity Index (CVI). The Item-level CVI (I-CVI) was calculated as the proportion of experts rating an item as either 3 or 4 on the relevance scale (Polit & Beck, 2006), while the Scale-level CVI (S-CVI/Ave) was computed as the mean of all I-CVI values. The corresponding formulas are presented in Table 2. Following Polit, Beck, and Owen (2007), an item-level threshold of I-CVI = 1.00 was required for each item with a four-member panel, and the S-CVI/Ave was required to achieve a minimum value of .90. Based on the CVI results, necessary revisions were made to ensure that the module content was valid, relevant, and aligned with the intended learning outcomes.

Table 2. The formula of I-CVI and S-CVI/Ave

The CVI indices	Formula
I-CVI (item-level content validity index)	I-CVI = the number of experts who rated the item as 3 or 4 /number of experts
S-CVI/Ave (scale-level content validity index based on the average method)	S-CVI/Ave = sum of I-CVI/ number of items

Note: adopted from Almanasreh, Moles, & Chen, 2019

3.5 Content of the CT-POA Module

Building on the instructional needs identified in RQ1—including the recognized importance of CT in EFL reading and writing, the challenges faced by both students and teachers, and the instructional activities recommended by experienced instructors—the CT-POA module was designed to provide a systematic, feasible, and engaging approach to integrating CT into the College English curriculum.

The CT-POA Reading and Writing Module was designed to integrate the Paul-Elder framework into EFL reading-writing instruction. It consisted of three units aligned with common academic essay patterns—illustration, cause & effect, and comparison/contrast. Intended learning outcomes included: (a) application of the elements of thought and intellectual standards during reading and planning, (b) development of argumentation and organization in writing, and (c) accurate and varied language use. The materials were developed for intermediate EFL learners and were delivered over four 90-minute lessons per unit. The module totaled 44 pages, including a front cover, a table of contents, and instructional materials. A summary of the unit topics, learning outcomes, core content, and activities is provided in Appendix A.

4. Results

This section reports findings from the needs analysis (RQ1) and the content validation of the CT-POA module (RQ2). No implementation or learning-effect evidence were included.

4.1 Results for RQ1

Thematic analysis of interviews with five university English instructors identified three themes: (a) the perceived importance of CT in reading and writing, (b) challenges to integrating CT, and (c) recommended instructional activities.

Interview analysis indicated that all participating instructors regarded CT as integral to EFL reading and writing. Five main benefits emerged (Figure 3): fostering creativity, enhancing analytical skills, improving persuasiveness, strengthening insights, and facilitating learning.

As T4 noted, "developing students' CT skills helps them become more open-minded, fostering a spirit of critique and innovation," while T2 emphasized that CT enables learners to "clearly express their viewpoints and support them with strong arguments." T1 added that it encourages examining issues from multiple perspectives, which is essential for engaging with complex academic texts.
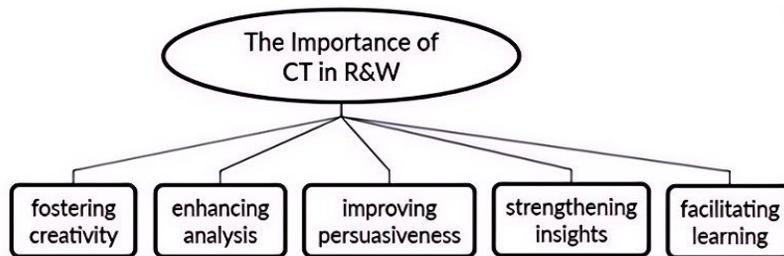

Figure 3. The Importance of CT in R&W

Although teachers recognize the importance of CT, its integration into EFL instruction remains limited due to student- and teaching-level barriers (Figure 4). On the student side, low intrinsic motivation, passive learning habits from exam-oriented education, limited English proficiency, and lack of confidence hinder active critical engagement. As T1 noted, "students are accustomed to passively accepting answers rather than questioning or analyzing." T3 added that fear of mistakes and peer judgment discourages students from expressing independent views.
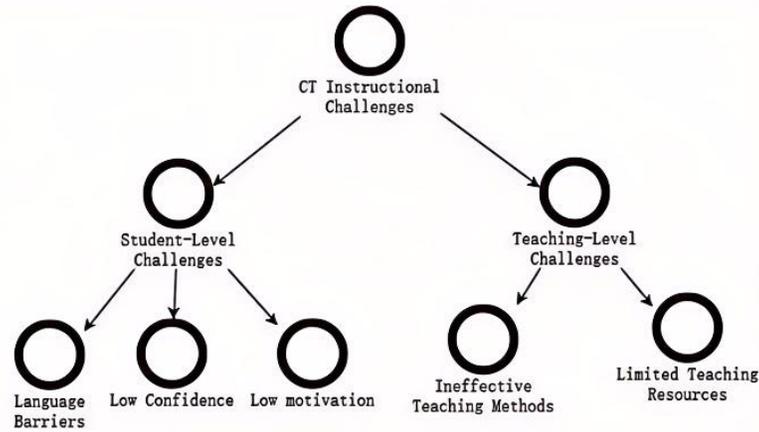
Figure 4. Challenges in Teaching CT

Teacher-level challenges include insufficient CT-specific teaching resources, reliance on traditional methods, lack of methodological guidance, and difficulty in embedding CT organically into subject teaching. As T2 emphasized, "It's not easy to obtain teaching resources specifically for CT," while T4 pointed out, "The most challenging aspect is integrating the cultivation of CT with subject teaching in an organic way." Without clear strategies and materials, efforts to promote CT often remain fragmented and unsystematic.

Interview data revealed several suggested activities for fostering CT in EFL reading and writing, including case analysis, cooperative tasks, critical reading, debates, discussions, essay writing, presentations, questioning, speeches, technology-assisted learning, and timely feedback. Discussion-based activities were most frequently emphasized. T3 valued guided discussions for stimulating reflection, and T5 highlighted that structured discussions can enhance students' analytical ability. Debates and speeches were also noted by three teachers as effective for developing reasoning and argumentation, with T4 stressing the benefits of combining them with essay writing. T3 further recommended critical reading to train students to question and evaluate texts. Technology-assisted learning was proposed by T1 and T2, who saw AI and multimedia tools as means to address learning barriers and broaden perspectives. Timely feedback, emphasized by T5, was considered essential for refining reasoning and improving writing.

Based on the identified issues in students' CT and writing proficiency and the challenges teachers faced in implementing CT instruction, the CT-POA module incorporated targeted activities (Figure 5), including structured writing tasks, critical reading, questioning, reasoning-based and collaborative discussions, presentations, technology-assisted learning (e.g., Pigai), and formative feedback. These activities were designed to cultivate logical reasoning, argument development, analytical skills, and rhetorical clarity, while ensuring feasibility in the current teaching context. Collectively, they aimed to foster students' CT and writing proficiency in a systematic and engaging manner.
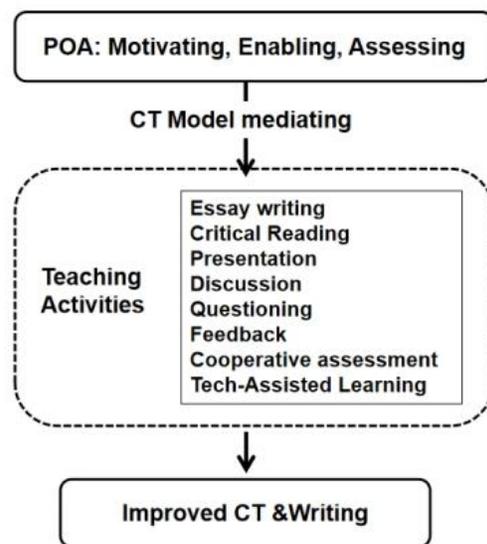

Figure 5. Instructional Activities in the CT- POA module

4.2 Results of RQ2: Content Validity Results of the Module

Table 2 displays expert evaluations of the learning outcomes of the module. All items received an I-CVI of 1.00, resulting in an S-CVI/Ave of 1.00. This indicates unanimous expert agreement on the clarity, specificity, measurability, alignment with course goals, responsiveness to students' needs, and integration of CT and writing—thereby demonstrating excellent content validity for the learning outcomes.

Table 2. I-CVI and S-CVI/Ave Values by Experts for the Learning Outcomes of the module

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
Clearly stated	1	1	1	1	4	1	Accepted
Specific	1	1	1	1	4	1	Accepted
Measurable	1	1	1	1	4	1	Accepted
Align with the overall course goals	1	1	1	1	4	1	Accepted
Meet the specific needs of students	1	1	1	1	4	1	Accepted
Integrate CT and writing	1	1	1	1	4	1	Accepted
S-CVI/Ave	1	Accepted					

Table 3 shows that all ten items assessing the module content achieved an I-CVI of 1.00, yielding an S-CVI/Ave of 1.00. Experts agreed that the content was well-organized, logically sequenced, and aligned with learning objectives and student needs.

Table 3. I-CVI and S-CVI/Ave Values by Experts for the module content

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
Align with the module objectives	1	1	1	1	4	1	Accepted
Well-organized	1	1	1	1	4	1	Accepted
Logically sequenced	1	1	1	1	4	1	Accepted
Supports progressive development of skills	1	1	1	1	4	1	Accepted
Tailored to students' level	1	1	1	1	4	1	Accepted
Offering explicit CT applications	1	1	1	1	4	1	Accepted
Provides a wide range of communicative functions	1	1	1	1	4	1	Accepted
Provides new & interesting information	1	1	1	1	4	1	Accepted
Uses a variety of delivery modes	1	1	1	1	4	1	Accepted
Appropriate time allocation	1	1	1	1	4	1	Accepted
S-CVI/Ave						1	Accepted

As presented in Table 4, the seven items evaluating instructional activities and assignments also achieved favorable I-CVI scores, leading to an S-CVI/Ave of 1.00. Experts noted that these components can effectively promote students' writing and CT skills, encourage interaction, and align with students' proficiency levels.

However, some constructive suggestions were offered. E1 noted that the pre-lesson tasks might be overly demanding. E2 expressed concerns about the workload of assigning three writing tasks per unit. In response, revisions were made to ensure a balance between academic rigor and student feasibility.

Table 4. I-CVI and S-CVI/Ave Values by Experts for the Activities & Assignments

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
Promote writing skills	1	1	1	1	4	1	Accepted
Promote CT	1	1	1	1	4	1	Accepted
Encourage interaction	1	1	1	1	4	1	Accepted
Align with the objectives and content	1	1	1	1	4	1	Accepted
Align with students' current levels	1	1	1	1	4	1	Accepted
Expose students to learn something new and challenging	1	1	1	1	4	1	Accepted
Relevant and strengthen teaching	1	1	1	1	4	1	Accepted
S-CVI/Ave						1	Accepted

Table 5 reflects expert ratings on language clarity and appropriateness. All five items received an I-CVI of 1.00. However, E1 observed that certain expressions were not entirely idiomatic, and some task instructions contained complex sentence structures potentially beyond intermediate learners. These issues were addressed by simplifying the language while preserving the intended depth of CT tasks.

Table 5. I-CVI and S-CVI/Ave Values for the Language and Expression Construct

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
Clear	1	1	1	1	4	1	Accepted
Easy to understand	1	1	1	1	4	1	Accepted
Concise	1	1	1	1	4	1	Accepted
Align with students' current levels	1	1	1	1	4	1	Accepted
Aupports learning objectives	1	1	1	1	4	1	Accepted
S-CVI/Ave						1	Accepted

As shown in Table 6, all five assessment-related items received an I-CVI of 1.00, confirming the content validity of the module's evaluation

framework. Experts agreed that the assessments can effectively measure both CT and writing skills and are consistent with the objectives of this module.

Table 6. I-CVI and S-CVI/Ave by Experts for the Assessment Mechanisms

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
aligned with the module objectives.	1	1	1	1	4	1	Accepted
formative assessments correspond with summative assessments	1	1	1	1	4	1	Accepted
measure students' writing skills	1	1	1	1	4	1	Accepted
measure students' CT skills	1	1	1	1	4	1	Accepted
provide feedback to students within an appropriate time.	1	1	1	1	4	1	Accepted
S-CVI/Ave						1	Accepted

Table 7 summarizes expert evaluations on module usability. All eight items achieved an I-CVI of 1.00, supporting the conclusion that the module is student-centered, practically applicable, and cognitively and affectively appropriate. The clear presentation and sufficient scaffolding were particularly noted as strengths in supporting students' metacognitive development.

Table 7. I-CVI and S-CVI/Ave by Experts for the Usability & Appropriateness

No. Item/Experts	E1	E2	E3	E4	No. Agreed	I-CVI	Status Item
engages students actively	1	1	1	1	4	1	Accepted
practical classroom procedures	1	1	1	1	4	1	Accepted
clear guidelines	1	1	1	1	4	1	Accepted
enough scaffolding	1	1	1	1	4	1	Accepted
clear presentation	1	1	1	1	4	1	Accepted
tailors to Ss' cognitive needs	1	1	1	1	4	1	Accepted
supports affective domain	1	1	1	1	4	1	Accepted
enhances metacognitive skills	1	1	1	1	4	1	Accepted
S-CVI/Ave						1	Accepted

An overview of the panel experts' feedback and proposed improvements is outlined below (Table 8):

Table 8. Summary of Experts' Comments and Suggestions

Expert	Expert Comments and Suggestions
1	- Integrates Paul-Elder CT framework effectively. Clear teaching steps, encourages collaborative learning and classroom interaction. - Learning objectives are too general; need to be more specific and measurable. - Some critical questions are linguistically complex for intermediate learners. - Pre-class tasks may be too heavy. - Some English expressions are unnatural.
2	- Focuses on improving writing and CT in line with 21st-century core competencies. Systematic structure with complete learning cycle. - Writing workload (3 tasks per sub-module) may be overwhelming.
3	- Clear and specific instructional goals aligned with College English course. Well-organized content and diverse activities and high usability in classroom settings. - Overlap between "structure" and "content" dimensions in peer evaluation checklist. - Some instructional goals lack specificity.
4	- Structured design enhances clarity for implementation. Emphasizes key competencies: CT, creativity, collaboration. Promotes meaningful, personalized learning experiences. - Teachers may struggle to meet all students' needs due to time and resource constraints.

Across all five evaluated constructs—learning outcomes, module content, activities and assignments, language and expression, assessment mechanisms, and usability appropriateness —both I-CVI and S-CVI/Ave values reached positive score of 1.00. These results demonstrate acceptable content validity and expert consensus on the quality and appropriateness of the CT-POA module.

6. Discussion

This study employed the ADDIE instructional design model, focusing specifically on the development and validation of a reading and writing module to enhance students' CT and writing skills based on identified instructional needs. The model provided a structured and systematic framework that enabled the researcher to identify instructional needs, define learning objectives, design instructional content, and develop practical teaching materials and assessment tools. To improve EFL learners' CT and writing skills, this module incorporated the Paul-Elder CT framework into college English reading and writing classroom, offering a practical and well-supported pedagogical approach.

The findings highlight significant challenges to infusing CT into English instruction, including a shortage of qualified faculty capable of employing diverse pedagogical strategies and students' low intrinsic motivation and passive learning habits shaped by exam-oriented education. These challenges are consistent with previous studies (Tan, 2020; Q. Zhang, Liu, & Shen, 2023). The module's structured activities such as discussion and peer assessment aim to mitigate these barriers by fostering active and critical engagement.

Although individual ratings on the relevance scale varied between "3" (relevant) and "4" (highly relevant), the I-CVI for each item reached

1.00 because all experts rated the items at least as "relevant". Therefore, a value of 1.00 in I-CVI and S-CVI/Ave reflects unanimous agreement on the relevance of the items, even if not all ratings were the maximum possible score. This outcome demonstrates that the module met the threshold for acceptable content validity across all constructs, while also revealing that certain items might still have room for refinement to achieve the highest perceived relevance. The results supported the module's content validity and its suitability for classroom implementation, indicating that the module is likely to address the challenges identified in the needs analysis.

Nevertheless, this study has limitations. First, the needs analysis phase included only five university English instructors from two institutions. The small and context-specific sample may limit the generalizability of the findings. Future studies could expand the needs analysis to include a larger and more diverse group of instructors, as well as incorporate student' perspectives, to obtain a more comprehensive understanding of instructional needs and further refine the module. Second, the expert validation involved a limited number of participants and did not include direct feedback from students or in-class implementation data. Future research should test the module's effectiveness in real classroom settings and investigate its impact on students' CT and writing performance.

however, the systematic approach and instructional strategies incorporated may be applicable to similar educational environments facing challenges in CT instruction.

In conclusion, this study provides a validated framework for enhancing CT and writing skills through a structured module that responds directly to identified instructional needs. The module holds practical significance for improving teaching practices and student outcomes in CT education, with potential to inform future curriculum development and pedagogical reform.

7. Conclusion

This study addressed the practical need to cultivate CT and writing skills in Chinese college English classrooms by designing and developing a CT-POA instructional module. Grounded in the Paul–Elder CT framework and aligned with the principles of POA, the module features systematic goal setting, coherent content sequencing, and task-aligned activities.

The design process followed the first three phases of the ADDIE model, namely analysis, design, and development, to ensure responsiveness to instructional needs. During expert validation, language education specialists and an educational psychologist affirmed the module's content relevance, internal coherence, and classroom feasibility. Based on this initial development stage, the module appears to have acceptable content validity and practical potential, and it may serve as a useful resource and structured guide for college English teachers seeking to integrate critical thinking into their instruction.

Future research should implement the module in real classroom settings to examine its effects on students' CT and writing performance and to further refine its content and applicability.

Authors' contributions

Dr. Mohamad Termizi bin Borhan was responsible for study design and manuscript revision. Li Tian was responsible for data collection and drafted the manuscript. Prof. Simranjeet Kaur Judge and A/P Charanjeet Singh revised the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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The Publication Ethics Committee of the Sciedu Press.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix

Appendix A Summary of CT-POA Module Units and Core Activities

Unit and Genre Focus	Learning Outcomes	CT Elements and Intellectual Standards Targeted	Key Activities and Assignments
Unit 1: The Way to Success — Illustration essay	--Identify main ideas and organization; --Apply elements of thought and intellectual standards; --Compose a logically organized illustration essay; --Integrate unit vocabulary.	--Elements: Purpose, Question at issue, Information, Inference. --Standards: Clarity, Relevance, Accuracy, Logic.	--Pre-class: Draft 1 on "The Traits of a Successful Person" via Pigai; Reflect on Pigai feedback. -- In-class • L1 Close Reading: lead-in; analyze text structure and meaning; • L2 Language Focus: vocabulary, paraphrasing, grammar consolidation; • L3 Critical Reading & Writing Appreciation: Paul–Elder guided questions; analyze illustration techniques; compare Draft 1 with model; plan revisions; • L4 Assessing: teacher–student collaborative assessment; peer checklist review. --After-class: submit Draft 2 via Pigai.
Unit 2: Traveling — Cause & Effect essay	--Identify main ideas and organization; --Apply elements of thought and intellectual standards; --Compose a logically organized cause & effect essay; --Integrate unit vocabulary.	--Elements: Purpose, Question at issue, Information, Inference, Concept, Point of View. --Standards: Clarity, Relevance, Accuracy, Logic, Precision, Breadth.	-Pre-class: Draft 1 on "The Surge in Global Travel: Exploring the Driving Forces" via Pigai; Reflect on Pigai feedback. -In-class • L1 Close Reading: lead-in; analyze text structure and meaning; • L2 Language Focus: vocabulary, paraphrasing, grammar consolidation; • L3 Critical Reading & Writing Appreciation: Paul–Elder guided questions; analyze cause & effect techniques; compare Draft 1 with model; plan revisions; • L4 Assessing: teacher–student collaborative assessment; peer checklist review. -After-class: submit Draft 2 via Pigai.
Unit 3: When Work Is a Pleasure — Comparison /Contrast essay	--Identify main ideas and organization; --Apply elements of thought and intellectual standards; --Compose a logically organized comparison/contrast essay; --Integrate unit vocabulary.	--Elements: Purpose, Question at issue, Information, Inference, Concept, Point of View, Assumption, Consequence/Implication. --Standards: Clarity, Relevance, Accuracy, Precision, Breadth, Depth, Fairness, Logic, Significance.	--Pre-class: Draft 1 on "Happiness at Work" via Pigai; Reflect on Pigai feedback. -- In-class • L1 Close Reading: lead-in; analyze text structure and meaning; • L2 Language Focus: vocabulary, paraphrasing, grammar consolidation; • L3 Critical Reading & Writing Appreciation: Paul–Elder guided questions; analyze comparison/contrast techniques; compare Draft 1 with model; plan revisions; • L4 Assessing: teacher–student collaborative assessment; peer checklist review. --After-class: submit Draft 2 via Pigai.

Notes: Each unit spans four 90-minute lessons following the Motivating–Enabling–Assessing sequence.