

Strategies of Content Knowledge Representation and EFL Learners' English Writing Proficiency: Mediating Role of Critical Thinking Skills

Shen Xiaolei

Faculty of Educational Studies, Universiti Putra Malaysia
Serdang Selangor, Malaysia.

Lilliati Ismail

Faculty of Educational Studies, Universiti Putra Malaysia
Serdang Selangor, Malaysia.

Corresponding Author: lilliati@upm.edu.my

Hu Yurong

Faculty of Language and Linguistics, Universiti Malaya, Kuala Lumpur, Malaysia.

Wei Mengqi

Foreign Language Department, Henan Normal University, Henan Province, China

Received:05/12/2023

Accepted:08/25/2023

Published: 09/24/2023

Abstract

The exploration of optimizing content knowledge representation and enhancing critical thinking capabilities in English as Foreign Language (EFL) learners' writing still needs to be improved. Cultivating adept critical thinking skills and effective content knowledge representation is paramount for EFL learners, given its correlation with heightened writing proficiency. This study sought to examine critical thinking skills as a mediator in the correlation between strategies of content knowledge representation and writing proficiency among EFL learners. A total of 360 English as foreign language participants engaged in the California Critical Thinking Skills Test and responded to a questionnaire on strategies of content knowledge representation conducted at Kaifeng Science Technology and Communication College, China. Subsequently, participants undertook a writing task, and the outcomes underwent analysis using SPSS 26.0, incorporating descriptive analysis, correlational analysis, and AMOS 24.0 for mediating analysis. The findings unveiled a correlation between critical thinking skills and EFL learners' writing proficiency, echoing the association observed between content knowledge representation strategies and writing proficiency. Furthermore, critical thinking skills were identified as a mediator, linking content knowledge representation strategies to writing proficiency among EFL learners. The combination of content knowledge representation and critical thinking skills emerged as a positive role in the writing process. This research underscored the paramount significance of critical thinking skills within a specialized discipline, highlighting their transformative potential for EFL learners' writing competency and accentuating their functions in the broader writing pedagogy. *Keywords:* content knowledge representation, critical thinking skills, English as foreign language learners, writing pedagogy, writing proficiency

Cite as: Xiaolei, S., Ismail, L., Yurong, H., & Mengqi, W. (2023). Strategies of Content Knowledge Representation and EFL Learners' English Writing Proficiency: Mediating Role of Critical Thinking Skills. *Arab World English Journal*, 14 (3) 309-323. DOI: <https://dx.doi.org/10.24093/awej/vol14no3.19>

Introduction

English writing is considered a task that requires complex knowledge and logical thought, encompassing content knowledge, systematic knowledge, writing process knowledge, contextual knowledge, as well as critical thinking skills. However, it has been observed that language learners, particularly those under teacher instruction, tend to focus more on vocabulary and linguistic structures rather than on developing critical thinking abilities and content in their writing (Eda, 2018; Tan, 2020). Within the writing classroom, an undue emphasis resides on grammatical intricacies and mechanical writing skills, inadvertently sidelining the vital aspects of content organization and the logical cohesion of ideas (Bernstein & Greenhoot, 2016; Esmaeil et al., 2022; Teng, 2019). Consequently, there is a growing need for effective learning strategies among learners and teachers.

Deep thought plays a crucial role in English writing, and critical thinking skills such as inference, assumption recognition, deduction, interpretation, and evaluation are vital in this process. Some research has effectively elucidated the integration of critical thinking activities in the foreign language field (Ayçiçek, 2021; Li, 2021). Critical writers engage in the analysis, argumentation, and evaluation of ideas while organizing their writing. Importantly, after critical thinking training, learners tend to convey their perspectives critically and engage with multiple facets of a given topic (Esmaeil et al., 2022; Nadri & Azhar, 2016). Therefore, critical thinking skills serve as partial tools for enhancing learners' writing proficiency.

Furthermore, the significance of knowledgeable representational strategies in writing should be paid attention to. As mentioned earlier, teachers and students often prioritize language proficiency, focusing on syntax and lexicon (Jung et al., 2019; Teng, 2019). Similarly, the strategies employed for representing writing content play a significant role in the compositional process. Representing writing content requires the application of various strategies, including the writer's perspectives, facts, evidence, and theories. These strategies aid students in comprehending and enriching their writing content (Banerjee, 2019; Dyches et al., 2020; Ellerton, 2022). Thus, content knowledge representation strategies are independent factors in the writing process that facilitate the development and elaboration of writing content.

The relationship between content knowledge strategies and writing proficiency can be further influenced by selecting relevant critical thinking skills, particularly those grounded in argumentation and evaluation. Integrating critical thinking skills into content affects learners' writing ability as it expands their knowledge of English writing. For instance, previous research has explored the role of critical thinking skills in writing, particularly in fostering depth of thought (Lu & Xie, 2019; Wang & Seepho, 2017), demonstrating that writing thought becomes more profound through analysis and explanation. Other studies have examined the contribution of content knowledge representation strategies to learners' writing proficiency, indicating that writing content can be effectively represented using strategies such as facts, evidence, and statistics (Nejmaoui, 2018; Soodmand et al., 2017). These studies have shed light on the associations between content knowledge representation strategies, critical thinking skills, and writing proficiency (Cole et al., 2015; Dyches et al., 2020; Ellerton, 2022). However, few studies have examined critical thinking skills as a mediator in the relationship between content knowledge representation strategies and writing proficiency. Therefore, the present study aims to investigate the role of critical thinking skills as a mediator in the connection between content knowledge representation strategies and writing proficiency among EFL learners.

Literature Review

Strategies of Content Knowledge Representation and English Writing Proficiency

English writing is a complex task that requires content knowledge, logical thought, and critical thinking skills. However, in traditional language learning settings, learners often focus more on vocabulary and grammar, neglecting the development of critical thinking abilities and content organization (Ellerton, 2022; Teng & Yue, 2022). As a result, there is a growing need for effective learning strategies encompassing both language proficiency and critical thinking skills.

Content knowledge refers to the understanding and organization of information in writing. It can be divided into topical knowledge and discourse knowledge. Topical knowledge relies on material resources to deepen writers' perspectives, while discourse knowledge focuses on expressing oneself effectively in writing (Qin & Bi, 2012). Strategies of content knowledge representation can be categorized into two types: internal knowledge strategies, which involve personal experiences and individual viewpoints, and external knowledge strategies, which rely on objective information such as facts and statistics (Ellerton, 2022; Qin & Bi, 2012). These strategies, such as subjective perspective, objective statement, paraphrasing, and comprehensive strategies, play a significant role in expanding the content and improving the quality of writing (Qin & Bi, 2012; Yang & Wu, 2016).

Some research has investigated the interplay between strategies of content knowledge representation and English writing proficiency. Manalastas (2020) found that students who performed well in content knowledge were more likely to produce well-organized compositions. Olinghouse et al. (2015) observed that different compositional strategies influenced the representation of content knowledge in argumentative writing. Meihami and Rashidi (2018) highlighted the role of metacognitive strategies in reducing writing anxiety and improving fluency and accuracy. These studies emphasize the importance of content knowledge strategies in enhancing writing proficiency.

Critical Thinking Skills and English Writing Proficiency

Critical thinking skills are essential for effective English writing. Critical thinking involves the analysis, evaluation, and interpretation of information to form well-reasoned and informed perspectives (Facione, 1990). Scholars have conceptualized critical thinking as a combination of cognitive factors, such as self-reflection, reasoning, and problem analysis (Esmaeil et al., 2022; Li & Liu, 2021; Mauro et al., 2022). Critical thinking skills can be categorized into various dimensions, including deduction, reasoning, assumption identification, and intellectual traits such as fairness, open-mindedness, and confidence (Cole et al., 2015; Dong & Yue, 2015).

Several studies have explored the relationship between critical thinking skills and English writing proficiency. Moeiniasl et al. (2022) found that students with high critical thinking skills demonstrated better writing performance and individual voice in assessing others' perspectives. Nejmaoui (2018) highlighted the role of critical thinking skills in enhancing learners' abilities to produce reflective thinking essays. Also, other studies have illustrated using critical thinking skills improves writing competencies and critical thinking processes (Bernstein & Greenhoot, 2016; Liu & Stapleton, 2018; Teng & Yue, 2022). These findings emphasize the positive impact of critical thinking skills on English writing proficiency.

Critical Thinking Skills as a Mediator

While previous studies have examined the direct correlations between strategies of content knowledge representation, critical thinking skills, and writing proficiency, little attention has been given to the mediating role of critical thinking skills in the relationship between content knowledge representation and writing proficiency. Understanding the mediating role of critical thinking skills can provide valuable insights into the underlying processes that contribute to improved writing proficiency.

Some studies have suggested that critical thinking skills act as a mediator between content knowledge representation strategies and writing proficiency (Tiruneh et al., 2017; Yang & Wu, 2016; Qin & Bi, 2012). Learners with better critical thinking skills tend to perform better in English writing by effectively representing their knowledge (Teng & Yue, 2022; Yilmaz et al., 2019). Effective content knowledge representation strategies, combined with critical thinking skills, can minimize writers' anxiety and facilitate the use of appropriate critical thinking skills in writing (Ellerton, 2022; Kim, 2020).

However, the majority of previous studies have employed statistical analysis methods such as SPSS, while only a limited number of studies have used Structural Equation Modeling (SEM) for data analysis. Therefore, this study aimed to fill this gap by utilizing SEM with AMOS 24.0 to analyze the correlations between content knowledge representation strategies, critical thinking skills, and writing proficiency.

Method

The present research was meticulously designed to address the following research questions:

1. What are the correlations between content knowledge representation strategies, critical thinking skills, and writing proficiency among EFL learners?
2. Do critical thinking skills mediate the correlation between content knowledge representation strategies and writing proficiency among EFL learners?

By exploring these questions, this study aimed to contribute to understanding the complex relationship between content knowledge representation, critical thinking skills, and writing proficiency in the context of EFL learning.

Participants

This study purposefully chose 837 sophomore students, aged between 19 and 20 years, who were engaged in learning English as a foreign language. Each student had completed their final English course examination including writing in the preceding term, achieving commendable grades of A+, A, and A-. Throughout the previous semester, experienced lecturers adeptly delivered foundational instruction on essential elements such as vocabulary, syntax, and textual structure in writing classes, catering to the needs of these English writing students. A subset of 373 participants who had attained an A level in their examinations was included in this study.

Instruments

This study employed the *California Critical Thinking Skills Test (CCTST)* developed by Facione (1990) in conjunction with a questionnaire on strategies of content knowledge representation as established by Qin and Bi (2012). The CCTST serves as an evaluative test to gauge the critical thinking abilities among EFL learners. It consists of 34 items, systematically

distributed across five sections: interpretation, analysis, evaluation, induction, and deduction. Each question is worth one point, resulting in 34 points as a total possible score. Proficiency levels in these sub-skills are stratified as strong (28 or above), intermediate (19-28), or weak (19 or below) based on existing categorizations. The internal consistency of the CCTST demonstrated high reliability in this study, as evidenced by a Cronbach's alpha coefficient of 0.87.

The questionnaire on strategies of content knowledge representation was adapted from Qin and Bi (2012) and comprised 21 items grouped into six dimensions: subjection strategy, objection perspective strategy, statistic strategy, assessment strategy, comprehension strategy, and theory and fact strategy. Participants rated each item on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." This questionnaire has notably exhibited high internal consistency, as evidenced by a Cronbach's alpha coefficient of 0.75.

Writing Task

Writing tasks were used to gauge knowledge organization efficiency and critical thinking rationality. The writing task was based on the IELTS academic writing section, requiring participants to write an argumentative essay of no less than 250 words within 40 minutes.

The criteria for evaluating the IELTS writing examination consisted of five components: Task Achievements, Coherence and Cohesion, Lexical Usage, Grammar, and Writing Accuracy. Each composition was assessed by a panel of three experienced professors using a holistic grading method ranging from 0 to 5 for each band.

Procedures

The procedure began with administering the CCTST to assess the critical thinking abilities of EFL English learners. Following that, the strategies of content knowledge representation questionnaire were distributed. Thirteen participants encountered difficulties with the questionnaires and were excluded from the analysis. The remaining 360 participants who completed both questionnaires engaged in a writing task evaluated by the three experienced lecturers who had undergone one week of criteria training.

The data collected was analyzed using SPSS 26.0 and AMOS 24.0. Initially, descriptive analysis was employed to examine the normality of statistics. Pearson correlation analyses were conducted to examine the correlations between critical thinking skills, strategies of content knowledge representation, and writing performance among EFL learners. Additionally, SPSS 26.0 and AMOS 24.0 were utilized to examine the mediating impact of critical thought skills on the interaction between strategies of content knowledge representation and EFL learners' writing proficiency.

This research employed an ex-post-facto design (Esmail et al., 2022) without any treatments. Normality was assessed, and Pearson correlations were used to identify the correlations between critical thinking skills, strategies of content knowledge representation, and writing performance among EFL learners.

Results

As portrayed in Table 1, the mean score of critical thinking sub-skills ranged from 2.11 to 4.21, strategies of content knowledge representation varying between 3.86 and 4.35, and writing proficiency encompassing a range of 4.00 to 4.21. The observance of the normality assumption is substantiated by the Skewness data, which oscillated within the confines of -1.261 to 0.479, while

the Kurtosis data exhibited values ranging from -0.563 to -2.355. These numerical values aligned with the established thresholds for Skewness and Kurtosis (*i.e.*, $Skewness|2|$ and $Kurtosis|2|$) (James, 2016).

Table 1. *Descriptive statistics of the research variables*

	Mean	Std. deviation	Skewness	Kurtosis
Critical thinking skills				
Interpretation	3.91	.88	-.648	.303
Analysis	2.11	.40	-.809	.058
Evaluation	2.12	.44	-1.228	1.594
Induction	4.21	.79	-.804	.192
Deduction	4.19	.77	-.721	.207
Content knowledge representation				
Subjection	4.31	.76	-1.261	2.355
Objection	4.35	.72	-1.116	1.877
Statistic	4.05	.76	-.419	.071
Assessment	3.93	.81	-.258	-.643
Comprehension	4.03	.80	-.729	.952
Theory and Fact	3.86	.87	-.554	-.043
Writing proficiency				
Task Achievement	4.21	.81	-.624	-.541
Coherence and cohesion	4.02	1.11	.479	-.563
Lexical resource	4.02	.83	-.710	.674
Grammar	4.01	.81	-.513	.083
Accuracy	4.00	.78	-.556	.435

Moreover, the results in Table 2 showed that the five critical thinking categories were associated with six strategies of content knowledge representation, but not strongly, as all coefficients were less than 0.4. Nonetheless, the interaction between interpretation and comprehension ($r=0.380$, $p<0.05$) was superior to the others, indicating that writers understood content thoroughly by categorizing it into various sectors. However, there was no relationship between induction and theory and fact ($r=0.084$, $p=0.112>0.05$), implying that learners were not skilled in using theory or facts to induce or deduce perspectives.

Table 2. *Correlation between critical thinking skills and strategies of content knowledge*

		Subjection	Objection	Statistic	Assessment	Comprehension	Theory and Fact
Interpretation	Pearson	0.363**	0.311**	0.188**	0.269**	0.380**	0.147**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.005
Analysis	Pearson	0.305**	0.295**	0.200**	0.184**	0.346**	0.159**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.002
Evaluation	Pearson	0.283**	0.243**	0.211**	0.171**	0.317**	0.182**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.001
Induction	Pearson	0.219**	0.239**	0.173**	0.104*	0.225**	0.084
	Sig.	0.000	0.000	0.001	0.048	0.000	0.112
Deduction	Pearson	0.282**	0.246**	0.305**	0.214**	0.273**	0.147**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.005

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 3 illustrates the interaction between five critical thought sub-skills and five writing proficiency components. Writing proficiency components were correlated with each critical thinking skill. Meanwhile, the correlation between deduction, coherence and cohesion ($r=0.441$, $p<0.001$) was superior to others, indicating that writers could express their arguments more

smoothly with the help of clear explanation. Interpretation, such as clarifying meaning or categorizing, had an influence on writing accuracy ($r=0.184$, $p<0.001$).

Table 3. Correlation between critical thinking skills and writing proficiency

		Task Achievement	Coherence and Cohesion	Lexical resource	Grammar	Accuracy
Interpretation	Pearson	0.259**	0.372**	0.401**	0.292**	0.184**
	Sig.	0.000	0.000	0.000	0.000	0.000
Analysis	Pearson	0.254**	0.379**	0.308**	0.306**	0.283**
	Sig.	0.000	0.000	0.000	0.000	0.000
Evaluation	Pearson	0.301**	0.382**	0.296**	0.254**	0.246**
	Sig.	0.000	0.000	0.000	0.000	0.000
Induction	Pearson	0.247**	0.372**	0.351**	0.267*	0.288**
	Sig.	0.000	0.000	0.001	0.048	0.000
Deduction	Pearson	0.319**	0.441**	0.228**	0.378**	0.299**
	Sig.	0.000	0.000	0.000	0.000	0.000

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

The association between subjection and task achievement was highest ($r=0.453$, $p<0.001$) in Table 4, indicating that the more familiar topics writers were concerned with, the more experienced perspectives they organized. Grammar proficiency in writing was influenced by subjection, objection, statistic, assessment, and comprehension strategies. Still, there was no relationship between theory, fact, and grammar ($r=0.064$, $p=0.229>0.05$).

Table 4. Correlation between strategies of content knowledge representation and writing proficiency

		Task Achievement	Coherence and Cohesion	Lexical resource	Grammar	Accuracy
Subjection	Pearson	0.453**	0.371**	0.318**	0.444**	0.425**
	Sig.	0.000	0.000	0.000	0.000	0.000
Objection	Pearson	0.377**	0.313**	0.292**	0.341**	0.292**
	Sig.	0.000	0.000	0.000	0.000	0.000
Statistic	Pearson	0.359**	0.376**	0.250**	0.304**	0.317**
	Sig.	0.000	0.000	0.000	0.000	0.000
Assessment	Pearson	0.279**	0.209**	0.324**	0.419*	0.236**
	Sig.	0.000	0.000	0.001	0.048	0.000
Comprehension	Pearson	0.288**	0.246**	0.303**	0.378**	0.293**
	Sig.	0.000	0.000	0.000	0.000	0.000
Theory and Fact	Pearson	0.256**	0.230**	0.194**	0.064	0.294**
	Sig.	0.000	0.000	0.000	0.229	0.000

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

To be an acceptable model fit, the structural model was revised by connecting measurement errors (Byrne, 2016), and the modified model fit is presented in Figure 1. In standardized estimate loading factors, the observed and unobserved variables ranged from 0.33 to 0.93 in strategies of content knowledge representation, 0.59 to 0.93 in critical thinking skills, and 0.63 to 0.75 in writing proficiency, representing an acceptable effect size. CFA (Confirmatory Factor Analysis) results revealed an association between content knowledge representation, critical thinking, and writing proficiency. The correlation between content knowledge representation and logical

thoughts was 0.39 ($p < 0.05$), indicating that an individual's knowledge and logical thoughts interact through mediation. The moderated interaction between skills in critical thinking and writing proficiency was 0.50 ($P < 0.05$), pointing to a link between learners' compositions and critical thoughts. The correlation of 0.60 ($P < 0.05$) is higher than the other two, suggesting a significant connection between EFL learners' writing proficiency and strategies of content knowledge represented in essays.

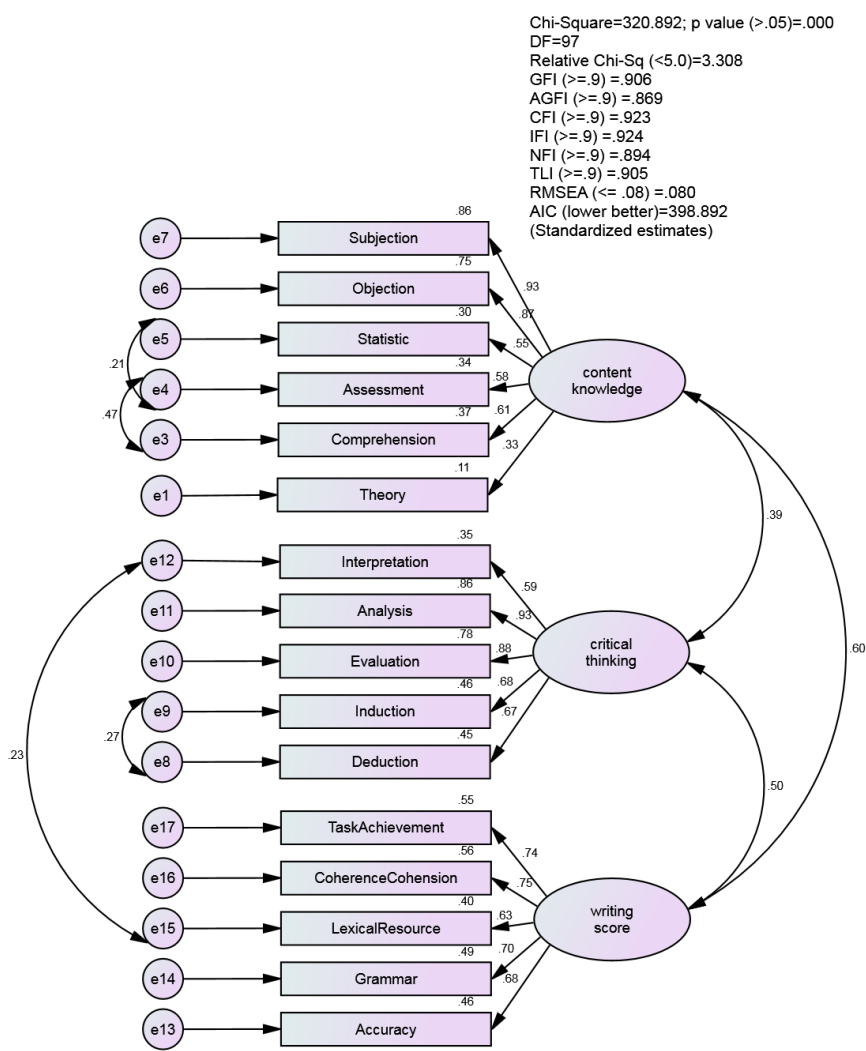


Figure 1. Model fit indices from confirmatory factor analysis

Additionally, the results in Table 5 indicated that the statistics from model fit indices ($X^2=320.829$; $df=97$; $X^2 /df=3.308$; $GFI=0.906$; $RMSEA=0.080$; $CFI=0.923$; $TLI=0.905$; $NFI=0.894$) are in the acceptable range (Byrne, 2016).

Table 5. Model fit indices from confirmation factor analysis

Model fit indices	X ²	df	X ² /df	GFI	RMSEA	CFI	TLI	NFI
Criteria	-	-	<5	>0.9	<0.10	>0.9	>0.9	>0.9
Model	320.829	97	3.308	0.906	0.080	0.923	0.905	0.894

Lastly, to determine the position of critical thought as a moderator in the connection between strategies of content knowledge representation and writing proficiency, the impact of content knowledge representation on compositional proficiency was first calculated directly. The t-value in Figure 2 and Table 6 was 0.610 (p<0.05), demonstrating that strategies of content knowledge representation directly impact writing proficiency.

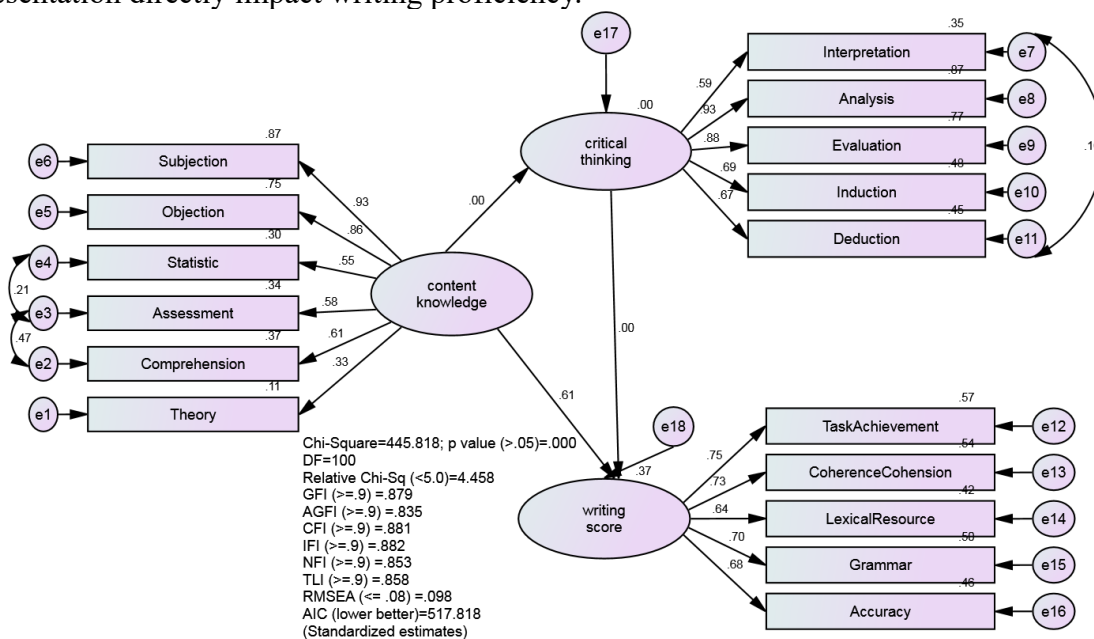


Figure 2. Directing effect of strategies of content knowledge representation and writing proficiency

Given the impact of strategies of representing content knowledge on critical thinking ability, the loading factor of t-value was 0.39 (p<0.05) in Figure 3, indicating that the observed correlation is significant, and a link existed between strategies of content knowledge representation and critical thinking skills. Besides, the t-value loading factor on the effect of critical thinking on writing proficiency is 0.33 (p<0.05), proving that the observed connection is active and that the positive connection between skills in critical thought and compositional proficiency has been confirmed.

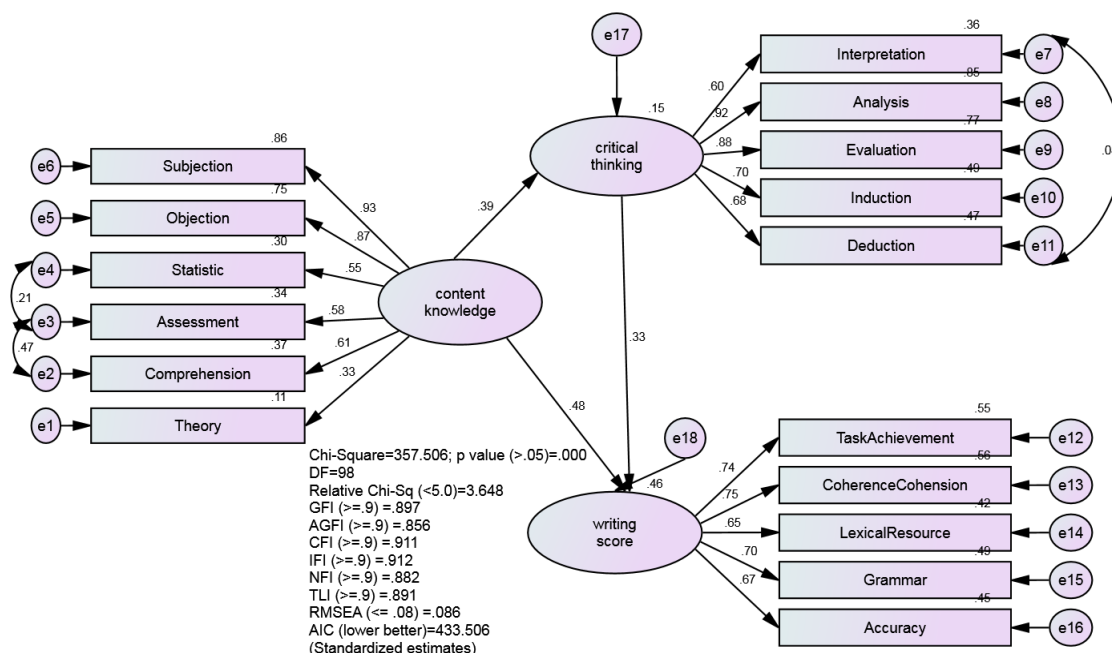


Figure 3. The mediating effect of strategies of content knowledge representation and writing proficiency

Furthermore, when scrutinizing critical thinking skills as a mediator, the correlation between strategies of content knowledge representation and writing proficiency was 0.48, highlighting the robustness of the observed relationship. This reaffirmed the substantial interaction between content knowledge representation and writing proficiency, which was further emphasized through the mediation of critical thinking skills. Besides, in Table 6, the Standard Indirect Effect (SIE) was 0.127 ($p < 0.05$), suggesting that critical thinking skills were a partial mediator in the interplay between strategies of content knowledge representation and writing proficiency.

Table 6. Results of critical thinking skills as a mediator on strategies of content knowledge representation and writing proficiency

Hypothesized Path	Beta	p
Direct Model		
Strategies of Content Knowledge Representation → Writing Score	.610	.000
Mediation Model		
Strategies of Content Knowledge Representation → Critical thinking skills → Writing Score	.481	.000
Std. Indirect Effect (SIE)	.127	.000

Discussion

As mentioned earlier, this study aimed to examine the role of critical thinking skills as a mediator in the relationship between strategies of content knowledge representation and writing proficiency among EFL learners. The findings revealed an active interaction between critical thinking skills and writing proficiency ($r = 0.50$), as well as a significant correlation between strategies of content knowledge representation and writing proficiency ($r = 0.60$), which is

consistent with previous research (Ellerton, 2022; Manalastas, 2020). Furthermore, there was a positive association between critical thinking skills and strategies of content knowledge representation ($r=0.39$), indicating a mutual connection between these variables.

It was observed that critical thinking skills significantly contributed to EFL learners' writing proficiency. Writers with higher levels of critical thinking skills demonstrated better writing proficiency than those with lower levels of critical thinking skills. This finding supported the notion that skilled writers utilize critical thinking to enhance their writing abilities, as noted by Li and Liu (2021). These writers understand the topics, develop the essay's structure, and assess the rationality of the material to construct coherent and well-supported ideas. The more they employ critical thinking skills, the higher their writing scores. Additionally, writers who provided clear explanations achieved higher scores in coherence and cohesion in writing proficiency. This aligns with the findings of Nadri and Azhar (2016) and Liu and Stapleton (2018), which suggested that critical thinkers improve their writing through deep thinking, filtering relevant information, and effectively organizing their compositions. Although the learners' overall performance was below average, they displayed a positive attitude toward critical thinking skills. Lu and Xie (2019) indicated that writers commonly integrate comprehensive resources and substantiating evidence into their writing, employing adept critical thinking skills to appraise and regulate their compositions. Similarly, according to Samson (2019), critical thinking as a multidimensional process including "complexity, integration, skills, principles, values, and assumption" (p.6) motivates writers to incorporate knowledge and skills into the writing process. However, Soodmand et al. (2017) argued that the interaction between critical thinking skills and English writing is weak, with deduction being one of the challenging skills in writing propositions.

The findings also revealed a significant correlation between content knowledge representation strategies and EFL learners' writing proficiency. This finding supported the previous research by Olinghouse et al. (2015), and Yang and Wu (2016), which highlighted the influence of content knowledge representation on writing achievement and performance. The present study found that learners gradually connect their prior knowledge to writing and enrich the content by employing strategies of content knowledge representation. Importantly, their attention is not confined solely to precise syntax or vocabulary, but to unearthing pertinent facts and evidence that substantiate their perspectives. Consistent with the findings of Yang and Wu (2016), familiarity with the topic influenced the utilization of content knowledge strategies. Learners perform better when writing on familiar topics as they possess relevant knowledge and experiences, which enhances their motivation and fluency. They also found that different strategies for representing content knowledge were associated with different attitudes toward writing. The subjective strategy, which contributed to improved writing fluency and motivation, allowed writers to express their perspectives. Therefore, topical familiarity played a crucial role in writing proficiency. However, it is worth noting that the strategies for representing content knowledge were beneficial in moderating the overuse of subjective experiences. Effective writing necessitates the fusion of internal and external knowledge, amalgamating individual experiences with pertinent facts and concepts. Without compelling evidence, writers tend to overgeneralize their writing organization. These findings support Qin and Bi's (2012) classification of internal knowledge into knowledge absorption (e.g., theory, paraphrase, and generalization), knowledge evaluation (e.g., critical thinking skills), and knowledge development (e.g., statistics) to broaden the content of writing. The emphasis on internal knowledge conflicts with knowledge criticality and development.

Learners establish connections between their perspectives and those of others to effectively express their ideas.

Furthermore, the findings revealed a significant association between critical thinking skills and strategies of content knowledge representation, which is consistent with Moeiniasl et al. (2022), and Yang and Wu (2016). As suggested by Moeiniasl et al. (2022), an increase in critical thinking awareness leads writers to adopt reasonable strategies for representing content knowledge in their essays, thereby enhancing their writing performance. Additionally, critical thinking skills in language learning are manifested through the representation of content knowledge. Similarly, Yang and Wu (2016) found that advanced writers prefer to represent relevant cognitive knowledge and incorporate critical thinking skills for self-regulation. Learners generate their perspectives by combining prior knowledge with novel strategies to construct the structure of their writing. Consequently, strategies of content knowledge representation are characterized as representing prior knowledge in light of new knowledge. Based on their assessment of existing knowledge, writers use critical thinking to generate new knowledge, thereby achieving writing goals ranging from knowledge representation to thought promotion.

The structural equation model (SEM) analysis indicated that critical thinking skills serve as a moderator in the relationship between strategies of content knowledge representation and writing proficiency among EFL learners. The utilization of critical thinking skills encourages students to gather diverse materials, consider multiple viewpoints, and enhance objectivity and problem-solving abilities (Liu & Stapleton, 2018). On the other hand, the approach of content knowledge representation involves presenting writing content through various strategies to improve writing quality (Esmaeil et al., 2022). Additionally, a familiar topic boosts learners' motivation to organize their perspectives and effectively implement writing strategies (Yang & Wu, 2016). Critical thinking skills enhance learners' writing abilities by enabling them to make decisions, explain relevant theories, and engage in problem-solving projects. In contrast to Esmaeil et al.'s (2022) study, which found that critical thinking skills do not mediate the relationship between language strategies such as metacognition, cognition, and EFL learners' writing efficiency, this study unveiled a significant mediating effect of critical thinking skills on the relationship between strategies of content knowledge representation and EFL learners' writing proficiency.

Conclusion

This study unveiled noteworthy correlations among content knowledge representation strategies, critical thinking skills, and writing proficiency among EFL learners. The findings demonstrated a positive interaction between critical thinking skills and writing proficiency, as well as a mediated relationship between content knowledge representation strategies and writing proficiency through critical thinking skills. These results emphasized the importance of developing critical thinking skills and utilizing effective strategies for representing content knowledge to enhance EFL learners' writing abilities.

The implications of this study suggest that educators should prioritize integrating critical thinking skills into writing instruction to improve students' analytical, explanatory, and evaluative abilities in their compositions. Furthermore, curricula should shift the focus from personal experiences to a balanced combination of internal and external knowledge, enabling learners to explore diverse perspectives and enhance the quality of their writing. By understanding the mediating role of critical thinking skills and the influence of content knowledge representation

strategies, educators and researchers can further enhance writing pedagogy and contribute to the field of second language acquisition.

About the Authors:

Shen Xiaolei is a PhD student in TESL at the University of Putra Malaysia at the Faculty of Educational Studies. She is fascinated about learning strategies such as metacognitive strategies and critical thinking skills. ORCID ID: <https://orcid.org/0000-0002-8112-6179>.

Dr Lilliati Ismail is a senior lecturer at the Faculty of Educational Studies, Universiti Putra Malaysia. Her research interests include grammar instruction and task-based language teaching. ORCID ID: <https://orcid.org/0000-0002-7977-7327>.

Hu Yurong is a master student at the Faculty of Language and Linguistics, Universiti Malaya. She is interested in researching in second language teaching and discourse analysis. ORCID ID: <https://orcid.org/0000-0002-8022-1457>.

Wei Mengqi is a senior lecturer at the Faculty of Foreign Language, Henan Normal University. Her research interests include cognitive strategies and foreign language teaching. ORCID ID: <https://orcid.org/0009-0001-4741-7239>.

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