International Jordanian journal Aryam for humanities and social sciences; IJJA
Volume7, Issue 3, 2025

Raising Critical Thinking Awareness in EFL Writing Classrooms: Evidence from an Infusion Approach

Dr. Samia Moustaghfir

PhD Holder, Arts and Pedagogical Engineering Research Laboratory, Faculty of Languages, Letters and Arts, Ibn Tofail University- Kenitra-Morocco

Received: 7/6/2025
Revised: 26/7/2025
Accepted: 19/8/2025
Published online: 13/9/2025
https://doi.org/10.65811/737
* *Corresponding author:*
Email: samia.moustaghfir@ui.ac.ma

Citation: *Moustaghfir, S. (2025). " Raising Critical Thinking Awareness in EFL Writing Classrooms: Evidence from an Infusion Approach. International Jordanian journal Aryam for humanities and social sciences; IJJA, 7(3).*

International Jordanian journal Aryam for humanities and social sciences: Issn Online 3006-7286

Abstract

This study investigates the impact of explicitly teaching critical thinking strategies through the infusion approach on the critical thinking awareness (CTA) of EFL university students. The infusion approach, which integrates critical thinking instruction directly into subject content, is examined as a means to enhance both metacognitive and cognitive awareness in academic writing contexts. Drawing on a quasi-experimental design, the study involved pre- and post-tests administered to control and experimental groups. Results from an Independent Samples t-Test revealed a highly significant difference between the groups ($p < .001$), indicating that the intervention had a notable effect on students' CTA. For within-group analysis, a Wilcoxon signed-rank test showed no significant change in the control group ($Z = -1.272$, $p = .203$), while the experimental group exhibited a statistically significant improvement ($Z = -6.930$, $p < .001$), with all 50 participants demonstrating progress. Anchored in metacognitive theory and critical pedagogy, the findings highlight the pedagogical value of integrating critical thinking instruction into writing curricula. The study offers practical implications for EFL educators aiming to cultivate reflective, analytical learners through metacognitive scaffolding and content-based critical thinking integration.

Keywords: Critical Thinking Awareness (CTA), Infusion Approach, EFL Writing Instruction

تعزيز الوعي بالتفكير النقدي في أقسام الكتابة باللغة الإنجليزية كلغة أجنبية: أدلة من مقاربة الإدماج

سامية مستغفر [1]

حاصلة على الدكتوراه، مختبر البحث في الفنون والهندسة البيداغوجية، كلية اللغات والآداب والفنون، جامعة ابن طفيل – القنيطرة، المغرب

يهدف هذا البحث إلى دراسة تأثير التدريس الصريح لاستراتيجيات التفكير النقدي، من خلال منهج الدمج ، على وعي طلاب الجامعة من دارسي الإنجليزية كلغة أجنبية بمهارات التفكير النقدي. يعتمد هذا المنهج على إدماج تعليم التفكير النقدي داخل المحتوى الأكاديمي، خاصة في سياق الكتابة الأكاديمية، من أجل تعزيز الوعي المعرفي وما وراء المعرفي لدى الطلاب. تم اعتماد تصميم شبه تجريبي، حيث أُجريت اختبارات قبلية وبعدية على مجموعتين: ضابطة وتجريبية. أظهرت نتائج اختبار (t) للعينات المستقلة فرقًا دالًا إحصائيًا كبيرًا بين المجموعتين (قيمة $p < 0.001$)، مما يدل على فعالية التدخل. أما على مستوى التحليل داخل المجموعات، فقد أظهر اختبار (Wilcoxon) عدم وجود فرق دال في المجموعة الضابطة ($Z = -1.272$، $p = 0.203$)، بينما أظهرت المجموعة التجريبية تحسنًا دالًا إحصائيًا ($Z = -6.930$، $p < 0.001$) مع تقدم جميع المشاركين الخمسين في مرحلة ما بعد الاختبار. تؤكد هذه النتائج أهمية التدريس ما وراء المعرفي في تعزيز مهارات التفكير النقدي لدى طلاب اللغة الإنجليزية، وتقدم توصيات عملية للمدرسين لإدماج التفكير النقدي ضمن تعليم الكتابة الأكاديمية، بهدف تطوير متعلمين أكثر وعيًا وتحليلاً.

الكلمات الدالة: الوعي بالتفكير النقدي ، (CTA)منهج الدمج ،تعليم الكتابة باللغة الإنجليزية كلغة أجنبية

Introduction

In recent years, critical thinking (CT) has been widely recognized as a cornerstone of higher education, essential not only for academic success but also for meaningful engagement in professional and social life. Within English as a Foreign Language (EFL) contexts, however, cultivating learners' critical thinking remains a persistent pedagogical challenge. While language proficiency continues to be the primary focus of instruction, the development of cognitive and metacognitive skills often receives insufficient attention. One significant barrier is the lack of explicit instruction in CT strategies. Many EFL teaching practices rely on implicit or incidental incorporation of CT, where learners are expected to "pick up" critical thinking through general classroom engagement. This approach often leaves students unaware of what CT entails, how it is applied, and why it matters. Indeed, several studies have noted that EFL students frequently struggle to recognize and articulate their own critical thinking processes (Yang & Gamble, 2013; Stapleton, 2011).

Without a clear understanding of CT as a conceptual and procedural framework, students may find it difficult to transfer such skills across contexts or develop metacognitive awareness of their reasoning. This gap becomes particularly evident in academic writing, where the expectation to construct logical, evidence-based arguments presupposes a level of CT competence that many learners have not been explicitly taught. In response to this pedagogical gap, this study adopts an infusion approach , an instructional model that integrates explicit CT instruction into the core content of academic courses (Swartz & Parks, 1994). Unlike stand-alone CT programs, the infusion model embeds critical thinking strategies within the subject matter, thereby contextualizing their application and promoting deeper engagement.

Drawing on a quasi-experimental design, this research investigates whether the infusion approach, when applied within an EFL writing course, enhances students' awareness and understanding of critical thinking. The primary objective of this study is to evaluate the effectiveness of the infusion approach in raising EFL students' critical thinking awareness (CTA) within a writing course. Specifically, the current study seeks to:

- Investigate how explicitly taught CT strategies affect students' recognition and understanding of critical thinking.
- Determine whether students in the experimental group display greater metacognitive and CT awareness than those in the control group.

Literature Review

The Nature of Critical Thinking

There is an ongoing debate about Critical thinking (CT) regarding its definition and the attributes that define the student "critical thinker". Despite decades of research, a clear and universally accepted definition remains elusive. Scholars such as Vacek (2009), Atkinson (1997), and Moore (2013) emphasize the conceptual ambiguity surrounding CT. The Delphi Report (Facione, 1990) was an intelligent attempt to reconcile the tensions among scholars about what critical thinking (CT) is, providing the following definition, which has been described as too long and "hard to follow" (Davies & Barnett, 2015, p.21):

> ***We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which***

> ***that judgment was based. Critical thinking is essential as a tool of inquiry. Critical thinking is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, honest in facing personal biases, prudent in making judgments, willing to consider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and circumstances of inquiry permit. (Facione, 1990)***

This account of CT while has been widely accepted as a theoretical framework, its practical implementation in higher education remains challenging. Nonetheless, the significance of CT in education is widely acknowledged. Facione (2011) underlines its importance for higher-level thinking and real-world problem solving. Furthermore, they point out that the definition fails to provide clear guidance for curriculum development or institutional adoption, limiting its utility for educators and administrators seeking to embed CT more effectively in higher education (Davies & Barnett, 2015).

Recently, however, there has been growing recognition that CT is also indispensable for success in education. According to Facione (2011), "Critical thinking is essential to education because it supports students' ability to engage in higher-level thinking and problem-solving, which are crucial for academic and professional success" (p.7).One reason for this shift in perspective is the realization that traditional methods of education often fail to adequately prepare students for the complex challenges they will face in the real world. These challenges require not only knowledge of facts and concepts but also the ability to think critically about how to apply that knowledge in new and unfamiliar situations. As a result, many psychologists now view CT as a key competency that should be explicitly taught and assessed in educational settings.

Bloom's Taxonomy and critical thinking

Another widely used framework for CT is Bloom's taxonomy, developed by Benjamin Bloom in the 1950s. This taxonomy identifies six levels of thinking, ranging from lower-order skills like recalling information and recognizing patterns to higher-order skills like analyzing, synthesizing, and evaluating information. As the significance of critical thinking has grown in educational discourse, attention has expanded from how it is taught to how it can be assessed. Instruments such as the California Critical Thinking Disposition Inventory (CCTDI) and the Critical Thinking Assessment Test (CAT) have been developed to capture different dimensions of students' critical engagement. These tools, although varying in focus and scope, reflect a shared understanding that CT encompasses both cognitive abilities and dispositional factors.

Overall, Bloom's taxonomy provides a useful conceptual foundation for integrating CT into instructional planning. While it does not capture the full complexity of critical thought, particularly in terms of disposition and context-specific judgment, it nevertheless supports the design of learning tasks that aim to deepen students' intellectual engagement . In the context of higher education, explicitly teaching CT has become increasingly recognized as essential. Many students enter university with only a vague or intuitive sense of what CT means, often confusing it with simply having an opinion or being argumentative. This is why instruction must begin by raising students' awareness of the concept itself: what CT is, how it functions, and why it matters. Making the concept of CT visible through clear explanations, concrete examples, and reflective tasks helps demystify it, turning it from an abstract ideal into a practical habit of mind.

Moreover, explicit CT instruction plays a central role in this process. When students are guided to identify, practice, and internalize CT components, such as analyzing ideas, evaluating evidence, or constructing logical arguments, they not only improve their writing but also begin to

think more intentionally. Over time, this growing awareness becomes a catalyst for deeper engagement with academic tasks and more independent, reflective learning. In this sense, CTA is not a byproduct of learning but a goal in its own right ; one that supports students' ability to make informed judgments, approach writing critically, and transfer these skills across disciplines.

The Role of Metacognition in Critical Thinking Awareness

Metacognition plays a central role in nurturing learners' awareness of their own thought processes, which is a crucial dimension of CT. Often defined as the ability to reflect on, understand, and regulate one's cognition, metacognition supports learners in becoming more autonomous, strategic, and self-aware (Schraw & Dennison, 1994). Engaging in metacognitive thinking enables students to track their cognitive processes and make informed decisions to enhance their understanding or approach problems differently. Although the concept of metacognition has been discussed extensively in psychological and educational literature, its complexity has led to varied interpretations.

Early work by Flavell (1976) and Brown (1987) distinguished two major dimensions: metacognitive knowledge, which includes understanding one's cognitive strengths, weaknesses, and strategies, and metacognitive regulation, which refers to planning, monitoring, and evaluating learning processes. These two components form the backbone of how individuals develop control over their thinking, an essential ability in any context that demands critical judgment. Within CT instruction, metacognitive strategies allow learners to evaluate the quality of their reasoning, reflect on the steps they take to solve problems, and adjust their thinking in response to new challenges or feedback. For instance, students who are metacognitively aware are more likely to question the validity of information, recognize biases in their reasoning, or revisit their conclusions when evidence demands it. This kind of reflective behavior is what distinguishes passive information receivers from active, critical thinkers.

Moreover, the importance of metacognition in fostering CT has also been recognized through its integration into learning frameworks that emphasize reflection, higher-order thinking, and self-assessment (Livingston, 2003). Fundamentally, When students become aware of how they learn and think, they are better equipped to approach tasks strategically, manage their cognitive resources, and respond flexibly to problems. Educational tools such as reflective journals, learning diaries, and guided self-questioning have proven effective in developing such awareness (Baker, 2010; Mokhtari & Reichard, 2002).

In addition, a wide body of research supports the use of both real-time and retrospective assessments to explore how learners apply metacognitive strategies (Tarricone, 2011). These assessments help educators identify students' levels of self-regulation and tailor instruction to encourage deeper thinking. Consequently, as students grow more proficient in regulating their cognition, their ability to engage in critical inquiry, reason logically, and form evidence-based conclusions improves significantly.

Despite these promising developments, CT often remains vague for EFL students, even with encouragement from teachers. Here, metacognitive awareness plays a crucial bridging role by encouraging learners to monitor and control their thinking specifically during writing tasks. For example, scholars like Pineda-Báez (2009) and Zohar and Barzilai (2015) argue that metacognition facilitates epistemic cognition and helps reduce cognitive biases such as confirmation bias (Nickerson, 1998). Supporting this, empirical evidence highlights the effectiveness of metacognitive instruction in improving writing performance (Mustain & Ahmadi, 2023; Teng, 2016; Zhang & Qin, 2018). These studies consistently show that students who consciously plan, monitor, and evaluate their writing produce more coherent and well-structured essays.

The Integration of Critical Thinking in EFL Classrooms: Explicit vs. Implicit Instruction Debate

The question of how best to foster students' CTA remains central to contemporary pedagogical discussions, particularly within EFL writing classrooms. One key dimension of this debate concerns the relative effectiveness of explicit versus implicit instructional approaches. While implicit instruction integrates CT within broader subject content, often expecting learners to acquire critical habits incidentally, explicit instruction focuses directly on teaching CT as a distinct set of skills and dispositions. Advocates of explicit instruction argue that it offers a clearer, more structured pathway for developing students' metacognitive awareness. Facione (1990), in his foundational work on the Delphi Report, emphasized the importance of students not only being able to think critically but also being consciously aware of what it means to do so.

This level of self-awareness cannot be assumed to emerge naturally; it requires intentional, focused engagement with the components of CT. In this sense, explicit teaching of CT may serve as an essential precursor to deeper, more autonomous critical engagement. Research supports this position. For example, Marin and Halpern's (2011) study demonstrated that students who were explicitly taught how to analyze, evaluate, and make reasoned judgments exhibited greater gains in CT performance than those in control conditions. This suggests that clear and deliberate instruction helps students not only develop the skills themselves but also recognize when and how to apply them, a key marker of CT awareness.

In contrast, implicit instruction, while potentially beneficial for encouraging authentic application of CT in context-rich environments, often assumes that learners will intuitively develop critical capacities through engagement with complex texts or problem-solving tasks. However, without scaffolding or meta-instruction, students may remain unaware of the cognitive strategies they are using , or failing to use. As Elder and Paul (1994) point out, when CT remains unarticulated in the classroom, students may replicate superficial learning behaviors, mistaking compliance or correctness for deep thinking.

This is particularly relevant in the context of writing instruction, where higher-order thinking skills are essential. Students cannot be expected to demonstrate these skills effectively in their writing if they are not explicitly taught how to engage in them. Furthermore, awareness of CT processes is not only a cognitive skill but also a reflective stance, a willingness and ability to question assumptions, consider alternative perspectives, and assess the logic of one's own reasoning. Despite its demonstrated benefits, explicit instruction does not operate in isolation. A growing number of scholars advocate for a balanced approach that combines explicit instruction with opportunities for contextualized application. As Ennis (1993) suggests, students are most likely to internalize CT dispositions when they are first taught them explicitly and then given opportunities to practice them across disciplines. Such integration helps bridge the gap between theory and practice, allowing students to develop both conscious awareness and flexible application of CT skills.

In EFL contexts, where linguistic, cultural, and cognitive demands intersect, such explicit approaches may be particularly beneficial. For many learners, CT is not merely a new skill set but a new epistemological orientation that challenges previously held notions of authority, truth, and meaning. As such, raising CT awareness requires not only instructional clarity but also pedagogical intentionality. Students need to be guided in identifying CT within the writing process, understanding its value, and applying it with increasing independence and confidence.

The Moroccan Context

In recent years, educational reforms in Morocco have underscored the value of CT within higher education, recognizing it as a key competency for academic and professional success. Chouari (2016) documents a gradual integration of CT principles into university curricula, notably at institutions such as Moulay Ismail University in Meknes. Despite this momentum, Hellalet (2021) points out that empirical investigations of CT practices in Moroccan EFL classrooms are still limited, particularly regarding how students become aware of and engage in CT. Given the evidence favoring explicit CT instruction, the Moroccan context appears ripe for adopting pedagogical approaches that foreground strategic awareness. Explicitly teaching CT strategies, such as argument analysis, evidence evaluation, and reflective questioning, can help Moroccan EFL learners recognize when and how to apply CT in their writing. The aim is to make these processes transparent, helping educators guide their students through the stages of metacognitive regulation: planning, monitoring, and evaluating their own thought processes (Flavell, 1979).

Studies on Critical Thinking Awareness

An increasing body of research highlights the importance of fostering learners' awareness of critical thinking as a precursor to its effective application. Across various disciplines and educational levels, explicit exposure to CT strategies has been shown to enhance students' understanding, attitudes, and cognitive engagement. Akatsuka (2019), for instance, found that incorporating higher-order thinking questions in EFL classrooms not only improved learners' speaking abilities but also raised their awareness of CT attitudes. Crucially, the benefits were observed across different proficiency levels, suggesting that CTA can be developed regardless of language competence when instruction is explicit and sustained. Similarly, Berdahl et al. (2020) demonstrated that targeted CT instruction significantly increased students' self-efficacy and valuation of CT. The study emphasized the importance of linking CT directly to course content and ensuring that students recognize its relevance through structured, reflective tasks.

Other studies have approached CTA from different angles. Djiwandono (2013) showed that even brief CT training prompted noticeable shifts in students' questioning patterns and metacognitive behavior. Meanwhile, Durmuşçelebi (2018) found a positive correlation between students' cognitive awareness and their critical thinking levels, reinforcing the idea that CT awareness and CT skills develop in tandem. From a pedagogical perspective, Lai (2011) and Halpern (1998) stress the necessity of teaching CT through open-ended, real-world tasks and a metacognitive framework. Their models argue that students become more aware of CT not just by practicing skills but by understanding the rationale and cognitive processes behind them. Moreover, studies in teacher education (Kanmaz, 2020; Choy et al., 2012) reveal that while teachers often recognize the value of CT, they may lack the training or curricular support to teach it effectively. This further highlights the need for clear, replicable frameworks that prioritize awareness-building as a foundation for CT instruction.

Together, these studies converge on a common conclusion: critical thinking awareness is not merely an outcome of good teaching, it is a necessary condition for meaningful learning. Whether through reflective questioning, metacognitive training, or explicit modeling, raising students' consciousness of CT helps them internalize and apply it more effectively across academic tasks.

Conclusion

The evolving definitions and conceptual frameworks surrounding critical thinking (CT) have opened the door to a potential paradigm shift in educational practices, particularly in higher education. As academic disciplines increasingly intersect, fostering CT becomes essential for

helping students draw meaningful connections across fields of knowledge. However, raising students' awareness of what critical thinking entails , and how it applies to academic writing, remains a fundamental first step. Explicit instruction in CT can make the concept more accessible, allowing students to understand its core components and to integrate them consciously into their thinking and writing processes. The real challenge for educators, then, lies in identifying pedagogical strategies that not only enhance students' capacity to analyze information, evaluate arguments, and reflect on complex issues, but also enable them to approach problems from diverse and informed perspectives. In this sense, developing students' CTA is not merely a cognitive aim, but a foundational goal for transformative learning and meaningful academic engagement. Building on the insights drawn from the theoritical foundations of CT, it becomes clear that explicit instruction in CT holds promise for enhancing students' awareness and their ability to apply it consciously in their academic tasks . However, despite the growing recognition of its value, there remains a gap in how CT is concretely implemented in EFL classrooms, particularly within the Moroccan higher education context. To address this, the present study seeks to examine the impact of an infusion approach to teaching critical thinking on students' awareness and use of CT in their writing tasks **.** The following section outlines the methodological framework adopted to investigate this aim, detailing the research design, participants, instruments, procedures, and analytical techniques employed .

Methodology

Research Questions and Hypotheses

This study addresses the following research question:

What is the impact of the infusion approach on students' critical thinking awareness?

Ha: The infusion approach has a positive impact on students' critical thinking awareness.

H0: The infusion approach does not impact students' critical thinking awareness.

Research Design

To investigate the impact of explicit critical thinking instruction, this study adopted a quasi-experimental research design, which is particularly appropriate for educational contexts where random assignment is impractical or ethically constrained (Shadish et al., 2002). Participants were assigned to either an experimental or a control group based on availability rather than random selection. The experimental group received instruction explicitly integrating critical thinking strategies into their writing course, while the control group continued with standard instruction without such focus. Data were collected using a Likert-scale questionnaire administered as both a pre-test and post-test to measure students' awareness of critical thinking before and after the intervention. This design allowed for a comparative analysis of changes in awareness between the two groups. Although quasi-experimental designs do not permit full control over confounding variables, they offer strong external validity and are well-suited for investigating educational interventions in authentic classroom settings (Cook & Campbell, 1979; Shadish et al., 2002). Grounded in a deterministic worldview (Creswell & Creswell, 2023), the study aims to contribute actionable insights into how explicit instruction can enhance CTA among EFL university learners.

Participants

This study involved 100 second-year (S2) students from L'École Normale Supérieure de Rabat (ENS), divided into two groups of 50 each. Participants, aged between 18 and 20 and of mixed gender, were selected using convenience sampling ,a practical and widely accepted method

in second language research (Dörnyei, 2007; Newby, 2014). This non-random selection was based on accessibility and institutional feasibility. Prior to the intervention, all participants completed a standardized Pearson Longman ELT test of 2006 to ensure baseline equivalence. The results confirmed that both groups were at comparable levels of English proficiency, thereby minimizing the risk of language ability influencing the outcomes. In other words, the results of the proficiency test revealed that the majority of participants were positioned at the A2 level according to the Common European Framework of Reference for Languages (CEFR).

This standardized classification served to establish a common linguistic baseline among participants, ensuring that any observed shifts in CTA following the intervention could not be attributed to disparities in language proficiency. To further strengthen internal validity, efforts were made to control for external variables that might affect the results. A detailed demographic breakdown of participants is presented in the table below.

Tableau 1. Participant Demographics by Group

Group		Count	Gender N %	Mean Age	Range	S D
Control Group	Male	18	36.0%			
	Female	32	64.0%			
Age				18.04	3.00	.70
Experimental Group	Male	17	34.0%			
	Female	33	66.0%			
Age				18.16	3.00	.65

Instruments

To assess students'critical thinking awareness (CTA), a structured questionnaire was administered as both a pre- and post-test to participants in the control and experimental groups. The instrument consisted of two parts: a brief demographic section and the Critical Thinking Awareness Questionnaire (CTAQ). The CTAQ employed a 5-point Likert scale ranging from 1 (Very Unfamiliar) to 5 (Very Familiar) and focused on three core dimensions of CT: Evaluation, Analysis, and Creation.

The Evaluation section included items assessing students' ability to assess sources, identify fallacies, and evaluate evidence. The Analysis section explored their skills in problem decomposition, data interpretation, and pattern recognition. The Creation section examined their familiarity with creative problem-solving, argument construction, and design thinking. In total, 17 items were used to capture participants' self-reported familiarity with CT-related skills. Participants were instructed to respond independently and honestly. This instrument provided

baseline data on CT awareness, enabling a comparison of changes following the explicit CT instruction intervention.

Results

Pre-Treatment Analysis

Before proceeding with the main analysis, it was crucial to assess the assumptions of normality and homogeneity of variance. These assumptions are essential to ensure that the parametric tests applied are appropriate and yield valid results (Field, 2013).

Assumptions Checking

- **Normality**

The normality of the pre-test scores for critical thinking awareness in both the control and experimental groups was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The results are presented in the table below:

Tableau 2: ***Tests of Normality for Pre-Test Scores***

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Mean_pre	Control	.162	50	.002	.956	50	**.058**
	Experimental	.161	50	.002	.962	50	**.105**

a. Lilliefors Significance Correction

The Kolmogorov-Smirnov test indicated a significant deviation from normality in both the control (D (50) = .162, p = .002) and experimental (*D (50) = .161, p = .002*) groups. However, the Shapiro-Wilk test, which is more sensitive for small sample sizes, did not indicate significant deviations from normality in either the control group (*W (50) = .956, p = .058*) or the experimental group (*W (50) = .962, p = .105*)[1].

According to Ghasemi and Zahediasl (2012), the Shapiro-Wilk test is often preferred in research with sample sizes less than 100, as it provides a more accurate assessment of normality. Given these results, while there is some indication of non-normality, the deviations are minor and are unlikely to have a substantial impact on the subsequent analyses, particularly given the robustness of parametric tests to mild departures from normality when sample sizes are moderate to large (Pallant, 2020).

[1] *Note. D* = Kolmogorov–Smirnov test statistic; *W* = Shapiro–Wilk test statistic; *df* = degrees of freedom; *p* = probability value. Values of *p* less than .05 indicate statistically significant deviations from normality.

- **Homogeneity of Variance**

The assumption of homogeneity of variance was tested using Levene's test, the results of which are summarized in the Table below.

Tableau 3: ***Test of Homogeneity of Variances for Pre-Test s Cores***

		Levene Statistic	df1	df2	Sig.
Mean_pre	Based on Mean	.213	1	98	**.646**
	Based on Median	.100	1	98	.752
	Based on Median and with adjusted df	.100	1	96.705	.752
	Based on trimmed mean	.168	1	98	.683

Levene's test revealed that the variances were equal between the control and experimental groups for the pre-test scores ($p > .05$ for all metrics), confirming that the assumption of homogeneity of variance was met. This finding supports the use of parametric tests in subsequent analyses, as the equality of variances is a key assumption for such tests (Tabachnick & Fidell, 2013).

The results of the normality and homogeneity of variance tests indicate that the assumptions for parametric testing were generally satisfied. As such, the data is deemed appropriate for the subsequent statistical tests, ensuring that the results will be both valid and reliable (Hair, Black, Babin, Anderson, & Tatham, 2010).

Descriptive Statistics

Descriptive statistics provide an overview of the central tendencies, dispersions, and overall patterns within the data collected before the intervention. These statistics are crucial for understanding the baseline characteristics of the control and experimental groups, allowing for a clearer interpretation of the impact of the infusion approach on CTA. According to Gravetter and Wallnau (2017), descriptive statistics are essential in providing a summary of the sample data, helping researchers to identify any initial differences between groups that might influence the outcomes of an experimental study. The table below presents the descriptive statistics for the pre-treatment critical thinking awareness scores in both the control and experimental groups. The mean score for the control group (M = 2.45, SD = 0.33) is slightly lower than that of the experimental group ($M = 2.4624, SD = 0.30252$). The minimum and maximum scores for the control group range from 1.56 to 3.12, while those for the experimental group range from 1.76 to 3.12. These results indicate a relatively similar baseline in critical thinking awareness between the two groups before the intervention. The standard deviations for both groups are comparable, suggesting that the variability in critical thinking awareness scores is consistent across the control and experimental groups. This similarity in variability and mean scores supports the assumption that any differences observed post-intervention can be attributed to the infusion approach rather than pre-existing disparities between the groups.

Tableau 41: ***Descriptive Statistics for Pre-Treatement Critical Thinking Awarness Scores***

	N	Minimum	Maximum	Mean	Std. Deviation
mean_pre _cont	50	1.56	3.12	**2.4513**	.32671
mean_pre_exp	50	1.76	3.12	**2.4624**	.30252
Valid N (listwise)	50				

Inferential Statistics

To assess whether there were differences in levels of awareness between the control and experimental groups before the treatment, an independent samples t-test was conducted. The analysis began by testing the assumption of equal variances using Levene's test for equality of variances. As shown in Table 4, the results indicated that the assumption of homogeneity of variances was met, F (1, 98) =0.213, $p=0.646$. Since the p-value was greater than 0.05, we failed to reject the null hypothesis that the variances of the two groups were equal, allowing us to proceed with the t-test under the assumption of equal variances.

Tableau 5*: Independant Sample t-Test for Pre-Treatment Critical Thinking Awarness Scores*

		Levene's Testof Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean_pre	Equal variances assumed	.213	.646	-76	98	**.861**	-.01109	**.06297**	-.13606	.11387
	Equal variances not assumed			-.176	97.426	**.861**	-.01109	**.06297**	-.13606	.11388

Following this, an independent samples t-test was conducted to determine whether there was a statistically significant difference in pre-treatment critical thinking awareness between the groups. The t-test for equality of means showed that there was no statistically significant difference in the pre-treatment critical thinking awareness scores between the control and experimental groups, $t(98) = -0.176$, $p = 0.861$. The mean difference between the groups was minimal and not significant, (M difference = −0.011, 95% CI: −0.136). This suggests that, prior to the intervention; both groups had comparable levels of critical thinking awareness. Once again, these results support the reliability of the subsequent analyses, as they confirm that any post-treatment differences in critical thinking awareness can be attributed to the infusion approach treatment rather than pre-existing differences between the groups.

Post- Treatment Analysis

Between-Group Analysis

This section explores the effect of the infusion approach on students' critical thinking awareness by comparing the post-intervention scores of the control and experimental groups. In otherwords, the analysis addresses the following main Research Question :

Research Question (RQ): *What is the impact of the infusion approach treatment on students' critical thinking awareness?*

- The null hypothesis (H0) posits that the infusion approach treatment does not have a positive impact on students' critical thinking awareness. In other words, there is no significant difference between the control and experimental groups'post-intervention scores.

- The alternative hypothesis (Ha) suggests that the infusion approach treatment has a positive impact on students' critical thinking awareness, meaning that the experimental group would have significantly higher post-intervention scores than the control group.

A between-group analysis was conducted comparing the control and experimental groups' post-intervention scores.

Assumptions Checking

- **Normality**

Normality of the post-treatment critical thinking awareness scores was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The results are presented in the table below:

Tableau 6 2***: Tests of Normality***

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	Df	Sig.	Statistic	Df	Sig.
Mean_post	Control	.116	50	.090	.929	50	.005

	Experimental	.140	50	.016	.972	50	.269

a. Lilliefors Significance Correction

- **Homogeneity of variance**

Levene's test for equality of variances was conducted to determine if the variances between the control and experimental groups were equal. The results are summarized in the table below:

Tableau 7*: Tests of Homogeneity of Variance*

		Levene Statistic	df1	df2	Sig.
Mean_post	Based on Mean	14.335	1	98	**.946**
	Based on Median	13.742	1	98	.842
	Based on Median and with adjusted df	13.742	1	67.674	.832
	Based on trimmed mean	14.488	1	98	.773

These results indicate that the assumption of homogeneity of variance was met. This implies that the variances between the two groups were equal and the independent samples t-test results are reliable.

Descriptive Statistics

The descriptive statistics for post-intervention critical thinking awareness scores are as follows:

Tableau 8*: Descriptive Statistics for Post-Intervention Scores*

	N	Minimum	Maximum	Mean	Std. Deviation
mean_post_cont	50	1.76	3.94	**2.4988**	.36960
mean_post_exp	50	3.76	4.53	**4.0929**	.16852
Valid N (listwise)	50				

The descriptive statistics table above provides an overview of the post-intervention critical thinking awareness scores, showing that the experimental group (*M = 4.0929*) had a substantially higher mean score than the control group *(M = 2.4988).* This initial finding suggests that the infusion approach may have positively influenced students' critical thinking awareness.

Inferential Statistics

To determine whether the observed difference between the control and experimental groups was statistically significant, an independent samples t-test was conducted. In other words, the t-test compares the mean post-intervention scores of the two groups and determines whether the difference between them is likely due to the infusion approach treatment or merely due to random variation. The results are summarized below:

Tableau 9*: Independent Samples t-Test for Post-Intervention Critical Thinking Awareness Scores*

		Levene's Test for Equality of Variances		T-Test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean_post	Equal variances assumed	14.335	.000	-27.749	98	**.000**	-1.59412	.05745	-1.70812	-1.48012
	Equal variances not assumed		.000	-27.749	68.530	**.000**	-1.59412	.05745	-1.70873	-1.47950

As shown in Table 9, Levene's test for equality of variances was significant *(F = 14.335, p < 0.001),* indicating that the variances between the two groups were equal, thereby justifying the use of the t-test. The independent samples *t*-test itself revealed a statistically significant difference between the control and experimental groups, t (68.53) = −27.75, $p < .001$. The experimental group had a significantly higher mean score than the control group, with a mean difference of −1.59 (SE =.057). The 95% confidence interval for the difference in means ranged from −1.71 to −1.48. These results provide strong evidence that the infusion approach treatment had a statistically significant positive impact on students' critical thinking awareness. The experimental group, which was exposed to the infusion approach, outperformed the control group to a statistically significant degree ($p < 0.001$). The findings from both the descriptive and inferential statistics support the conclusion that the infusion approach treatment significantly enhanced students' critical thinking awareness.

Within-Group Analysis

To explore the impact of the infusion approach on students' critical thinking awareness, a within-group analysis was conducted to compare pre- and post-intervention scores for both the control and experimental groups. Initially, a paired-samples t-test was considered for this purpose, as it is commonly used to detect significant changes within the same group. However, statistical assumptions of normality and homogeneity of variance must be met for this test to be valid. To ensure the appropriateness of the analysis, the normality of the data was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests, and the homogeneity of variance was evaluated using Levene's test. The results of these checks, presented in the tables below, revealed violations of both assumptions in certain cases. Consequently, a non-parametric alternative, the Wilcoxon signed-rank test, was chosen to examine the differences in critical thinking awareness scores more robustly. The following sections present the results of the assumption checks and the rationale for selecting the Wilcoxon test.

Assumptions Checking

- **Normality**

The normality of the pre- and post-intervention critical thinking awareness scores was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The results are presented in the table below:

Tableau 10: ***Tests of Normality for Pre- and Post-Intervention Critical Thinking Awareness Scores***

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Mean_pre	Control	.162	50	.002	.956	50	**.058**
	experimental	.161	50	.002	.962	50	**.105**
Mean_post	Control	.116	50	.090	.929	50	**.005**
	experimental	.140	50	.016	.972	50	**.269**

a. Lilliefors Significance Correction

The Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the normality assumption was violated for both pre- and post-intervention scores in the control group, and for the pre-intervention scores in the experimental group. Since the normality assumption was not met, a Wilcoxon signed-rank test is more appropriate for analyzing these data.

- **Homogeneity of variance**

Homogeneity of variance was tested using Levene's test. The results are summarized below:

Tableau 11: ***Test of Homogeneity of Variance for Pre- and Post-Intervention Critical Thinking Awareness Scores***

		Levene Statistic	df1	df2	Sig.
Mean_Pre	Based on Mean	.319	1	98	**.574**
	Based on Median	.134	1	98	.715
	Based on Median and with adjusted df	.134	1	95.654	.715
	Based on trimmed mean	.239	1	98	.626
Mean_Post	Based on Mean	34.124	1	98	**.000**
	Based on Median	30.882	1	98	.000
	Based on Median and with adjusted df	30.882	1	56.574	.000
	Based on trimmed mean	34.189	1	98	.000

The results for the post-intervention scores indicate that the assumption of homogeneity of variance was violated *(p = .000).* This suggests that variances between the control and experimental groups were not equal for the post-intervention scores.

Since both normality and homogeneity of variance assumptions were violated, the paired-samples t-test is not appropriate. Instead, a non-parametric test, mainely the Wilcoxon signed-rank test, will be used to analyze the differences in critical thinking awareness scores.

Descriptive Statistics

Tableau 12: ***Descriptive Statistics for Pre- and Post-Intervention Scores***

		mean_cont_pre	mean_pre_exp	mean_post_cont	mean_post_exp
N	Valid	50	50	50	50

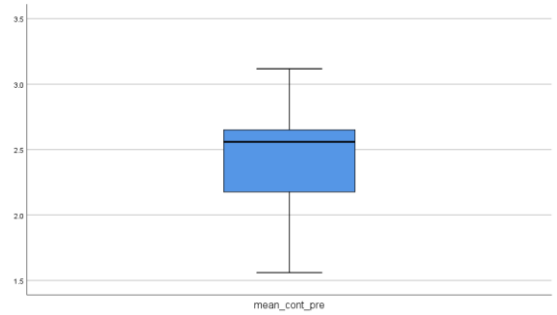
Missing	0	0	0	0
Median	2.5588	2.5588	2.5294	4.0588
Mode	2.59	2.59	2.59	4.06
Range	1.56	1.35	2.18	.76

The median scores show that the central tendency of the control group did not change significantly from pre to post-intervention, remaining around 2.53, whereas the experimental group showed a significant increase in median score from 2.56 to 4.06. This indicates a substantial improvement in critical thinking awareness in the experimental group. The mode values for the control group pre and post-intervention are the same, suggesting consistency in the most frequently occurring score. In contrast, the mode for the experimental group shifted from 2.59 to 4.06, reflecting the positive impact of the intervention. The range for the control group widened post-intervention, suggesting increased variability in scores, while the experimental group's range decreased, indicating more consistent higher scores.

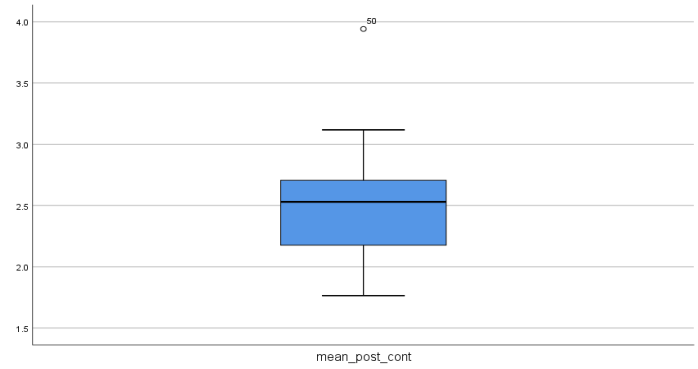
Inferential Statistics

For the control group, the Wilcoxon signed-rank test was used to analyze pre- and post-intervention changes in critical thinking awareness. The ranks table indicates that there were only 2 cases where the post-intervention score was lower than the pre-intervention score, while 5 cases showed an improvement. The majority of the scores (43 cases) did not change, as reflected in the ties. The Z value of -1.272 and the asymptotic significance level (p = 0.203) indicate that there is no statistically significant change in critical thinking awareness for the control group. The effect size was calculated using this formula ($r = Z/\sqrt{N}$) and interpreted using the standard Cohen (1988) criteria: 0.01= small effect, 0.03= medium effect, and 0.05= large effect[2]. This result is consistent with the absence of notable change in the median scores.

Figure 1: ***Box Plot of Differences in Scores within the Control Group***

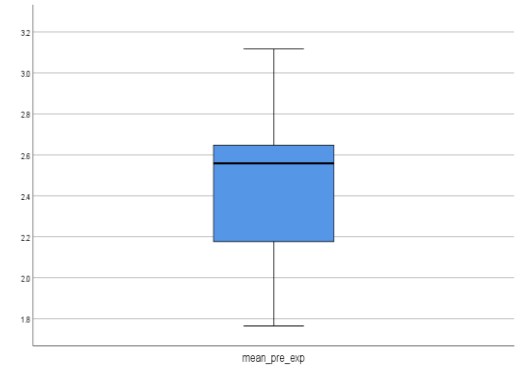


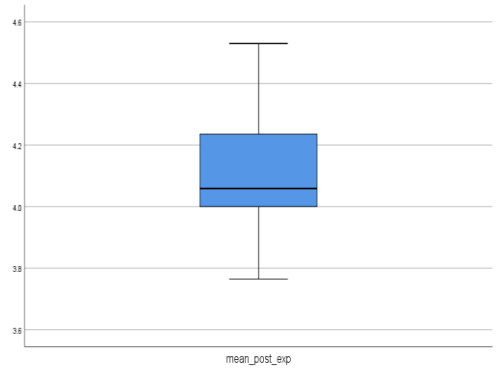
[2] **Note.** *Z* = Wilcoxon signed-rank test statistic; *p* = probability value; *r* = effect size calculated as Z divided by the square root of the number of observations (*N*). All tests were interpreted using a significance level of α = .05.



*(Symmetrical Distribution)

Figure 2: ***Box Plot of Differences in Scores within the Experimental Group***





*(Asymmetrical Distribution)

As demonstated in the boxplots above, the distribution of differences between pre- and post-intervention scores is symmetrical for the control group. This symmetry allows for the use of the Wilcoxon signed-rank test, which is suitable for symmetric data and helps identify significant changes in scores while accounting for the ranks of differences. In contrast, for the experimental group, the box plots reveal that the distribution of differences is asymmetrical; therefore, the sign test is more appropriate. Using this non-parametric test for the experimental group allows for the identification of significant changes in scores based solely on the direction of changes rather than their absolute values or ranks.

Tableau 13: ***Wilcoxon Signed-Rank Test Results for Pre- and Post-Intervention Scores in the Control Group***

		N	Mean Rank	Sum of Ranks
mean_post_cont – mean_ pre _ cont_	Negative Ranks	2[a]	3.25	6.50
	Positive Ranks	5[b]	4.30	21.50
	Ties	43[c]		
	Total	50		

a. mean_post_cont < mean_cont_pre

b. mean_post_cont > mean_cont_pre

c. mean_post_cont = mean_cont_pre

For the control group, the Wilcoxon signed-rank test was used to analyze pre- and post-intervention changes in CT awareness. The ranks table above indicates that there were only 2 cases where the post-intervention score was lower than the pre-intervention score, while 5 cases showed an improvement. The majority of the scores (43 cases) did not change, as reflected in the ties.

Tableau 14*: Wilcoxon Signed-Rank Test Statistics for Pre- and Post-Intervention Scores (Control Group)*

	mean_post_cont mean_ pre _cont
Z	-1.272[b]
Asymp. Sig. (2-tailed)	**.203**

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The Z-value of -1.272 and the asymptotic significance level (p = 0.203) suggest that there is no statistically significant change in critical thinking awareness for the control group. With a p-value greater than 0.05, the null hypothesis cannot be rejected, indicating that the intervention did not have a significant impact on critical thinking awareness for this group. This finding aligns with the large number of ties in the ranks table, showing that most scores did not change significantly. This result is consistent with the absence of notable change in the median scores.

Comparison of Pre- and Post-Intervention Scores for the Experimental Group

To evaluate the impact of the intervention on the experimental group, we compared pre- and post-intervention scores using the sign test, appropriate for the asymmetrical distribution of differences in this group. Overall, the positive differences and the significant p-value confirm that the intervention had a substantial and positive impact on students' critical thinking awareness, aligning with the hypothesis that the infusion approach treatment is effective.

Tableau 15 3*: Sign Test Results for Pre- and Post-Intervention Scores in the Experimental Group: Frequencies*

		N
Mean_Post_Exp - Mean_Pre_Exp	Negative Differences[a]	0
	Positive Differences[b]	50
	Ties[c]	0
	Total	50

a. mean_post_exp < mean_pre_exp

b. mean_post_exp > mean_pre_exp

c. mean_post_exp = mean_pre_exp

- Negative Differences: 0 (indicating no cases where post-intervention scores were lower than pre-intervention scores)
- Positive Differences: 50 (indicating all cases where post-intervention scores were higher than pre-intervention scores)
- Ties: 0 (no cases where pre- and post-intervention scores were the same)

In the experimental group, all 50 participants showed a positive difference between pre- and post-intervention scores, with no cases of negative differences or ties. This suggests that the intervention led to an increase in critical thinking awareness for all participants in this group. Therfore, the null

hypothesis can be rejected, suggesting that the intervention significantly affect the experimental group's critical thinking awareness.

Tableau 16: ***Sign Test Statistics for Pre- and Post-Intervention Scores (Experimental Group)***

	mean_post_exp - mean_pre_exp
Z	-6.930
Asymp. Sig. (2-tailed)	.000

a. Sign Test

A Sign Test was conducted to compare pre- and post-intervention scores for the experimental group. The test revealed a statistically significant increase in scores, $Z = -6.93$, $p < .001$ from pre- to post-intervention, indicating that the infusion approach had a substantial positive impact on students' critical thinking awareness in the experimental group.

Discussion

To address Research Question 1, the post-intervention critical thinking awareness scores of the control and experimental groups were compared to evaluate the effectiveness of the infusion approach. The results of the Independent Samples t-Test revealed a highly significant difference between the two groups ($p < .001$), suggesting that the intervention had a notable impact on students' critical thinking awareness. For within-group analysis, a Wilcoxon signed-rank test was employed for the control group due to the violation of normality assumptions. The analysis yielded a Z-value of -1.272 and a p-value of .203, indicating no statistically significant improvement in the control group. In contrast, the experimental group showed a consistent positive shift, with all 50 participants improving between the pre- and post-test phases. The Wilcoxon test produced a Z-value of -6.930 and a p-value of < .001, confirming a statistically significant increase in critical thinking awareness after the intervention.

These findings strongly support the effectiveness of the infusion approach in enhancing students' critical thinking awareness. This aligns with previous research emphasizing the importance of explicitly teaching critical thinking to foster metacognitive development and improve student outcomes (Hornby & Greaves, 2022; McLeskey, Rosenberg, & Westling, 2013). In particular, metacognitive awareness is widely acknowledged for its role in enabling students to monitor, evaluate, and adjust their thinking processes—an ability that not only promotes deeper learning but also empowers learners to engage in reflective and independent thought (Mustain & Ahmadi, 2023). Furthermore, research has shown that explicit instruction, as opposed to implicit or embedded methods, results in greater cognitive gains, particularly in high-order skills such as analysis, evaluation, and synthesis (Paul, 1989; Kaplan, 1991). The effectiveness of conscious strategy use, as emphasized by Ellis (1994), reinforces the need to deliberately integrate critical thinking into language instruction to promote deeper learning outcomes. Consequently, the null hypothesis was rejected, and the results corroborate existing evidence advocating for pedagogical strategies that integrate critical thinking explicitly into the curriculum.

Implications and Future Directions

The findings underscore the pedagogical value of explicitly teaching critical thinking through an infusion approach. The significant improvement in critical thinking awareness among students in the experimental group highlights that critical thinking is not an incidental byproduct of education but a skill that must be deliberately taught. Embedding critical thinking instruction within writing courses can raise students' metacognitive awareness, enabling them to better reflect on, evaluate, and regulate their thinking. These results support the integration of structured critical thinking activities in higher education curricula, particularly in EFL contexts, where such skills are essential for academic success and autonomous learning. Moreover, the findings of this study highlight the value of explicitly teaching critical thinking to raise students' awareness of their own reasoning processes. This awareness not only contributed to significant improvements in their writing performance, but also revealed promising implications for EFL education more broadly. A meaningful direction for future research would be to investigate how fostering critical thinking awareness can support students' engagement and autonomy across other areas of English language learning. In EFL contexts, where learners often struggle to take ownership of their learning, metacognitive awareness can serve as a catalyst for more active participation, deeper reflection, and strategic language use. Exploring this dimension could deepen our understanding of how critical thinking instruction impacts not just academic outcomes, but also learners' self-regulation and motivation.

REFERENCES

Akatsuka, Y. (2019). Awareness of critical thinking attitudes and English speaking skills: The effects of questions involving higher-order thinking. *Journal of Pan-Pacific Association of Applied Linguistics, 23*(2), 59–84. https://doi.org/10.25256/PAAL.23.2.4

Atkinson, D. (1997). A Critical Approach to Critical Thinking in TESOL. TESOL Quarterly, 31(1), 71-94. https://doi.org/10.2307/3587975

Baker, L.. (2010). Metacognition. International Encyclopedia of Education. 204-210. 10.1016/B978-0-08-044894-7.00484-X.

Berdahl, L. (2020). Teaching critical thinking in political science: A case study. *Journal of Political Science Education, 16*(2), 150–167. https://doi.org/10.1080/15512169.2020.1743920

Davies, M., & Barnett, R. (Eds.). (2015). *The Palgrave handbook of critical thinking in higher education*. Palgrave Macmillan. https://doi.org/10.1007/978-1-137-37805-7

Djiwandono, P. (2013). Critical thinking skills for language students. *International Journal of Applied Linguistics & English Literature, 2*(4), 132–140. https://doi.org/10.7575/aiac.ijalel.v.2n.4p.132

Durmuşçelebi, M. (2018). Students' cognitive awareness and investigation of critical thinking levels. *International Journal of Innovative Research in Education, 5*(3), 24–33.

Chouari, A. (2016). Critical thinking in the EFL classroom: The case of developing argument skills in Moroccan university students. *Arab World English Journal (AWEJ), 7*(2), 129–140. https://doi.org/10.24093/awej/vol7no2.9

Ellis, R. (1994). *The study of second language acquisition*. Oxford University Press.

Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist, 53*(4), 449–455. https://doi.org/10.1037/0003-066X.53.4.449

Hornby, G., & Greaves, L. (2022). Strategies for teaching critical thinking in higher education: A review of the literature. *Education Sciences, 12*(5), 312. https://doi.org/10.3390/educsci12050312

Lai, E. R. (2011). Critical thinking: A literature review research report. *Pearson*.

Kanmaz, A. (2020). Middle school teachers' critical thinking skills and awareness towards teaching critical thinking skills. *Journal of Education and Practice, 11*(7), 10–18.

Kaplan, M. (1991). Teaching intellectual autonomy: The role of critical thinking instruction. *Teaching Sociology, 19*(4), 485–493. https://doi.org/10.2307/1318323

Livingston, L. (2010). Teaching Creativity in Higher Education. *Arts Education Policy Review*, *111*(2), 59–62. https://doi.org/10.1080/10632910903455884

McLeskey, J., Rosenberg, M. S., & Westling, D. L. (2013). *Inclusion: Effective practices for all students*.

Pearson Higher Ed.

Mokhtari, K., & Reichard, C. A. (2002). Assessing Student's Metacognitive Awareness of Reading Strategies. Journal of Educational Psychology, 94, 249-259. https://doi.org/10.1037/0022-0663.94.2.249

Mustain, M., & Ahmadi, R. A. K. (2023). *The implications of applying metacognitive strategies on English writing skills of students: A perspective on problem solving and students' self-efficacy*. Technium Social Sciences Journal, 50(1), 300–307. https://doi.org/10.47577/tssj.v50i1.9904

Nielsen, C. (2002). Community learning: Creating a sustainable future through critical awareness. *Journal of Educational Change, 3*(1), 45–60. https://doi.org/10.1023/A:1016255709711

Paul, R. (1989). Critical thinking in the classroom. *Teaching PreK–8, 19*(6), 49–51.

Pineda Báez, C., (2004). Critical Thinking in the EFL Classroom: The Search for a Pedagogical Alternative to Improve English Learning. Íkala, revista de lenguaje y cultura, 9(15), 45-80. https://doi.org/10.17533/udea.ikala.3142

Rivas, S. F. (2022). Metacognitive strategies and development of critical thinking in higher education. *Frontiers in Psychology, 13*, Article 842345. https://doi.org/10.3389/fpsyg.2022.842345

Stapleton, P. (2011). A survey of attitudes towards critical thinking among Hong Kong secondary school teachers: Implications for policy change. Thinking Skills and Creativity, 6(1), 14–23. https://doi.org/10.1016/j.tsc.2010.11.002

Swartz, R. J., & Parks, S. (1994). Infusing critical and creative thinking into content instruction: A lesson design handbook for the elementary grades. Pacific Grove, CA: Critical Thinking Press and Software. https://digitalcommons.georgiasouthern.edu/ct2-library/21

Teng, F. (2016). Immediate and delayed effects of embedded metacognitive instruction on Chinese EFL students' English writing and regulation of cognition. *Thinking Skills and Creativity, 22*, 289–302. https://doi.org/10.1016/j.tsc.2016.06.005

Vacek J. E. (2009). Using a conceptual approach with concept mapping to promote critical thinking. *The Journal of nursing education,* 48(1), 45–48. https://doi.org/10.3928/01484834-20090101-11

Yang, Y.-T. C., & Gamble, J. (2013). Effective and practical critical thinking-enhanced EFL instruction. ELT Journal, 67(4), 398–412. https://doi.org/10.1093/elt/cct038

Zhang, L. J., & Qin, J. J. (2018). Validating a questionnaire on EFL writers' metacognitive awareness of writing strategies in multimedia environments. In Å. Haukås, C. Bjørke, & M. Dypedahl (Eds.), *Metacognition in language learning and teaching* (pp. 157–178). Routledge.

Zohar, A., & Barzilai, S. (2015). Metacognition and teaching higher order thinking (HOT) in science education: Students' learning, teachers' knowledge and instructional practices. In *The Routledge International Handbook of Research on Teaching Thinking* (pp. 229-242). Taylor and Francis.