

# An Investigation of Critical Thinking Techniques In Teaching And Learning Academic Writing

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**Abstract:** The study investigated the uses of specific critical thinking techniques in developing students' academic writing. The study also examined the potential benefits of integrating critical thinking into writing pedagogy. The study employed a quantitative research design to answer the research questions. The findings revealed that there were significant differences in Socratic Questioning Technique (SQT) among the levels of writing proficiency. The proficient writer use more SQT than good writers and fair writers  $M= 4.4$ ;  $M=3.52$  and  $M=3.48$  respectively. The poor writers used SQT the least,  $M=3.15$ . For the Think Aloud Technique (TAT), proficient writers used the most,  $M=4.44$ , while the mean for poor users was  $M=3.69$ . The finding also showed that there were significant differences in the Argument Mapping Technique (AMT) among the levels of Writing Proficiency. Proficient writer used the techniques a lot  $M=4.28$ . The poor writer was  $M=3.55$ . Another finding of the research showed that most teachers believed that the integration of critical thinking into writing pedagogy brings benefits for language writers.

**Key words:** Critical thinking techniques, academic writing, integration of critical thinking into writing pedagogy.

## I. Introduction

### 1.1. Background and Context

Writing skills are of paramount importance in education, as they serve multiple critical functions in the learning process. They are essential for students' academic success and play a significant role in their intellectual and cognitive development. Writing allows students to articulate their thoughts, ideas, and knowledge in a structured and coherent manner. It helps teachers and instructors assess students' understanding of the subject matter and their ability to express themselves clearly (Bereiter & Scardamalia, 1987). Writing encourages critical thinking by requiring students to analyze, evaluate, and synthesize information. Through writing assignments, students learn to think deeply and critically about a topic, strengthening their analytical skills (Paul & Elder, 2006). Writing is an integral part of the research process. Students must develop skills in literature review, source analysis, and proper citation. Writing research papers and essays promotes scholarly inquiry and a deeper understanding of a subject (Booth et al., 2008). Otherwise, writing enables students to express their creativity and individual perspectives. Creative writing, including poetry, fiction, and personal essays, fosters self-expression and self-discovery. Writing assignments often require students to solve complex problems, formulate arguments, and provide evidence to support their positions. This fosters problem-solving skills that can be applied to various aspects of life and education (Flower & Hayes, 1980). As students advance in their education, writing skills become crucial for creating resumes, cover letters, and reports. These skills are essential for job applications, internships, and other professional opportunities.

In short, writing skills are integral to the educational process. They foster effective communication, critical thinking, and problem-solving abilities. Moreover, they empower students to document their learning, express themselves creatively, and prepare for future academic and professional challenges. These skills are a cornerstone of academic achievement and personal growth in the educational context.

### 1.2. Problem Statement

#### 1.2.1. Lack of emphasis on critical thinking in writing instruction

The lack of emphasis on critical thinking in writing instruction is a significant issue in education, and it can lead to several shortcomings in students' writing skills. In some traditional educational settings, the focus is often on rote memorization of facts and formulaic writing rather than developing critical thinking skills (Paul & Elder, 2006). When writing is reduced to a mechanical task of following a template or adhering to strict guidelines, students may struggle to engage in meaningful critical analysis. Besides, Overemphasis on grammar and syntax at the expense of content and argumentation can hinder the development of critical thinking skills. Students may prioritize surface-level correctness over thoughtful analysis. Another reason for the lack of critical thinking in writing is that in standardized testing environments, where time constraints are significant, there can be limited space for in-depth critical analysis. Students may focus on meeting the test requirements rather than developing nuanced

arguments. Looking at the issue from teachers' perspectives, some teachers may not receive adequate training in how to incorporate critical thinking into writing instruction. They may be more comfortable focusing on surface-level issues or adhering to prescribed curricula (Paul & Elder, 2006). Sometimes, the concept of critical thinking gets misunderstood. Ennis, R. H. (1987) claim that there can be misconceptions about what critical thinking entails. Some educators may associate it solely with argumentation, overlooking its broader role in analysis and evaluation.

To address this issue, it's essential to shift the paradigm of writing instruction towards a more holistic approach that places a strong emphasis on critical thinking. This can be achieved through professional development for educators, the design of curricula that promote critical analysis, and recognition of the broader skills that writing encompasses. Additionally, as the references highlight, critical thinking should be integrated into every stage of the writing process, from brainstorming and researching to revising and editing. Encouraging students to engage in critical analysis not only enhances their writing skills but also prepares them for more effective communication and problem-solving in various aspects of life.

### *1.2.2. The potential benefits of integrating critical thinking into writing pedagogy*

Integrating critical thinking into writing pedagogy can yield a range of significant benefits for both students and educators. This approach not only enhances students' writing skills but also prepares them for more effective communication, problem-solving, and lifelong learning. The ability to think critically while writing equips students with the skills to articulate their thoughts and ideas more clearly and persuasively. They can communicate complex concepts effectively, both in writing and in spoken discourse. Additionally, integrating critical thinking into writing encourages students to analyze and evaluate information more thoroughly. They become adept at assessing the validity of sources and recognizing biases, enhancing their overall analytical skills (Halpern, 1998). Critical thinking in writing enables students to approach complex problems and challenges with a systematic and analytical mind set. They learn to break down issues into manageable components and develop well-structured solutions. Booth (2008) proves that students who engage in critical thinking while writing develop stronger research skills. They become more adept at finding reliable sources, critically evaluating information, and synthesizing data into well-informed arguments. Elder & Paul, R. (2008) added that critical thinking in writing fosters a habit of questioning and seeking deeper understanding. This skill is transferable to other aspects of life, encouraging students to be lifelong learners. Students who integrate it into their writing are better equipped for success in their careers.

Incorporating critical thinking into writing pedagogy not only enhances the quality of written work but also equips students with skills that have broad applications in their academic, professional, and personal lives. It empowers them to think independently, solve problems, and engage with complex issues effectively.

### *1.3. Research purposes*

The primary purpose of the study was to explore and understand the relationship between the incorporation of specific critical thinking techniques in writing instruction among students of different writing proficiency. The goal is to assess the degree to which critical thinking interventions contribute to improvements in the quality, clarity, and overall effectiveness of students' written work. The secondary purpose is to identify and examine the various perceived benefits associated with the integration of critical thinking into writing pedagogy. This involves exploring the positive outcomes and advantages that educators, students, and other stakeholders attribute to the incorporation of critical thinking strategies in the teaching and learning of writing. The goal is to provide insights into the broader impacts and advantages of this pedagogical approach. These research purposes collectively aim to contribute to the existing knowledge base on the intersection of critical thinking and writing pedagogy. By investigating the relationship between specific critical thinking techniques and improvements in writing skills, as well as exploring the potential benefits of integrating critical thinking into writing instruction, the research seeks to inform educational practices and enhance the understanding of effective teaching strategies in the context of writing development.

### *1.4. Research Questions*

With the above mentioned research purposes, the study attempts to answer the following research questions;

*1.4.1. To what extent does the use of specific critical thinking techniques vary among students of different writing proficiency?*

*1.4.2. What are the potential benefits of integrating critical thinking into writing pedagogy?*

### *1.5. Significance of the Study*

The research holds significant importance for various stakeholders, including educators, students, and the academic community. Investigating critical thinking techniques in academic writing can lead to the development of more effective pedagogical approaches that improve student learning and writing skills. The research can identify strategies that students can use to enhance their academic writing skills, such as Socratic questioning, argument mapping, and think-aloud techniques (Bean, 2011). The findings can inform educators about best practices in teaching critical thinking in the context of academic writing, leading to more effective teaching methods and curriculum design. The research can influence educational policies and curriculum design, encouraging the integration of critical thinking techniques into academic writing courses (Facione, 2015). Investigating critical thinking techniques in academic writing can foster interdisciplinary learning and promote critical thinking as a transferable skill across various disciplines. Besides, investigating critical thinking techniques in academic writing can foster interdisciplinary learning and promote critical thinking as a transferable skill across various disciplines.

In summary, the research on critical thinking techniques in academic writing has far-reaching implications for education, student development, teaching practices, and the cultivation of critical thinking skills in the broader context of society. It has the potential to transform the way academic writing is taught and evaluated, ultimately leading to more skilled and informed individuals.

## **II. Literature Review**

### **2.1. Definition of Critical Thinking**

Critical thinking is a cognitive process that involves analyzing, evaluating, and synthesizing information to make informed decisions and solve problems. It is a valuable skill in various aspects of life, including education, work, and personal development. Several key components of critical thinking are commonly discussed in academic and professional literature. Critical thinking begins with a clear and specific purpose. This entails identifying the problem or question that needs to be addressed (Paul, R., & Elder, L., 2006). Effective critical thinkers ask relevant and probing questions to gather information and explore different perspectives (Browne & Keeley, 2013). Critical thinkers seek out and evaluate relevant sources of information. They assess the credibility and reliability of these sources (Facione, 2015). Critical thinking involves interpreting and understanding information. This may involve identifying biases, assumptions, and implications in the information (Nosich, 2018). Critical thinkers break down complex problems or ideas into their constituent parts to examine the relationships and connections between them.

### **2.2. The role of critical thinking in the writing process**

Critical thinking is a fundamental component of the writing process. It involves the ability to analyze, evaluate, and synthesize information, enabling writers to develop coherent and persuasive arguments. Critical thinking is crucial when selecting and evaluating sources for research. Writers must assess the credibility and relevance of their sources to ensure the quality of their writing. When brainstorming ideas, writers need to critically assess their own thoughts and identify the most compelling arguments (Paul & Elder, 2006). Formulating a clear and effective thesis statement requires critical thinking. Writers must evaluate different angles and perspectives on the topic before selecting their stance. They need to consider counterarguments and anticipate a potential objection, which requires critical analysis (Booth et al., 2008). Critical thinking is central to selecting and presenting evidence to support arguments. Writers must assess the quality, relevance, and credibility of their evidence. They also need to critically analyze the logical flow of their arguments, ensuring that they are persuasive and coherent (Ennis, 1987). Critical thinking helps writers organize their thoughts and ideas logically. They need to critically evaluate the best structure for their document to ensure clarity and coherence. This involves making strategic decisions about the order of points and the hierarchy of information (Flower & Hayes, 1980). Revision and editing, critical thinking is essential. Writers must evaluate their work objectively, looking for weaknesses in arguments, inconsistencies, and areas that need improvement. They need to critically assess the clarity and effectiveness of their writing from the reader's perspective (Faigley, 1985). In summary, critical thinking is a foundational element of the writing process. It informs every stage, from idea generation to drafting, revising, and editing. Writers must critically evaluate their own work, sources, and arguments to produce effective and persuasive writing. The references provided offer further insights into the role of critical thinking in writing.

### **2.3. Theoretical perspectives on the connection between writing and critical thinking**

The connection between writing and critical thinking has been explored from various theoretical perspectives. Process writing theory emphasizes the dynamic and recursive nature of the writing process. It suggests that engaging in the various stages of writing, such as prewriting, drafting, revising, and editing, facilitates critical thinking. Writers continually re-evaluate their ideas, revise their arguments, and engage in reflective thinking throughout the writing process (Flower & Hayes, 1981). Bloom's Taxonomy categorizes cognitive skills into a hierarchical structure, with higher-order thinking skills, such as analysis, synthesis, and evaluation, situated at the top. Writing, especially academic writing, involves these higher-order thinking skills, indicating a strong connection between writing and critical thinking (Anderson & Krathwohl (Eds.), 2001). Argumentation theory highlights the importance of constructing and evaluating arguments. Writing, particularly persuasive or argumentative writing requires critical thinking skills to present and analyze evidence, assess counterarguments, and build a coherent and logical case. Metacognition involves thinking about one's thinking processes. Writing provides a platform for metacognitive reflection, as individuals articulate and organize their thoughts on paper. The act of writing helps individuals become more aware of their thinking processes, fostering critical thinking (Flavell, 1979). Genre theory suggests that writing is influenced by specific genres or types of discourse. Different genres demand different cognitive processes, including critical analysis and interpretation. Understanding and producing various genres contribute to the development of critical thinking skills (Swales, 1990). These theoretical perspectives collectively highlight the intricate and multifaceted relationship between writing and critical thinking. They underscore the idea that writing is not just a product but a process that engages cognitive skills associated with critical thinking. As individuals express and refine their thoughts through writing, they actively participate in the cognitive processes that characterize critical thinking.

### **2.4. Empirical studies demonstrating the link between critical thinking and writing quality**

There is a substantial body of empirical research demonstrating the link between critical thinking and writing quality. Back to the past, McMillan (1987) reviews various empirical researches on critical thinking and its impact on writing quality in higher education. It suggests that enhancing critical thinking skills leads to improved writing quality. Paul & Elder (2006) emphasize the role of critical thinking in improving the quality of written work, highlighting the connection between critical thinking abilities and writing quality. Crisp & Sweigart (2011) investigate the effects of an honours program on critical thinking, writing ability, and affective learning, demonstrating the positive relationship between critical thinking and writing quality. Paul & Elder (2008) discuss the nature of critical thinking and how it is linked to developing better writing skills, emphasizing the importance of

fostering critical thinking in education. These studies collectively provide empirical evidence supporting the relationship between critical thinking skills and the quality of written work, especially in the context of higher education. They underscore the positive impact of teaching and cultivating critical thinking abilities on students' writing quality and overall academic achievement

### 2.5. Popular critical thinking techniques in writing

Critical thinking techniques in writing instruction aim to promote analytical and reflective thinking, which leads to more effective and well-structured written communication. One of the very popular techniques is *Socratic Questioning*. This is a powerful critical thinking technique that encourages students to think deeply, critically, and reflectively. It is named after the ancient Greek philosopher Socrates, who was known for his method of questioning to stimulate thoughtful discussion and analysis. Socratic Questioning typically involves a series of open-ended questions designed to explore and clarify ideas, assumptions, and implications. This technique is widely used in educational settings to promote critical thinking and is applicable in writing instruction. Students are encouraged to ask and answer critical questions that can help them clarify their thoughts and explore different perspectives (Paul & Elder, 2006). The other critical thinking technique that has been in use for writing could be the *Think-Aloud* technique which is a valuable approach in writing instruction and research that encourages students to verbalize their thought processes as they write. This technique provides insight into a writer's decision-making, problem-solving, and metacognitive strategies during the writing process. By narrating their thoughts, students make their cognitive processes explicit, allowing instructors to identify strengths and areas for improvement. Think-aloud encourage writers to reflect on their thought processes as they write, including brainstorming, planning, drafting, revising, and editing (Flower & Hayes, 1981). This technique greatly promotes metacognition, which involves thinking about one's thinking. It enables students to monitor and control their cognitive processes during writing (Kellogg, 2008). Think-aloud focus on the writing process rather than the final product, providing insights into how students approach various writing tasks. Instructors can provide real-time feedback based on students' verbalized thought processes, guiding them to make better decisions while writing (Pressley, et al, 1994). In writing instruction, think-aloud are used to improve students' metacognitive awareness and writing skills. By verbalizing their thoughts, students can identify areas where they struggle and develop more effective writing strategies. Instructors can offer guidance and feedback based on these verbalizations, which can lead to improved writing outcomes. Another critical thinking technique is *Argument Mapping* which teaching students to create visual representations of arguments can help them identify the structure and coherence of their writing and critically evaluate their arguments. Argument mapping is a critical thinking technique used in writing that involves visually representing the structure of an argument. It helps writers analyze, evaluate, and communicate complex arguments by illustrating the relationships between premises and conclusions. Argument maps can take various forms, including diagrams, charts, or graphs, and serve as powerful tools for enhancing critical thinking and improving the organization of written work. Argument maps provide a visual representation of the logical structure of an argument, making it easier for writers to see the relationships between claims, evidence, and reasoning (Van Gelder, 2001). By mapping out their arguments, writers can clarify their own thinking and ensure that their arguments are logically sound and coherent (Van Gelder & Monk, 2000). Argument mapping allows writers to dissect arguments into their constituent parts, identifying premises, conclusions, and any potential fallacies or weak points. Writers can use argument mapping to critically evaluate the strength and validity of their arguments, as well as identify areas for improvement (Coppin, 2017). Argument mapping is particularly beneficial in academic and professional writing, where constructing clear and logically sound arguments is essential. It helps writers identify areas of their arguments that need improvement and facilitates effective communication of complex ideas. By visually representing the structure of arguments, writers can enhance the quality of their written work and their critical thinking skills.

## III. Methodology

### 3.1. Research Design

Research design refers to the overall plan or strategy chosen to answer research questions or test hypotheses. The choice of research design depends on the nature of the research, the goals, and the questions being investigated. In order to quantify the extent of the relationship between the use of critical thinking techniques and improvements in students' writing skills, the quantitative research design was selected. A questionnaire was employed to gather quantitative data on the frequency and types of critical thinking techniques used during writing instruction. Additionally, quantitative data were collected on students' writing skills through pre- and post-instruction assessments.

### 3.2. Participants

The participants of the study were 23 teachers of English at some universities in the north of Vietnam. The student participants were 87 students from Dai Nam University. These students have just finished a semester of intensive academic writing skill. The final mark of their writing test was used to rank their proficiency; *proficient writer, good writer, fair writer and poor writer*. Frequencies and percentages were calculated for Gender and Writing Proficiency.

The most frequently observed category of Gender was Female ( $n = 61, 70.11\%$ ). The most frequently observed category of Writing Proficiency was Fair writer ( $n = 49, 56.32\%$ ). Frequencies and percentages are presented in Table 1.

Variable	<i>n</i>	%
Gender		
Male	26	29.89
Female	61	70.11

Missing	0	0.00
<b>Writing Proficiency</b>		
Proficient writer	5	5.75
Good writer	22	25.29
Poor writer	11	12.64
Fair writer	49	56.32
Missing	0	0.00

Note. Due to rounding errors, percentages may not equal 100%.

Table 1: Frequency Table for Nominal Variables

### 3.3. Data Collection Instruments

The instruments which were used to collect data consist of two sets of questionnaires; the first questionnaire consists of 15 Likert scale items. These items are categorized as types of critical thinking techniques that the students used in their writing practice. The second questionnaire was for teachers. The items in this questionnaire were designed to measure the benefits of integrating critical thinking techniques into writing pedagogy. The questionnaire consists of 10 Likert scales items.

## IV. Results

### 4.1. Research question 1: To what extent does the use of specific critical thinking techniques vary among students of different writing proficiency?

A Cronbach alpha coefficient was calculated for the Socratic Questioning Technique SQT scale, consisting of SQT1, SQT2, SQT3, SQT4, and SQT5. The Cronbach's alpha coefficient was evaluated using the guidelines suggested by George and Mallery (2018) where  $> .9$  excellent,  $> .8$  good,  $> .7$  acceptable,  $> .6$  questionable,  $> .5$  poor, and  $\leq .5$  unacceptable. The items for SQT had a Cronbach's alpha coefficient of .79, indicating acceptable reliability. Table 2 presents the results of the reliability analysis.

Scale	No. of Items	$\alpha$	Lower Bound	Upper Bound
SQT	5	.79	.73	.84

Note. The lower and upper bounds of Cronbach's  $\alpha$  were calculated using a 95.00% confidence interval.

Table 2: Reliability Table for SQT

A Cronbach alpha coefficient was calculated for the Think Aloud Technique (TAT) scale, consisting of TAT1, TAT2, TAT3, TAT4, and TAT5. The Cronbach's alpha coefficient was evaluated using the guidelines suggested by George and Mallery (2018) where  $> .9$  excellent,  $> .8$  good,  $> .7$  acceptable,  $> .6$  questionable,  $> .5$  poor, and  $\leq .5$  unacceptable. The items for TAT had a Cronbach's alpha coefficient of .82, indicating good reliability. Table 3 presents the results of the reliability analysis.

Scale	No. of Items	$\alpha$	Lower Bound	Upper Bound
TAT	5	.82	.77	.87

Note. The lower and upper bounds of Cronbach's  $\alpha$  were calculated using a 95.00% confidence interval.

Table 3: Reliability Table for TAT

A Cronbach alpha coefficient was calculated for the Argument Mapping Technique (AMT) scale, consisting of AMT1, AMT2, AMT3, AMT4, and AMT5. The Cronbach's alpha coefficient was evaluated using the guidelines suggested by George and Mallery (2018) where  $> .9$  excellent,  $> .8$  good,  $> .7$  acceptable,  $> .6$  questionable,  $> .5$  poor, and  $\leq .5$  unacceptable. The items for AMT had a Cronbach's alpha coefficient of .73, indicating acceptable reliability. Table 4 presents the results of the reliability analysis.

Scale	No. of Items	$\alpha$	Lower Bound	Upper Bound
AMT	5	.73	.65	.80

Note. The lower and upper bounds of Cronbach's  $\alpha$  were calculated using a 95.00% confidence interval.

Table 4: Reliability Table for AMT

## Descriptive Statistics

Summary statistics were calculated for SQT, TAT, and AMT. The observations for SQT had an average of 3.51 ( $SD = 0.78$ ,  $SE_M = 0.08$ ,  $Min = 1.60$ ,  $Max = 4.80$ ,  $Skewness = -0.57$ ,  $Kurtosis = -0.46$ ). The observations for TAT had an average of 3.74 ( $SD = 0.75$ ,  $SE_M = 0.08$ ,  $Min = 2.00$ ,  $Max = 5.00$ ,  $Skewness = -0.44$ ,  $Kurtosis = -1.00$ ). The observations for AMT had an average of 3.70 ( $SD = 0.61$ ,  $SE_M = 0.07$ ,  $Min = 2.40$ ,  $Max = 4.80$ ,  $Skewness = -0.12$ ,  $Kurtosis = -1.01$ ). When the skewness is greater than 2 in absolute value, the variable is considered to be asymmetrical about its mean. When the kurtosis is greater than or equal to 3, then the variable's distribution is markedly different than a normal distribution in its tendency to produce outliers (Westfall & Henning, 2013). The summary statistics can be found in Table 5.

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	<i>SE<sub>M</sub></i>	Min	Max	Skewness	Kurtosis
SQT	<b>3.51</b>	0.78	87	0.08	1.60	4.80	-0.57	-0.46
TAT	<b>3.74</b>	0.75	87	0.08	2.00	5.00	-0.44	-1.00
AMT	<b>3.70</b>	0.61	87	0.07	2.40	4.80	-0.12	-1.01

Note. '-' indicates the statistic is undefined due to constant data or an insufficient sample size.

Table 5: Summary Statistics Table for Interval and Ratio Variables

An analysis of variance (ANOVA) was conducted to determine whether there were significant differences in SQT by Writing Proficiency. The assumption of normality was assessed by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). For the assumption of normality to be met, the quantiles of the residuals must not strongly deviate from the theoretical quantiles. Strong deviations could indicate that the parameter estimates are unreliable.

The ANOVA was examined based on an alpha value of .05. The results of the ANOVA were significant,  $F(3, 83) = 3.26, p = .026$ , indicating there were significant differences in SQT among the levels of Writing Proficiency. The eta squared was 0.11 indicating Writing Proficiency explains approximately 11% of the variance in SQT. The means and standard deviations are presented in Table 6. Figure 1 showed the means of SQT by Writing Proficiency.

Combination	<i>M</i>	<i>SD</i>	<i>n</i>
Proficient writer	4.40	0.00	5
Good writer	3.48	0.93	22
Poor writer	3.15	0.70	11
Fair writer	3.52	0.69	49

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table 6: Mean, Standard Deviation, and Sample Size for SQT by Writing Proficiency

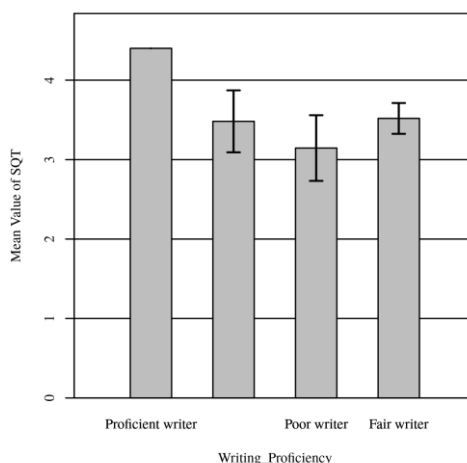


Figure 1: Means of SQT by Writing Proficiency with 95.00% CI Error Bars

### Post-hoc

A *t*-test was calculated between each group combination to further examine the differences among the variables based on an alpha of .05. The Tukey HSD *p*-value adjustment was used to correct for the effect of multiple comparisons on the family-wise error rate. For the main effect of Writing Proficiency, the mean of SQT for Proficient writer ( $M = 4.40, SD = 0.00$ ) was significantly larger than for Poor writer ( $M = 3.15, SD = 0.70$ ),  $p = .013$ . No other significant effects were found.

An analysis of variance (ANOVA) was conducted to determine whether there were significant differences in TAT by Writing Proficiency. The assumption of normality was assessed by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). For the assumption of normality to be met, the quantiles of the residuals must not strongly deviate from the theoretical quantiles. Strong deviations could indicate that the parameter estimates are unreliable.

The ANOVA was examined based on an alpha value of .05. The results of the ANOVA were not significant,  $F(3, 83) = 2.58, p = .059$ , indicating the differences in TAT among the levels of Writing Proficiency were all similar. The main effect, Writing Proficiency was not significant,  $F(3, 83) = 2.58, p = .059$ , indicating there were no significant differences of TAT by Writing Proficiency levels. The means and standard deviations are presented in Table 8.

Combination	<i>M</i>	<i>SD</i>	<i>n</i>
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Proficient writer	4.44	0.26	5
Good writer	3.92	0.68	22
Poor writer	3.69	0.86	11
Fair writer	3.60	0.74	49

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table 8: Mean, Standard Deviation, and Sample Size for TAT by Writing Proficiency

**Post-hoc**

There were no significant effects in the model. As a result, post-hoc comparisons were not conducted.

An analysis of variance (ANOVA) was conducted to determine whether there were significant differences in AMT by Writing Proficiency. The assumption of normality was assessed by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a Q-Q scatterplot (DeCarlo, 1997). For the assumption of normality to be met, the quantiles of the residuals must not strongly deviate from the theoretical quantiles. Strong deviations could indicate that the parameter estimates are unreliable.

The ANOVA was examined based on an alpha value of .05. The results of the ANOVA were significant,  $F(3, 83) = 3.42, p = .021$ , indicating there were significant differences in AMT among the levels of Writing Proficiency. The eta squared was 0.11 indicating Writing Proficiency explains approximately 11% of the variance in AMT. The means and standard deviations are presented in Table 11. Figure 2 showed means of AMT by Writing Proficiency

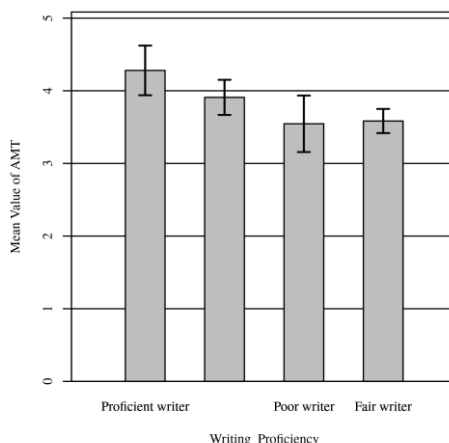


Figure 2: Means of AMT by Writing Proficiency with 95.00% CI Error Bars

Combination	M	SD	n
Proficient writer	4.28	0.39	5
Good writer	3.91	0.58	22
Poor writer	3.55	0.66	11
Fair writer	3.58	0.59	49

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table 11: Mean, Standard Deviation, and Sample Size for AMT by Writing Proficiency

**Post-hoc**

A t-test was calculated between each group combination to further examine the differences among the variables based on an alpha of .05. The Tukey HSD p-value adjustment was used to correct for the effect of multiple comparisons on the family-wise error rate. No other significant effects were found.

**4.2. Research question 2: What are the potential benefits of integrating critical thinking into writing pedagogy?**

Most of the teachers participated in the study agreed that integrating critical thinking into writing pedagogy brings benefits for students. The descriptive statistics showed the mean of “Integrating critical thinking into writing pedagogy prepares students for their future academic and professional endeavours” was  $M=4.04$ , ranking the first. The “Critical thinking in writing pedagogy contributes to the development of students as lifelong learners” ranked the last with  $M= 3.48$  (Table 12).

**Descriptive Statistics**

	N	Min	Max	Mean	Std. Dev
Integrating critical thinking into writing pedagogy prepares students for their future academic and professional endeavours.	23	2	5	<b>4.04</b>	.825
Integrating critical thinking into writing pedagogy fosters autonomy and independence in students' learning.	23	3	5	<b>3.96</b>	.825
Students show increased engagement and motivation when critical thinking is integrated into writing assignments.	23	2	5	<b>3.87</b>	1.100
Critical thinking enhances students' ability to critically evaluate and analyze information in their writing.	23	2	5	<b>3.78</b>	.671
Critical thinking activities in writing pedagogy contribute to a deeper understanding of the content being written about.	23	2	5	<b>3.78</b>	1.166
Critical thinking contributes to students' enthusiasm for the writing process.	23	2	5	<b>3.74</b>	1.010
Integrating critical thinking into writing instruction enhances students' overall writing skills.	23	2	5	<b>3.70</b>	1.222
The integration of critical thinking improves students' problem-solving abilities related to their writing tasks.	23	2	5	<b>3.57</b>	1.037
Students who engage in critical thinking during writing assignments produce clearer and more compelling written work.	23	2	5	<b>3.52</b>	.947
Critical thinking in writing pedagogy contributes to the development of students as lifelong learners.	23	2	5	<b>3.48</b>	.846
Valid N (listwise)	23				

Table 12: means of benefits of integrating critical thinking into writing pedagogy

## V. Conclusion

In conclusion, this investigation into critical thinking techniques in teaching and learning academic writing underscores the pivotal role that fostering critical thinking skills plays in the educational landscape. Our findings demonstrate a positive correlation between the application of these techniques and enhanced proficiency in academic writing. Students exposed to explicit critical thinking instruction exhibit not only improved writing abilities but also a heightened capacity for analytical thinking and effective communication.

The implications for educators are profound. Integrating targeted critical thinking strategies into academic writing curricula can empower students to navigate complex information, question assumptions, and construct well-supported arguments. As we reflect on the data gathered throughout this study, it becomes evident that the cultivation of critical thinking skills is not only conducive to academic success but is also a fundamental tool for lifelong learning and engagement.

Moving forward, educators and institutions should consider the integration of these techniques as an essential component of their teaching methodologies. By doing so, we pave the way for a generation of students who not only excel in academic writing but also possess the intellectual dexterity to meet the challenges of an ever-evolving world. In essence, this research advocates for a paradigm shift in educational practices one that places critical thinking at the forefront of academic development.

As we conclude this study, we do so with a sense of optimism about the transformative potential of incorporating critical thinking techniques into the teaching and learning of academic writing. The journey towards nurturing not just skilled writers, but adept critical thinkers, is a journey towards equipping our students with the tools they need to thrive intellectually and contribute meaningfully to society."

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## APPENDICES

### Appendix 1: Students' uses of Critical Thinking Techniques in Writing

**Introduction:** This survey is designed to assess your usages of critical thinking skills in the context of writing. Please respond honestly and thoughtfully to the following statements.

Please rate each statement on a scale from 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree.

#	Critical thinking techniques	Rating				
<b>Socratic Questioning technique</b>						
1.	I regularly use open-ended questions to clarify and define terms and ideas in my writing.	①	②	③	④	⑤
2.	I critically examine the underlying assumptions or premises in my writing and challenge them through questioning.	①	②	③	④	⑤
3.	I use questions to explore the evidence and support for the claims I make in my writing.	①	②	③	④	⑤
4.	I consider the consequences and implications of the arguments and ideas presented in my writing through questioning.	①	②	③	④	⑤

5. I regularly employ Socratic questioning to think about alternative viewpoints or counterarguments in my writing. ① ② ③ ④ ⑤

**Think aloud technique**

6. I often use the think-aloud technique while I'm writing to verbalize my thought process and decision-making. ① ② ③ ④ ⑤
7. I find that using think-aloud helps me become more aware of my thought processes and writing strategies. ① ② ③ ④ ⑤
8. The think-aloud technique is valuable for self-monitoring and improving my writing skills. ① ② ③ ④ ⑤
9. Using think-aloud allows me to identify and address issues in my writing more effectively. ① ② ③ ④ ⑤
10. I believe that integrating think-aloud into my writing process has enhanced my ability to produce better-written work. ① ② ③ ④ ⑤

**Argument mapping technique**

11. I often use argument maps to visually represent the structure of my written arguments. ① ② ③ ④ ⑤
12. I find that using argument maps helps me clarify the logical structure of my arguments and identify areas for improvement. ① ② ③ ④ ⑤
13. Argument mapping is a valuable tool for critically evaluating the strength and validity of my written arguments. ① ② ③ ④ ⑤
14. I use argument maps to effectively communicate complex ideas and arguments in my writing. ① ② ③ ④ ⑤
15. I believe that integrating argument mapping into my writing process has improved the overall quality of my written work. ① ② ③ ④ ⑤

**Appendix 2: A Survey on the Benefits of Integrating Critical Thinking into Writing Pedagogy**

**Instructions:** Please indicate the extent to which you agree or disagree with each statement by selecting the appropriate number on the scale, from 1 to 5, where 1 = strongly Disagree, 2 (Disagree), 3 (Neutral), 4 (Agree) and 5 = Strongly Agree.

#	Benefits of Integrating Critical Thinking into Writing	Rating				
1.	Integrating critical thinking into writing instruction enhances students' overall writing skills.	①	②	③	④	⑤
2.	Critical thinking activities in writing pedagogy contribute to a deeper understanding of the content being written about.	①	②	③	④	⑤
3.	The integration of critical thinking improves students' problem-solving abilities related to their writing tasks.	①	②	③	④	⑤
4.	Students show increased engagement and motivation when critical thinking is integrated into writing assignments.	①	②	③	④	⑤
5.	Critical thinking contributes to students' enthusiasm for the writing process.	①	②	③	④	⑤
6.	Integrating critical thinking into writing pedagogy prepares students for their future academic and professional endeavours.	①	②	③	④	⑤
7.	Critical thinking enhances students' ability to critically evaluate and analyze information in their writing.	①	②	③	④	⑤
8.	Students who engage in critical thinking during writing assignments produce clearer and more compelling written work.	①	②	③	④	⑤
9.	Integrating critical thinking into writing pedagogy fosters autonomy and independence in students' learning.	①	②	③	④	⑤
10.	Critical thinking in writing pedagogy contributes to the development of	①	②	③	④	⑤

students as lifelong learners.